EFFECTS OF PROJECT RISK FACTORS ON PROCUREMENT SELECTION METHODS IN SOUTH EAST NIGERIA: A STUDY OF WORLD BANK ASSISTED PROJECTS.

BY

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A THESIS SUBMITTED TO POSTGRADUATE SCHOOL

FEDERAL UNIVERSITY OF TECHNOLOGY, OWERRI.

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF SCIENCE (M.Sc) DEGREE IN PROJECT MANAGEMENT TECHNOLOGY

May, 2024

CERTIFICATION

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DEDICATION

This work is dedicated to my lovely wife Dr. (Mrs.) Theresa C. Njoku and my four children namely: Njoku – Chukwudi, Ogadinma Munachimso, Njoku – Chukwudi, Adimjahnobi Afoma, Njoku – Chukwudi, Tochukwu Jahdi and Njoku – Chukwudi, Ugonma Chimnoya for their unflinching support and encouragement during the period of this work.

ACKNOLEGDEMENTS

My profound gratitude goes to my thesis supervisor, Prof. K. A. Okorocha and the co-supervisor Prof. E. C. Ubani. I am especially indebted to them for their personal interest in my academic progress, professional advice, guidance, constructive suggestions, persistence and patience in reviewing my work despite their crowded schedules.

I sincerely thank the Head, Department of Project Management, Dr. G. C. Enyinna; Dean of SLIT, Prof. K. A. Okorocha; Dean of Postgraduate Studies, Prof. (Mrs.) J. N. Nwosu and Prof. B. C. Asiegbu for their Support.

I also express my appreciation to Lecturers in the Department of Project Management, Prof. G. F. Okoroafor, Dr. S. O. Okpighe, Dr.C.I. Anyanwu etc. who shared their treasured knowledge and experiences to prepare me to become a better manager.

My sincere greetings to my wife Dr. (Mrs.) T. C. Njoku for her loving support, encouragement and sound professional academic advice and to my four lovely Children: Pharm. Njoku-chukwudi, Ogadinma Munachimso, Adimjahnobi Afoma, Tochukwu Jahdi, and Chimnoya Ugonma who gave me the cooperation needed to make this research a reality.

I equally want to express my gratitude to my guardian Mr. P. E. Oparaocha, my elderly brother Mr. Abel I. Njoku and his wife Mrs. P. E. Njoku, my inlaw Mr Jonas Ukachukwu Ekenma and his wife Mrs Monica N. Ekenma, Mr. Vincent Onwukwe and his wife Mrs. Sussan I. Onwukwe and Mrs. Christiana N. Iheanacho for their moral support during the period of this work. I am grateful to Dr. Enyia Charles O. the Project Coordinator of Imo State COVID -19 Action Recovery Economic Stimulus (Imo CARES) for his immense contribution of ideas, helping me in the distribution of questionnaires and also in data analysis. I am also grateful to Mr. Promise Ukachukwu Chilaka who helped in the typesetting of my work.

May all thanks, honour and praise be ascribed to the Almighty God Jehovah, the supreme sovereign of the whole universe, the creator of heavens and the earth, the giver of life and journey mercies, health and knowledge for enabling me to come to the realization of this work.

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LIST OF ACROYMS

AfDB	African Development Bank
ANOVA	Analysis of Variance
CQS	Consultant Qualification Selection
CSDP	Community and Social Development Project
CV	Coefficient of Variation
DB	Design and Build
DC	Direct Contracting
DS	Direct Selection
FA	Force account
FBS	Fixed Budget Selection
FMEA	Failure Mode and Effects Analysis (FMEA)
HPDP	HIV/AIDS Program Development Project
HSDP	Health System Development Project
ICB	International Competitive Bidding
ICT	International Competitively Tendering
LCS	Least-Cost Selection
LCB	Local Competitive Bidding
LS	Local Shopping
LIB	Limited International Bidding
NCB	National competitive Bidding
NEWMAP	Nigerian Erosion and Watershed Management Project

NFDP-III	Third National Fadama Development Project
NS	National Shopping
PCA	Principal Component Analysis
PMI	Project Management Institute
PSGRDP	Public Sector Governance Reform Development Project
QBS	Quality Based Selection
QCBS	Quality and Cost Based Selection
RAMP	Rural Access Mobilization Project

Abstract

Selection of procurement methods without considering the effect of project risk factors has resulted to failure in achievement of sustainable acquisition of goods, works and consultancy services in many organizations. This study on effect of project risk factors on procurement selection methods in South East Nigeria is to improve and enhance selection of procurement methods in World Bank assisted projects. Non probability sampling survey technique was adopted. 400 questionnaires modelled in five point Likert scale were administered on the project team members of the seven World Bank assisted projects. 350 valid responses were obtained and data collected were analysed using component factor analysis, correlation and multiple regression analysis in Statistical Package for Social Sciences to identify, evaluate and rank the essential project risk factors that affect the selection of procurement methods. Principal component analysis were used to extracted four project risk factors namely: project resource and risk avoidance, price certainty for allocation of project responsibility, clients experience in handling project and contract funding arrangement and quality of services. These project risk factors were subjected to multiple regression analysis to determine their respective level of effect in the selection on procurement methods. Results revealed that at a significance level of 0.05, for procurement of goods, works and non consulting services, project completion time and risk avoidance and contract funding arrangement and quality of services ranked first with coefficient value of 0.433. For consultancy services, contract funding arrangement and quality of services had the highest effect on selection of QCBS procurement method with a coefficient value of 0.422 at a significance level of 0.05. It is recommended that prior to the selection of ICB and QCBS as procurement methods for goods, works and services consideration should be given to project completion time, risk avoidance, contract funding arrangement and quality of services.

Keywords: Effect, Project, Risk factors, Procurement, Selection Methods.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background Information

World Bank Assisted projects in Nigeria which is mostly carried out by Government, Consultants and Contractors normally face different kinds of risks (e.g. Management, Design, Finance, Construction, Political and External) during implementation. The successful execution of such projects and keeping them within estimated cost, prescribed schedules and quality depend on the procurement method. Procurement in World Bank assisted projects demands the highest integrity. The slightest error or inconsistency in conducting procurement processes or activities can lead to accusations that, even if ultimately proved to be without merit, can cause significant and lasting damage to the reputation of an individual and/or a procurement agency.

One of the main functions of procurement process is to ensure smooth and uninterrupted project/service delivery. Today, organizations operate in increasingly complex and uncertain environments with high risks of disruptions making project/service delivery an increasingly complex task. To the dislike of donor agencies (e.g., African Development Bank, World Bank etc), public owners, contractors and consultants, many projects experience extensive delays and thereby exceed initial time and cost estimates. The environmental pressures and risks require organizations to constantly and consequently analyse and reduce these risks (Tate, L.W., Ellram, L. M and Dooley, J.K . (2014).

Generally, risk can be defined as ‘the probability of an unwanted outcome happening’. It is also defined as the potential for complications and problems with respect to the completion of a project and the achievement of a project goal (Aghajanian, S and Shevchenko-Perepy, R. (2018) and as an uncertain future event or condition with the occurrence rate of greater than 0% but less than 100% that has an effect on at least one of project objectives (i.e., scope, schedule, cost, or quality, etc.). In addition, the effect or consequences of this future event must be unexpected or unplanned (Chia, 2006). The source of risk includes inherent uncertainties and issues relative to organizations’ fluctuating profit margin, competitive bidding process, weather change, job-site productivity, the political situations, inflation, contractual rights, and market competition, etc. Meanwhile, the choice of procurement method is influenced by factors like the conventional time-cost-quality model, project strategy,

client organization, financial objectives, level of integration of design and construction required, risk management and project constraints, (Izhar, H. B., Nafees A. M., Ali R. K., Muhammad A. L. and Shabir, H.K.(2019). The selection of a procurement method is a critical decision that must be taken into consideration in the procurement of World Bank assisted projects as ultimately it can mitigate or exacerbate project risks (New South Wales Government, 2008). Cartlidge (2009) ascertains that projects in whatever form involves various amounts of risk and the procurement strategy adopted will largely influence the allocation of risk on a project. Different procurement methods have different inherent risks associated with them and will therefore impact differently on project risk. Procurement encompasses the whole process of acquiring property and/or services. It begins when an agency has identified a need and decided on its procurement requirement. Procurement continues through the processes of risk assessment, seeking and evaluating alternative solutions, contract award, delivery of and payment for the property and/or services and, where relevant, the on-going management of a contract and consideration of options related to the contract. Procurement also extends to the ultimate disposal of property at the end of its useful life (Waters, 2004). Procurement is generally the process of acquiring goods and services as well as hiring contractors and consultants to carry out works and services (Makabira and Waiganjo, 2014).

According to Roodhooft and Abbeele (2006), public bodies have always been big purchasers, dealing with huge budgets. Mahmood, (2010) also reiterated that public procurement represents 18.42% of the World GDP. In developing countries, public procurement is increasingly recognized as essential in service delivery (Basheka and Bisangabasaija, 2010), and it accounts for a high proportion of total expenditure. For example, public procurement accounts for 60% in Kenya (Akech, 2005), 58% in Angola, 40% in Malawi and 70% of Uganda's public spending (Basheka and Bisangabasaija (2010). In a typical developing country like Nigeria around 10% of GDP may pass through public sector procurement systems - ranging from major infrastructure projects to routine departmental supplies purchasing each year (World Bank, 2000).

Different studies have confirmed the use of various types of procurement methods for project delivery in Nigeria. Studies of Ogunsanmi, *et al.*, (2003), Ojo, S.O. Adeyemi, A. Y. and Fagbenle, O. (2006), and Dada (2012) all confirm the use of traditional,

design and build, project management, construction management, labour only, direct labour etc.

The complex nature of the World Bank assisted projects today calls for a proper assessment and evaluation of risks (The Chartered Institute of Building, 2006). Acquaye (2011) opines that poor selection of procurement methods as a result of ignorance of the requisite procurement procedures have led to a number of contract failures. He further contends that, the selection of a procurement method affects the apportionment of risks between the parties during contract implementation. Selecting the appropriate procurement method will therefore contribute to obtaining best value for money and the management of procurement risk eventually (New South Wales Government, 2008).

Zou, P.W.X., Zhang, G., and Wang, J. (2006) have noted significantly that, in the achievement of project objectives in terms of cost, time, quality, safety and environmental sustainability, it is important to manage risks on construction projects through a holistic and systematic approach to the identification, analysis, occurrence and impact of these risks. Risk management is therefore an important step in every project's success (Rezakhani, 2012) as risk identification, assessment, mitigation and monitoring are important elements of a successful project risk management system (Kpodo, 2011).

Construction as part of World Bank project activities have been noted to have many risks (Banaitiene & Banaitis, 2012) and the effect of these risks can be quantified in monetary terms, property damage or personal injury (Abbasi, G. Y., Abdel-Jaber, M. S. and Abu-Khadeje, A. (2005). Nonetheless, the identification of these risks, the extent of occurrence and the degree of severity should they occur have a correlation with the choice of method used in procuring the goods, works and services. It is therefore necessary to evaluate the effect of project risk factors on the selection of procurement methods in South East Nigeria.

1.2 Problem Statement

The ability to select the right procurement method to achieve sustainable acquisition of goods, works and consultancy services had been challenging to World Bank assisted projects due to the prevalence of project risk factors. To succeed in selecting the procurement method that will result in the achievement of the overall project development objective the need to understand the risk associated with the choice of

each procurement method cannot be overemphasized. The selection of procurement methods in World Bank assisted projects in South East Nigeria have not been impressive enough; this can be attributed to the following hindrances:

i. Challenges due to the lack of widespread knowledge of the procurement selection processes (methods), blatant refusal to comply by some, political interference and many other external and internal factors too numerous to mention.

ii. Many World Bank assisted projects select procurement methods in a cursory manner while others use procurement system by default without taken into consideration the risk factors associated with each method.

iii. Some of the project team members of different projects with sole responsibility of deciding which procurement method or pathway to be used for the acquisition of different goods, works and services may not have the necessary qualification, skill and competence to select the requisite procurement method.

iv. Many procurement processes had been abandoned half way because of cost overrun and obsolete technology largely because effects of the risk factors were not taken into consideration before choosing a particular procurement pathway. When this happens, the project will not be actualized leading to failure in the project development objective.

v. According to Thai (2001), public procurement is perceived as a major government's function and numerous reforms and improvements have been carried out in many countries, it has however been an area of neglected academic research and education.

vi. Entities and organizations procuring critical construction projects may collapse completely or be put out of business by the cost of selection of poor procurement strategy which is not easily noticeable (Acquaye, 2011).

With procurement process increasingly gaining dominance in Nigeria and project risks being inherent with World Bank assisted procurement contracts, it is pertinent to carry out this study to determine the effect of project risk factors on the selection of procurement methods in South East Nigeria.

1.3 Objectives of the study

The broad objective of this study is to assess the effect of project risk factors on the selection of procurement methods in World Bank assisted project in South East Nigeria. The specific objectives are as follows:

1. Identify and analyse the project risk factors that affect selection of procurement methods in World Bank assisted projects in South East Nigeria.
2. To determine the extent of occurrence risk factors in World Bank assisted project in South East Nigeria.
3. Evaluate individual effects of project risk factors on selection of procurement method for goods, works and services in World Bank assisted projects in South East Nigeria.
4. Evaluate the collective effects of project risk factors on selection of procurement method goods, works and services in World Bank assisted projects in South East Nigeria.
5. To cluster these project risk factors against seven World Bank assisted projects in South East Nigeria.
6. Are there any relationship between project risk factors and selection of procurement method for goods, works and consulting service in World Bank assisted projects in South East Nigeria?
7. To Rank Project Risk Factors in relation to their importance to selection of procurement method in World Bank assisted project in South East Nigeria.

1.4 Research questions

The researcher seeks to find answers to the following fundamental questions on the effect of project risks factors on the selection of procurement method in a World Bank assisted project in South East Nigeria;

1. What are the project risk factors that affect selection of procurement method in World Bank assisted projects in South East Nigeria?
2. What is the extent of occurrence of each of the risk factors on World Bank assisted projects in South East Nigeria.

3. To what extent does each project risk factor individually affect selection of procurement method for goods, works and services in World Bank assisted projects in South East Nigeria?
4. To what extent do the project risk factors collectively affect selection of procurement method for goods, works and services in World Bank assisted projects in South East Nigeria?
5. Which of these project risk factors is/are important to each of the World Bank project in South East Nigeria?
6. What is the relative contribution of individual project risk factors to the selection of procurement method for goods, works and service in World Bank assisted projects in South East Nigeria?
7. How can these factors be ranked in relation to how important they are on selection of procurement method in World Bank assisted project in South East Nigeria?

1.5 Statement of hypotheses

(1) H_{01}: Collective project risk factors do not have any significant effect on the selection of a procurement method for goods, works and services in World Bank assisted project in South East Nigeria.

(2) H_{02}: Individual project risk factor does not have any significant effect on the selection of a procurement method for goods, works and services in a World Bank assisted project in South East Nigeria.

(3) H_{03}: Project risk factors have no significant contribution to procurement method selection in World Bank assisted projects in South East Nigeria.

1.6 Scope and limitation of the study

The scope of this study covers the entire World Bank assisted projects in South East Nigeria. Seven (7) selected World Bank assisted projects domiciled in Ministries of Agriculture, Environment, Health, Finance and Planning were considered. Primary data were collected from these selected donor funded agencies and were used for the research work.

However, the following limitations were encountered during the course of this research:

i. **Attitude of Respondents:** Collecting data through questionnaires or interviews can be very discouraging as a result of the attitude of some respondents. Some of these respondents were unwilling to share certain helpful information with the researcher while others were too busy to respond. Some other respondents most often misplace the questionnaires given to them.

ii. **Time limitation:** Due to time limitations this study is concerned with project risk factors affecting the two default procurement methods used by World Bank assisted for goods/ works and consultancy services in World Bank Assisted projects in South East Nigeria namely: International Competitive Bidding (ICB) and Quality and Cost Based Selection (QCBS).

iii. **Project Team Members:** World Bank assisted projects in South East Nigeria usually have project team members who are trained to implement their various projects. These team members are often trained in procurement of goods/works and services. The research took into consideration the opinion these team members. However, this research did not take into account the opinion of contractors, suppliers, stakeholders, regulators and others.

iv. **Period of Data Collection:** The data collected for this study covered only World Bank projects that were implemented in South East Nigeria within the last ten years.

1.7 Justification of the Study

This research will critically examine the effect of project risk factors on the selection of procurement methods in World Bank assisted project in South East Nigeria. Moreover, the proposed research will inform policy makers and the general public on the need to consider project risk factors in the selection of procurement method (Sallas-Mensah, 2012) for goods/works and services, particularly if the level of risk associated with the selection method is not

favourable in delivering project objectives despite their default choices in procurement contracts.

The outcome of the study will assist policy makers and stakeholders on how to carry out their procurement selection method. It will act as a guide document for future World Bank assisted projects in South East Nigeria. It will also help in evaluating the risk factors inherent in selection of procurement methods and enable organization be aware of such risk. The result of the findings will help procurement specialist in determining the most appropriate approach to adopt when selecting procurement pathway for goods, works and consultancy services.
The study would also serve as a reference material to many procurement specialist/ officers in World Bank assisted projects and other procuring entities/organization. It is hoped that this study would contribute to the promotion of the existing frontier or boundary between human knowledge on risk factors in procurement selection method.

CHAPTER TWO

LITERATURE REVIEW

2.1 THEORITICAL FRAME WORK

2.1.1 Decision-Making Theory

Wang, Y., Patel, S., and Patel, D. (2004) defines Decision-making as the process of choosing a preferred option or a course of actions from among a set of alternatives on the basis of given criteria or strategies. Herbert Simon (as cited in Hickson, D.J., Butler, R.J., Cray, D., Mallory, G.R., Wilson, D.C. (1986) asserted that decision-making and implementation has certain features which include but not limited to: (1) a number of alternatives, before a policy/decision maker to select one or more alternatives which will be suitable for a particular purpose. (2) There must be rationality in decision making process. (3) Decision-making is never a product of a single man and (4) Decision-making relates to a number of issues. Scott and Bruce (1995) proposed four different types of decision-making models: (a) rational decision-making model, which is characterized by a thorough research for and logical evaluation of alter-natives; (b) intuitive decision-making model, which is characterized by a reliance on hunches; (c) dependent decision-making model, which is characterized by a search for advice and direction from others; and (d) avoidance decision-making model. In analysing the effect of project risk factor on procurement selection method in South East Nigeria, an insight in the 'Rational Actor Model (RAM) Theory' of Decision making gives a background on the selection of procurement method based on the consideration of project risk factors.

2.1.1.1 Rational Actor Model:

The basic idea of the rational actor model theory is that the economic man or the rational man decides to pursue a particular process which in his judgment is rational and will ensure maximum utility. It is a cost-benefit approach which denotes that when a businessman decides to adopt a policy he will see first of all how much cost he will have to incur for the implementation of the policy and then how much benefit he expects to receive. Uzonwanne (2016) asserted that decisions are made by (a**)** identifying issue on which the decision is to be made. (b) The objective of the decision (c) purpose of the decision (d) collecting the materials for making the decision and (e) selection of the relevant materials only. The weakness of this theory is that it does not take into consideration other project risk factors apart from cost- benefit which is only one of the risk factor to be taken into consideration when selecting procurement methods for goods works and services.

2.1.2 Prospect Theory

Prospect Theory was introduced by Kahneman and Tversky (1979) as a theory of decision – making under conditions of risk. They asserted that (a) individuals consistently deviate from the predictions of rational choice because they choose between available options. (b) Individuals make decisions based on perceived gains instead of perceived losses. (c) If two choices are put before an individual, both equal, with one presented in terms of potential gains and the other in terms of possible losses, the former option will be chosen. (d)Individuals tend toward risk acceptance when confronted with choices between losses (losses frame) and risk aversion when confronted with choices over gains (gains frame). (e) They also overweight losses relative to comparable gains, and are risk-acceptant in the domain of loss but risk-averse in the domain of gain. (f) Decisions are based on judgements that are subjective in nature. As a result, decision-makers are likely to be influenced in their judgement even before they intervene in the decision-making process. Prospect theory is relevant to the selection of a particular procurement method for goods, works and consultancy services in preference to another method.

2.2 CONCEPTUAL FRAMEWORK

2.2.1 Concept of project

The term project is generally used to describe a collaborative enterprise frequently involving research or design that is carefully planned to achieve a particular aim. In works procurement, project may be used to refer to a sequence of tasks planned

from beginning to end and bounded by time, resources and required results (Schwalbe, 2004). Akpan and Ezenwa (2002) further add that it connotes a unique activity, situation, process, task, program, scheme or any human endeavour in which human, time and other resources are utilized to satisfy a definable or definite objective. The realization of the objective generally signals the completion of this unique activity.

The above definitions may all be deemed correct and this implies that projects cut across all fields of human endeavour. It may be pertinent to add however, that there are specific characteristics which have come to be globally accepted as distinguishing characteristics of a project:

- They are unique one time operation.
- They are transient in nature and usually of shorter duration depending however, on the complexity.
- They have definite start and end dates.
- Have specific budget and
- Have definite work scope, performance characteristics or quality requirements.

2.2.2 Concept of Risk

The concept of risk is a multi-directional concept closely related to that of uncertainty, but it can also be linked to concepts that have positive connotations. Risk is defined in accordance with the change associated with the chances of occurrence of an event and the consequences attached to it (Lee, C. K., Yiu, T. W., & Cheung, S. O. 2015). According to the Project Management Book (2008), "*risk is an uncertain event or condition that usually affects at least* one of the key performance indicators, such as time, cost, scope, or quality in a positive or negative way". Stonebumer, G., Goguen, A., & Feringa, A. (2002) posits that risk may also be regarded as a probability or threat of liability, damage, injury, loss or some other unwanted occurrence that takes place due to either internal or external vulnerabilities. There are two main characteristics for defining risk: the probability of occurrence; whether some event will take place in the future or not, and consequences of occurrence: the degree of the impact of event. Different definitions exist about what risk is and what it entails. However regardless of the definition adopted, certain keywords are associated with various definitions of

risk, including threat, uncertainty, probability, possibility, occurrence (Raz and Hillson, 2005). Adequate knowledge on the existing and anticipated risks is essential to gain the opportunity to mitigate the uncertainties. However, Saunders, M., Lewis, P., and Thornhill, A. (2009) revealed that it was wrong for risks to be categorized as good or bad because if dealt with properly, one can convert the risk into an opportunity, but if neglected or not handled properly, it may result in negative adversity. Thus, it can be said that two elements that consistently accompany risk are progress and opportunity.

2.2.2.1 **Types of Risks**

There are two kinds of risk that every individual or activity can be faced with: the generic/general risk and the peculiar/specific risk.

i. Generic risk

ii. Specific Risk

Project Management Institute (2013) defines individual risk as "an uncertain event or condition that, if it occurs, has a positive or negative effect on one or more project objectives'. Chapman and Ward (2003) also reveal that risk is the idea of the presence of considerable uncertainties in the achievable level of project performance. Risk is in every aspect of life and there may be no endeavour in life which is risk free. Every activity performed by a living being carries some kind of risk. Some activities carry an inherent risk. Skydiving, for example, is a challenging task which involves a high degree of risk, but there is also risk in riding a bicycle in the city. Although both cases carry a certain degree of risk, the probability of risk occurring in the first case is higher than in the latter case.

2.2.2.1.1 Various kinds of risks associated with projects

The various kinds of risks identified when reviewing the works of Akintoye and Macleod (1997); Lyons and Skitmore (2004); Elkingtin and Sallman (2002) and Westland (2006) are summarized as fellows;

i. Monetary Risk:

Risks relate to budget, investors or economic conditions of the state. Generally, organizations experience a lack of financial resources and in some cases they find it very difficult to attract investors who can financially support their projects.

ii. Political Risk:

Political risk includes problems relating to government and legal rules and regulations. Generally, legal policies do not affect projects significantly, but an unstable government considerably impacts the functioning of the project

iii Environmental Risk:

Next in the list is the environmental risk. This includes natural disasters such as earthquakes, landslides, heavy rainfall, floods, etc. These risks are out of the control of humans. However, one can reduce the impact of environmental risks through certain precautionary activities.

iv. Technical Risk*:*

This is one of the most frequent risks, which most projects face at some stage of the project life cycle. This occurs due to failure of either engineering or designing equipment/tools. Engineering designing is completed before the initialization of the project, but often, problems arise at the time of actual operation.

v. Project Risk:

Risks such as contractual, planning and scheduling, construction, quality and operational are categorized under project risk. They depend on the nature of the project and vary from project to project. All such risks are faced once actual operations have started.

vi. Human Risk:

This risk is associated with all types of projects, irrespective of the nature of the project and sector in which it is operating. It includes risks such as culture, labour and stakeholders. Most projects experience risk from labour or stakeholders. At the initial stage, projects find it difficult to attract investors, and the problem intensifies if the organization managing the project is relatively new to the market.

Organizations generally face problems relating to the availability of labour (Hillson *et al.*, 2006). Often, there is a shortage of labour or it is unavailable. This significantly impacts overall project. Cultural risk does impact on projects but it has a negligible impact on operations and functionality.

vii. Market Risk**:**

Market risks are related to those that are the result of either demographic factors or social factors. These factors also impact project operations.

viii. Safety:

In every project there is risk to human life. Therefore, no project can be risk free. In fact, safety risks are inherent to all projects. In large projects, where people have to work on heavy machineries, a small negligence on the part of the organization (contractual or labor) may result in a fatal accident. If proper security measures are not adopted by the project manager or the organization, it may result in several legal charges.

ix. Material:

The risk relates to the shortage of material or poor quality material, which is also associated with the majority of projects. For any project, various materials are required from time to time. It is not possible for the project manager to purchase all materials at once, so materials are purchased in batches. There is the possibility that there will be a scarcity of material in the market, which will result in the delay of the project. In the absence of materials, it is not possible for the manager to operate the project smoothly. In addition to this, the prices of raw material fluctuate so if the price of a certain raw material exceeds the expected price it will again make it difficult for the manager to complete the project within a specified budget (Chapman and Ward, 2003). Poor logistic facilities may also hamper project operations.

2.2.2.1.2 Risk Categorization

This may also be referred to as risk classification. A significant outcome of the substantive research in the field of risk management is the identification of key risks that affect works, and services procurements. However, methodologies for their classification are still far from universal. Risk are categorized based on their sources, areas of the affected project and any other useful parameter in order to determine the areas of the project that are the most exposed to the effects of **risks** or uncertainties (Project Management Institute, 2008). Project risks are categorized to avoid unpleasant surprises and to provide a systemic and structured approach in identifying the risks to a consistent level.

Over the years, many different classification of project risk has been developed. Thompson and Perry (1996) used source of risk to classify project risk in the construction industry, mineral, manufacturing and transport sectors into technical, construction, legal, natural, logistic social, economical, financial and political. Baloi, (2012) noted that project risk are assumed to be associated with the internal, operational and general environment. Consequently, he based his classification on primary source or cause of risk and the environmental layers as follows: Organizational –specific risk factors (Material related, labour related, equipment related, estimator related, management related, construction related and finance); Global risk factors (economical, political, competition, project/design, construction, and estimation) and Acts of God (heavy floods, massive landslides, earthquakes and tsunamis, hurricanes and others).

Zid and Ali (2016) used HRBS to partition project risk factors into internal risks and external risks. Internal risk was further subdivided into local and global risk. Local risks include labour and equipment, material and sub contract. On the other hand, global risk consists of construction, financial, management, Environmental and location, design, contractual and client. External risk factors were subdivided into legal, political and exterior. He observed that project managers and experts can finalize and deduce perfectly the decision making about all risks in the construction industry by using quantitative or qualitative analysis method.

Flanagan (1993) suggested three ways of classifying risk: by identifying the consequence, by type and by impact. Chapman and Ward (2003) grouped risks into four subsets: environment, industry, client and project. On their part, Chen, H., Hao G., Poon S.W., Ng F.F. (2004.) listed fifteen risks that concern project

cost and then divided them into three groups; resource factors, management factors and parent factors. They proposed that price escalation of materials for instance pertains to the resource factors, inaccurate cost budget and supplies/sub contractors default pertains to management factors while excessive interference on project management pertains to the parent factors. But Baloi and Price (2003) suggest two types: Broad risk and impact risk while Cooper and Chapman (1987) grouped risks into primary and secondary risks according to their nature and magnitude of impact.

Akindoyeni (2011) reported that risks can be classified into physical, environmental, logistic, financial, legal, political, contractual, design and enforcement/regulatory risks.

2.2.2.1.3 Sources of Risks

Information on potential risks can be gathered from a variety of sources including lessons learnt from previous projects, current performance measurements, feasibility studies, project documentation, process maps, checklists, influence diagrams, assumption analysis, *Strengths, Weaknesses, Opportunities, and Threats* (SWOT) analysis, Failure Mode and Effects Analysis (FMEA), and Root Cause Analysis (Project Management Institute, 2013). Risks factors can be also identified through interviews with subject matter experts, questionnaires, and brainstorming sessions with the project team and key project stakeholders. To implement project successfully, it is necessary to identify all the internal and external risk factors that may affect planning and implementation of the project. Renuka, S. M., Umarani,C., and Kamal, S. (2014) described two sources of project risk in construction industry namely engineering risk and non Engineering risks**.** Engineering risks include: client risk, design risk, project execution risk, project

management risk and tendering and resources management. On the other hand, non Engineering risk include: political risk, country risk, environmental and geological risk, natural hazard risk and statutory compliance risk. Engineering risks are predictable while non Engineering risks are not predictable. In his view predictable factors should be forecasted during the earlier stage of the project whereas the non predictable factors involve uncertainties; which should be estimated for the successful completion of the project because both risks will affect the cost, time, quality of the project success.

2.2.2.1.4 Sources of Risk in a Project

Shen *et al.* (2001) described six sources of risk in a project which include:

i. Financial Risk: These are risks that result from Bankruptcy of project partners, difficulty of converting currency, loss due to fluctuation of interest rate, loss due to fluctuation in inflation rate, low credibility of shareholders and lenders.
ii. Legal Risk: Risks due to breach of contracts by other participants, breach of contract by project partner, lack of enforcement of legal judgment, loss due to insufficient law for joint ventures, uncertainty and unfairness of court justice.
iii. Management Risk: Risk factors that results from change of organization within local partners, improper project feasibility study, improper project planning and budgeting, improper selection of project location, improper selection of project type, inadequate choice of project partner, inadequate project organization structure, incompetence of project management team, incomplete contract terms with partner, increases in project management overheads, poor relation and disputes with partner, poor relation with government departments, problems associated with culture differences, project delay.
iv. Market Risk: Risks that emanates from competition from other similar projects, shortfall in expected income from project use, increase in accessories facilities

price, increase in labour costs, increase in material price, increase in settlement costs, inadequate market demand, local protection.

v. Policy and Political Risk: Defined as cost increase due to change in policies/cost incurred due to corruption, and bribery, loss incurred due to political changes, loss due to bureaucracy of late approvals.

vi. Technical Risk: Accidents on site, design changes, equipment failure, errors in design drawings, hazards of environment regulations, incompetence of transport facilities, increase in site overheads, industrial disputes, local firms incompetence and low credibility, material shortage, obsoleteness of building equipment, poor procured materials, problem due to partners different practice shortage in accessory facilities, shortage in skilful workers, shortage in supply of water, gas and electricity, sub contractors low credibility, unknown site physical conditions, unusual weather and force majeure.

Akindoyeni, (2011) classified project risk in goods and works into nine sources namely:

i. Physical: Loss or damage by fire, earthquake, flood, accident, landslide

ii. Environment: Ecological damage, pollution, waste treatment, public enquiry

iii. Logistics: Loss or damage in transportation of materials and equipments, availability of specialized resources: expertise, designers, contractors, suppliers, plant, scarce construction skills, materials, access and communication, organization interface.

iv. Financial: Availability of funds, adequacy of insurances, adequate provision of cash flow, losses due to default by contractors and suppliers, exchange rate fluctuation, inflation and taxation.

v. Legal: Liability for act of others, direct liability, local law, legal differences between home country of client and home countries of contractors, supplies and designers, delayed dispute resolutions.

vi. Political: Political risk in country of owner contractor, designers and suppliers, war, revolution, changes in law and policy.

vii. Contractual: Feasibility of construction methods, safety, industrial relation extent of change, climate, quality and availability of management and supervision.

viii. Design: Design specifications, implementation (construction), monitoring and appropriate application.

ix. Enforcement/Regulatory: Weak enforcement mechanisms, standardization, commitment/will .

2.2.2.1.5 Construction Risks in a World Bank Assisted project

The works of Chileshe and Yirenkyi-Fianko (2011) studied the perceptions of risk and its impact on the construction industry. The study broadly categorizes various risk that are found in the construction industry into ten (10). These were, financial; resources; technical; economic; environmental, operational; government and political; relationship; security; and legal. The study further analysed risk on construction from the perspective of internal and external drivers‘. Buertey *et al* (2012a) studied and categorized risk variables in the construction industry based on their cost implication for decision making. The study categorizes risk variables into seven (7) with design, financial and economic risk factors as important cost risk categorizations.

Construction projects are always unique and the risk associated with them stems from different sources, with a lot of different participants with diverse expectations and interest, this naturally creates problems and confusions (Banaitiene & Banaitis, 2012). Risks in the construction industry is perceived to be a combination of a lot of activities which can be predictable or otherwise thereby resulting in the classifications of risks as technical, management, financial, environment, logistical,

or socio-political or natural disasters. The works of Ehsan, N., Alam, M., Mirza, E., Ishaque, A. (2010) broadly categorizes risk into External Risks‘ and Internal Risks’. They saw internal risk as being unique to a project and are caused by sources inherent in the project; example can be the inability of a product to function properly.

The works of Karim *et al* (2012), Akintoye & MacLeod (1997), Skorupka (2009), and Sudic *et al* (2013) identified various risks associated with construction projects under broad categorizations of physical, environmental, design, logistics, financial, legal, political, construction and operation risks. These risks variables or types under these five (5) categories are common and similar depending on the source of risks identified.

However, the twenty – six (26) risks variables identified by Odeyinka (2008) are noted to have synchronized the works of others. They have been categorized under the following three (3) generic factors;

i. Changes in design factors or specification,

ii. Project complexity and

iii. Natural inhibitions.

The works of Odeyinka *et al* (2008) was focused on the impact of these risks factors on the accuracy of cash flow forecast on construction projects. These factors will be adopted for the evaluation of the extent and impact of occurrence of the variables on projects procured through NCB.

Having outlined the myriad of risks affecting the construction of public works procured through NCB, the twenty-six (26) factors identified by Odeyinka *et al* (2008) have been chosen to be used in the preparation of the questionnaire for this study because, the list is most extensive and contains most of the other risks factors identified by all the other researchers. It is also observed that, the list is the most simplified to allow for extensive comprehension by all respondents.

Padiyar *et al.,* 2004 categorized the above risk factors into three generic groups which can further be classified into twelve (12) for infrastructure projects. These risk categories are listed below:

i. Land acquisition risk
ii. Delays in project development
iii. Project completion risk
iv. Project cost risk/cost overruns
v. Technology risk
vi. Regulatory and administrative risk
vii. Commercial risk
viii. Operations and maintenance risk
ix. Financial risk
x. Termination risk
xi. Force majeure
xii. Political and social risk

2.2.2.1.6 Risks in consultancy services

The research conducted by Alhassan and Aminu (2015), indicates that there are eight (8) key risks related to consultancy and they are as follows:
Unclear responsibility;

Compliance of material to specification;

Cost estimation accuracy;

Delay in site mobilization;

Design modification;

Clarity of details in drawing;

Excessive change order.

The above survey indicates that design modification was ranked the most important factor related to consultants in limiting World Bank Assisted projects. This popularly arisen in the design phases of a project and may result from issues such as variations by the client and defective designs. According to Alhassan and Aminu (2015), **t**o avoid defective design, the design teams need not only to fully understand what the clients want as defined in the project brief, but also to establish an efficient communication scheme among the designers. Inadequate program scheduling often appears in projects with a tight schedule when some programs need to be reduced to meet the project timeline. Moreover, uncertainty surrounds most facets of projects, which makes it impossible to accurately predict the time required for various programs. Choosing experienced designers can help to minimize the difference between the proposed and practical program schedules. Incomplete or inaccurate cost estimate is directly related to the designers/consultants,, knowledge and attitude towards work.

From the foregoing, it is clear that there is no template as yet for classifying risks. The list of categories depends on the author's preference or rationale for choosing a particular method which most often is to serve the purpose of his research. Klemetti (2006) observes that most of the categorizations are based on the assumption that risk

is something negative that ought to be avoided because it threatens the project; opportunities are rarely mentioned.

Recent approaches to risk classification tend to follow the pattern suggested by Perry and Hayes (1985) and this is gradually finding universal acceptability. Scholars, like Tah and Carr (1990) classified risk into two: internal factors and external factors. The internal factors refers to those risks which are under the control of key stakeholders like the clients, consultants, contractors, suppliers and sub-contractors and Project Managers. The external risks refer to those risks which are beyond the immediate control of key stakeholders. This method of classification clearly embodies both the friendly and unfriendly consequences of risk.

2.2.2.1.7 Risk factors that affect project implementation

Izhar *et al.*, (2019) identified the most effective factors influencing the selection of procurement methods in Pakistan public sector. The selection criteria include financial capability and experience of the client, project completion at estimated time and cost, level of Price competition in industry, quality certification, experience of contractor, construction complexity, allocation of responsibility to project stakeholders, nature, and size of the project, procurement policy, and material availability as the of the most effective factors to be considered in selection of procurement method in public sector.

Babatunde, S. O., Opawole, A., and Ujaddughe, I. C. (2010) indicated that different traditional methods of contract procurement are the most adopted in project execution in Nigeria. In the study he revealed that project completion at estimated time ranks the highest factor considered for traditional method, while quality assurance ranks highest with non-conventional method. Also the study further revealed that the choice of variants of the traditional procurement method

is made in order of consideration of project completion at estimated time; project completion at estimated cost; and availability of information at project inception. He further stated that choice of variants of the non-conventional procurement system is made in order of consideration of quality assurance; and a consideration of either project completion at estimated time or the consideration of the nature of the project. Project completion at estimated cost; minimization of construction time; minimization of design time are also considered as major factors in making choice of the variants of the non- conventional procurement method, indicating that much more factors are considered in making choice of the variants of the non conventional procurement method than the variants of traditional procurement methods in Nigeria.

Odhigu and Yahya., (2011) explains that the procurement method is the outcome of a series of decisions which are made during the early stages of a project and it is one of the most important decisions facing the project client. No single procurement system can be applied universally on all construction projects. Each procurement system is chosen for a particular project based on certain criteria which is used in selecting procurement methods and these criteria include: Time (Speed); Quality level; Risk allocation/avoidance; Flexibility to change design during both design and construction period; Responsibility; Complexity; Price competition; Certainty of cost and time; Disputes and arbitration; Project type; Client's experience; Experienced contractor availability; Client‟s willingness to be actively involved; Project site location; Client‟s trust in other parties; Political constraints; Project size; Regulatory impact; Market competitiveness; Client‟s requirement for value for money; Material availability; Client‟s financial capability.

Maizon, H.; Melissa, C. Y.; NG, C. Y.; NG, S. H.; Shim, M. H.; Tay, L. Y. (2006) presents the various factors influencing the selection of procurement systems in

the Malaysian construction industry. The selection criteria that are identified as the most common criteria influencing the choice of procurement method are time, controllable variation, complexity, quality level, price certainty, competition, responsibility division, risk avoidance, price completion, government policy and client‟s familiarity in a procurement method.

Shiyamini and Rameezdeen (2006) focused on the selection criteria in terms of client requirements, project characteristics, and external environment, thus ensuring that the selection criteria have been focused at macro level. The results of factor analysis revealed nine significant factors from client requirements which are risk management, time availability and predictability, price certainty, Price competition, accountability, flexibility for changes, quality of works, responsibility and parties‟ involvement, and familiarity. Six factors from the project characteristics which are project cost and funding method, project complexity, project type, time constrains, degree of flexibility, and payment modality. Five factors from the external environment which are market completion, economic conditions and the fiscal policy, technology, socio cultural suitability, and regulatory environment. Husam and Sedki (2009) explained the result is fifteen criteria which are (Quality level, speed, flexibility for changes, technology, complexity, time predictability, certainty of cost, familiarity, responsibility, risk avoidance, accountability, client involvement, Price competition, availability of procurement system in the local market, and legal issues).

Since each procurement system has its own feature and peculiarity, it is very important that all factors be considered when selecting the most appropriate procurement approach for a selection of procurement method (Rosli, A., Mustapa, M., and Abd Wahid, S., (2006).

Franco *et al*., (2002) concluded that twelve factors affecting the selection of procurement method in construction as being applicable in Hong Kong. These factors include:

1. Firms' background
    i. Reputation
    ii. Technical competence/qualification
    iii. Experience with similar project
2. Past performance
    i. Cost control;
    ii. Quality of work;
    iii. Time control.
3. Capacity to accomplish the work
    i. Present workload;
    ii. Availability of qualified personnel;
    iii. Professional qualification/experience.
4. Project approach
    i. Approaches to time schedule;
    ii. Approaches to quality;
    iii. Design approach/methodology.

In addition, the consultant fee, being one of the factors thought to be most likely to be considered by clients in Hong Kong, was added as a further criterion.

Thomas, NG., Luu, D., and Chen, S., (2001) illustrated that the selection and use of an appropriate procurement system is crucial to project success. The results

indicate that there are nine procurement selection criteria commonly used by Australian clients: speed, time certainty, price certainty, complexity, flexibility, responsibility, quality level, risk allocation and Price competition. Only time certainty and price certainty were seen by the respondents as unambiguous criteria, as the completion date and price can be objectively predicted by the client beforehand. Shafik and Martin (2012) investigated favoured procurement methods and the factors which influence their selection for house building in Scotland. The outcomes and experience gained highlight the fact that many factors have an impact on the selection process. Speed and level of quality is the greatest factor followed by client experience, then the project nature, and finally level of risk and cost.

Mahon (2011) confirmed that the procurement selection parameter of client requirement for budget/cost requirements was universally rated as the single most influential parameter on procurement route selection. This was closely followed by client requirement for on time completion. These two parameters were clearly rated as being the most influential in terms of procurement selection. The next most influential parameters were client experience and client requirement for in terms of value for money.

Abu Bakar, A., Osman, O., Bulba, A., (2009) mentioned that among the most important factors in Aceh rehabilitation and reconstruction in procurement stage are timing, responsibility, and quality. The local authority, local community and contractors were involved in the implementation of the procurement method in term of participation, approval, supervision and implementation.

Mortledge, R., Smith, A. and Kashiwagi, D.T. (2006). summarized that the following factors should be borne in mind when determining the most appropriate procurement method are:

i. External factors: consideration should be given to economic, commercial, technological, political, social and legal factors when selecting a procurement method

ii. Client characteristics: a client's knowledge and experience with procuring construction projects will influence the procurement method adopted. Procurement selection is influenced by the culture of the organization and the degree of desired client involvement

iii. Project characteristics: the size, complexity, location and uniqueness of the project should be considered as this will influence time, cost and risk.

iv. Ability to make changes: changes in projects are inevitable. The desired level of flexibility for the client to make changes during the project will influence the selection of a procurement method

v. Cost: an assessment for the need for price certainty prior to commencement of construction by the client should be undertaken. If price certainty is required, then design must be complete before construction commences and design changes minimized.

vi. Time: most capital works project are required within a specific time frame. If early completion is a critical factor then a procurement method that supports speedy completion may be favored.

Love, P., Davis, P., Baccarini, D., Wilson, G., and Lopez, R., (2008) illustrated that the selection criteria that the first focus groups identified as being important criteria to be considered during the procurement selection process were: project value, project complexity, project type (standard/novelty), location (regional/local), stakeholder integration, political considerations, client needs, and industry culture. Surprisingly, political considerations and the prevailing industry culture were issues that participants wanted to discuss. It was perceived that the selection of a procurement method was often a fait au complaint for the agency.

This is because of the requirement for cost certainty and the issues associated with probity and accountability, and thus deemed to be transparent features the traditional procurement process. It was stated by one participant that "Factors such as project value, project complexity, and project type are a given. We know from our own personal experience that traditional lump sum methods always work and give us cost certainty. When it is a complex project or it needs to be done quickly we may consider construction management. The biggest issue we have is that often it is decided from above because it is the flavor of the month".

Tran and Molenaar (2012) observed that the four following critical risk factors appear in all delivery method selection process (1) unexpected utility encounter; (2) third-party delays during construction; (3) geotechnical investigation; and (4) delays in reviewing and obtaining environmental approvals. This similarity indicates that these four critical risk factors are essential to consider for all delivery methods. However, it should be noted that the ranking of these factors diverge from one method to other methods. Eyitope, A., Ojo, S., Ajibola, M., Gbadebo, R., (2012) identified a list of thirteen critical criteria which were classified into the following four major areas;

A - Project technicality

1. Type/Complexity of the project;
2. Expected performance quality;
3. Design and product specifications;
4. Completion time.

B - Project business case and financing

5. Availability /Funding structure;
6. Number of competitors;
7. Price certainty and market structure.

C - Project risk management

8. Controllable variation;
9. Responsibility division and integration;
10. Risk sharing and allocation.

D - Public policy requirement

11. Specific government directive;
12. Trend in clien's familiarity;
13. Political reasons and interference.

The selection of project procurement strategy should necessitate robust analysis of project environment, in terms policies, available resources, risk associated, technicality, and preferred contractual arrangements amongst all parties towards devising a method of project implementation and to achieving project goals of time, cost and quality.

In studying the effect of project risk factors in the selection procurement method in World Bank assisted projects in South East Nigeria, the researcher took into consideration the project risk factors that were most frequently and commonly referenced in the literature and journals (Table 2.2 a and 2.2b). The risk factors are summarized in table 2.1 below:

Table 2.1: **20 Project risk factors** most frequently and commonly referenced in the literature and journals

S/N	**Project Risk factors**
1	Quality level of project
2	Project expected performance
3	Type of project
4	Clients experience
5	Price certainty
6	Risk avoidance

7	Complexity of Project
8	Price competition
9	Allocation of responsibility
10	Flexibility for variations in design
11	Natural Disaster
12	Political Interest
13	Quality of Services
14	Avaibility of technology
15	Availability of qualified staff
16	Available resources of project
17	Delivery time schedule
18	Funding arrangement
19	Location of project site
20	value of contract

Table 2.2a: Project Risk factors affecting the selection of procurement methods and frequency of reference from different sources.

S/N	Project Risk Factors	Sources																				
		Windapo *et al.*(2019)	Akintoye & Macleod. (1997)	Shafik M. & Martin P. (2006)	Rosali *et al.*(2006)	Babatunde *et al.* (2010)	Tran and Molenar (2012)	Izhar H. B *et al.* (2019)	Husam & Sedki *et al.* (2009)	Franco *et al.* (2006)	Odeyinka *et al.* (2008)	Peter E.D *et al* (2008)	Eyitope *et al.* (2012)	Mortiledge *et al*(2006)	Abu Baker (2009)	Cameron (2011)	Odihugu *et al.* (2011)	Thomas S. *Et al.* (2001)	Shiyaamini *et al* (2006)	Maizon *et al* (2006)	Benaitiene & Benaitis (2012)	Frequency of Reference
Group A- Cost related factors																						
1	Price competition		√					√	√							√		√	√	√		7
2	Cost of design	√																	√			2
3	value of contract			√			√			√		√			√							5
4	Price certainty								√			√	√	√			√	√	√	√		8
5	Cost control	√		√																		2
Group B-Time related factors																						
6	Delivery time schedule						√	√		√									√	√		5
7	Speed	√							√									√				3
8	Design time minimization					√																1
9	Time constrains																		√	√		2
10	Time control						√			√												2
11	Completion time													√	√							2
Group C-Client characteristic related factors																						
12	Type of project				√			√		√		√	√	√			√	√	√			9
13	Clients experience	√				√			√	√	√						√	√	√			8
14	Reputation of client									√												1
15	Method funding												√						√			2
16	Size of project		√					√						√						√		4
17	Flexibility for variations in design						√			√							√	√	√	√		6
18	Complexity of Project							√	√				√	√	√			√	√	√		7
19	Availability of qualified staff		√					√		√						√					√	5
20	Stakehoders involvement		√						√													2

21	Influence of regulatory agent				√				√														2

Table 2.2b: Project Risk factors affecting the selection of procurement methods and frequency of reference from different sources.

S/N	Project Risk Factors	Sources																				
		Windap *et al.*(20106)	Akintoye & Macleod. (1997)	Shafik. & Martin (2006)	Rosali *et al.*(2006)	Babatunde *et al.* (2010)	Daniel Tran and Keith M (2012)	Izhar H. B *et al.* (2019)	Husam & Sedki *et al.* (2009)	Franco *et al.* (2006)	Odeyinka *et al.* (2008)	Peter E.D *et al* (2008)	Eyitope *et al.* (2012)	Mortiledge *et al*(2006)	Abu Hassan & Abu Baker (2009)	Cameron (2011)	Odihugu *et al.* (2011)	Thomas S. *Et al.* (2001)	Shiyamini *et al* (2006)	Maizon *et al* (2006)	Karim *et al* (2012)	Frequency of Reference
Group D: Quality related factors		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
22	Quality of Services	√		√				√					√				√				√	6
23	Quality Certification										√				√							2
24	Quality level of project			√		√			√	√			√		√			√	√	√		9
25	Project Expected performance		√		√		√				√					√						5
26	Experience of project contractor			√								√										2
Group E- Factors related to External environment																						
27	Procurement policy		√			√		√														3
28	Material availability							√														1
29	Environment impact	√												√							√	3
30	Political Interest		√					√				√	√	√							√	6
31	Legal factors								√					√								2
32	Social factors		√				√							√							√	4
33	Economic conditioner													√					√			2
33	Natural Disaster	√	√							√							√		√		√	6
Group F- Risk related factors:																						
34	Risk avoidance							√	√		√		√				√	√		√	√	8
35	Allocation of responsibility								√				√		√			√		√	√	6
36	Disputes & arbitration						√	√														2
37	Complexity in project construction						√		√													1
Group G- Project characteristics related factors																						
38	Funding arrangement		√		√								√						√		√	5
39	Expected completion time of project					√										√						2
40	Location of project site		√					√				√			√						√	5

41	Project payments modality								√													1
42	Payment modalities				√				√				√									3
43	Project methodology			√																		1
44	Available resources of project		√		√					√				√							√	5
45	Availability of technology		√					√			√					√			√			5

2.2.3 Concept of procurement

Varied definitions and meanings have been given to the term 'procurement' and different organizations have used the term to mean different things. However, according to kidd (2005) procurement is a business management function that ensures identification, sourcing, access and management of the external resources that an organization needs or may need to fulfill its strategic objectives. Public procurement refers to the government's activity of purchasing the goods and services which it needs to carry out its functions (Arrowsmith and Heartley, 2002). These varied definitions of the term procurement have resulted in Kwakye (1997) contending that procurement is a word only recently encountered in the context of the construction work with different meanings to different people. This notwithstanding, public procurement has a long history, with the earliest procurement dating back from 2400 to 2800 BC written on a red clay tablet found in Syria (Thai, 2001).

2.2.3.1 General procurement systems for works

Procurement systems for works may be generally classified in respect of the level of integration of design and construction process as either traditional system or the integrated system (Onosakponome, F.O., Yahya, A., Abdul Rani, S.N., Shaikh,M.J. (2011). General procurement systems or procurement routes for works have evolved as a result of funding arrangements and costs, size and complexity of projects, influence of life cycle cost, client's active participation, and risks allocation among others (Cartlidge, 2009).

The best possible way of achieving project objectives and value for money is dependent on the procurement strategy adopted . The procurement strategy helps to achieve the optimum balance of risk, control and funding for a particular project. Therefore, the selected procurement method will ultimately deliver the procurement strategy (Onosakponome *et al*, 2011). The procurement method largely considers the design, construction, operation and maintenance of the project in the context of project team levels of engagement. Literature has confirmed two major procurement systems or routes that are used in the delivery of works projects (Mathonsi and Thwala, 2012). They are:

1. Traditional procurement system

2. Integrated/management procurement system (non - traditional)

2.2.3.1.1 Traditional Procurement System

The traditional procurement system is best described as sequential in nature where the design and production functions of a project are separated with the clients design team practically completing the design of the development scheme and then contractors tender for the project (Larmour, 2011). Cartildge (2009) describes this traditional procurement system as architect led, hence, it is the engagement of an architect that will subsequently lead to the engagement of the other team members. This method of procuring construction services is often referred to as Design-Bid-Build (DBB) (Hughes, 2012).

Tsai and Yang (2010) noted that in different countries, the conventional way of project delivery system is Design-Bid-Build (DBB) and this usually results in maximum cost and increases time of project delivery.

2.2.3.1.2 Integrated Procurement System (non-traditional systems)

According to Masterman (2002), the non-traditional procurement system is a diversified contemporary procurement system that does not only considers design and construction, but also involves financing, operating and facility management. The non traditional systems evolved due to increasing complexity and size of projects, limited project delivery times and the need to overcome the failures of the traditional system to respond effectively to the needs of the modern construction industries. The non traditional systems seeks to integrate the design and construction process. Over the years the forms and versions of integrated system used are briefly outlined below from literature.

2.2.3.1.3 Design and build:

Design-Build (DB) is defined as the system where the Contractor has responsibility for the final design as well as the construction of a project (Larmour, 2011). In DB method of procurement, contract is signed which enables a firm to take full responsibility and carry sole liability for both design and construction of a building. However, Cartildge, (2009) argued that design and build procurement method lacks control over quality of design. Also, it allocates little time for design development and usually there may be possible compromise over quality to provide cost savings by the contractor.

2.2.3.2: Methods of Public Works Procurement in Nigeria

Procurement selection methods for works globally can be categorized into two namely; International Competitive Bidding (ICB) also known as International Competitive Tendering (ICT) and Other Methods of Procurement (African Development Bank, 2012a; World Bank, 2011). This broad categorization of procurement selection methods into two by the international community and donor funding partners of Nigeria is underpinned by the rationale of open competition which is the basis for efficient public procurement (World Bank, 2011;).

2.2.3.2.1 International Competitive Bidding (ICB)

ICB is the most preferred selection method of procurement when properly administered, with all the necessary allowances for domestic margins of preference (African Development Bank, 2012a). This selection method provides all prospective and eligible tenderers the opportunity to compete in the provision of goods and works (World Bank, 2011). ICB selection method of procurement is applied in a non-discriminatory manner but with due attention to the consideration

of economy and efficiency (African Development Bank, 2012a) with emphasis on the importance of transparency in the procurement process (World Bank, 2011).

International Competitive Bidding is appropriate for high value or complex procurements, or where the goods or works by their nature or scope, are unlikely to attract adequate local competition (Public Procurement Authority Manual, 2007).

All prospective and eligible tenderer are given timely and adequate information on the employer‘s requirements for the works contract. This will inform prospective tenderer decision to bid or not to bid. The use of ICB for the procurement of works in Nigeria is increasingly becoming dominant as a result of an overall increase in the use of Country Procurement Systems (CPS).

2.2.3.2.2 Other Procurement Selection Methods.

Other procurement selection methods are applied for procurement of goods, works and non- consulting services where ICB will not be the most efficient and economic method of selection and where other methods are deemed more appropriate. Other methods of procurement as identified in the World Bank’s guidelines (2011) for borrowers and the African Development Bank’s rules and procedures (2012) for procurement of goods, works and non- consulting services are as follows:

i. Limited International Bidding
ii. National Competitive Bidding
iii. Shopping
iv. Framework Agreements
v. Direct Contracting
vi. Force Account

2.1.3.2.2.1 Limited International Bidding

African Development Bank, 2012a identifies Limited International Bidding (LIB) procurement selection method as essentially ICB by direct invitation without open advertisement. It further stated that LIB may be an appropriate method of procurement where (a) there is only limited number of suppliers, or (b) other exceptional reasons may justify departure from full ICB procedures. Under this selection method, bids are sought from a list of potential suppliers broad enough to assure competitive prices (World Bank Procurement Guidelines, 2014). Literature has confirmed that the term Limited International Bidding (LIB) has the same features and characteristics as restricted tendering (African Development Bank, 2012a; World Bank, 2011; PPA Manual, 2007)

2.2.3.2.2.2 National Competitive Bidding

National Competitive Bidding (NCB) is the competitive bidding procedure normally used for public procurement of goods, works, and non-consulting services which, by their nature or scope, are unlikely to attract foreign competition (World Bank Procurement Guidelines, 2014). The Public Procurement Act 234 and Manual (2007) of Nigeria describes NCB as the practice where only domestic suppliers or contractors are invited to submit their tenders/bids for a particular project.

The Country Procurement System (CPS) of Nigeria strictly reserves the procurement of goods and works contract by NCB for the sole prerogative and right of domestic firms in Nigeria (Act 224, section 25). However, the World Bank

and African Development Bank allows foreign firms who wish to compete under country NCB procedures to do so without any restrictions or inhibitions.

Low value goods/works which cost less than a stipulated threshold and are unlikely to attract foreign competition are earmarked for National Competitive Bidding (NCB). To be acceptable for use in Bank-financed procurement, an NCB procedure is modified as necessary to assure economy, efficiency, and transparency. According to the procurement guidelines (World Bank, 2014; African Development Bank, 2012), NCB may be the most appropriate method of procurement where foreign bidders are not expected to be interested for the following reasons:

(a) Size and value of the contract,

(b) where works are scattered geographically or spread over time,

(c) when works are labor intensive, or

(d) the goods, works, and non-consulting services are available locally at prices below the international market.

Also, NCB procedures may be used where the advantages of ICB are clearly outweighed by the administrative or financial burden involved.

2.2.3.2.2.3 Shopping

Shopping according to the World Bank Procurement Guidelines (2014) is a procurement method based on comparing price quotations obtained from several suppliers (in the case of goods), from several contractors (in the case of civil works), or service providers (in the case of non-consulting services) . The guidelines indicate that a minimum of three is required to assure competitive

prices. Shopping is an appropriate method for procuring limited quantities of readily available off-the-shelf goods or standard specification commodities of small value, or simple civil works of small value when more competitive methods are not justified on the basis of cost and efficiency. Requests for quotations indicate the description and quantity of the goods or specifications of works, as well as desired delivery (or completion) time and place. Quotations may be submitted by letter, facsimile, or by electronic means. The evaluation of quotations shall follow the same principles as of open bidding.

2.2.3.2.2.4 Direct Contracting.

Direct contracting is contracting without competition (single-source) and may be an appropriate method under the following circumstances.

(a) An existing contract for goods, works, and non-consulting services, awarded in accordance with procedures acceptable to the Bank, may be extended for additional goods, works, and non-consulting services of a similar nature (World Bank Procurement Guidelines, 2014). Direct contracting method is used in cases where no advantage could be obtained by further competition and on the condition that the prices on the extended contract are reasonable. Provisions for such an extension, if considered likely in advance, shall be included in the original contract;

(b) Standardization of equipment or spare parts, to be compatible with existing equipment, may justify additional purchases from the original Supplier;

(c) The required equipment is proprietary and obtainable only from one source;

(d) The procurement of certain goods from a particular supplier is essential to achieve the required performance or functional guarantee of an equipment or plant or facility;

(e) In exceptional cases, such as, but not limited to, in response to natural disasters and emergency situations.

2.2.3.2.2.5 Force Account

"Force Account" also known as "direct labor", "departmental forces", or "direct work" is a procurement method used for construction and installation of equipment and non-consulting services carried out by a government department using its own personnel and equipment (World Bank Procurement Guidelines, 2011), Force Account shall be justified and may only be used, for donor funded projects under any of the following circumstances:

(a) quantities of construction and installation works that are involved cannot be defined in advance;

(b) construction and installation works are small and scattered or in remote locations for which qualified construction firms are unlikely to bid at reasonable prices;

(c) construction and installation works are required to be carried out without disrupting ongoing operations;

(d) risks of unavoidable work interruption are better borne by the Borrower than by a contractor;

(e) specialized non-consulting services such as aerial surveys and mapping, as a matter of Borrower's law or official regulations for consideration such as national security, can only be carried out by specialized branches of the government; or

(f) urgent repairs to prevent further damages, requiring prompt attention, or works to be carried out in conflict-affected areas where private firms may not be interested.

2.2.3.2.3 Procurement Selection criteria

Different authors have postulated different procurement selection factors that can assist clients to choose the best procurement method. Studies of Soyombo and Ogunsanmi (2011) have demonstrated that procurement selection factors of client characteristics, project requirements and external environment are in use. However, Shiyamni *et al*. (2006) mentioned the use of three factors considered by client which include: cost related factors, time related factors and quality related factors. Several variables of client requirements were measured under cost, time and quality related factors. Project characteristics factors also include project type, size, cost, flexibility, complexity, site risk factors and degree of innovative technology. External environment factors considered are market competitiveness, availability of materials, natural disasters, industrial actions amongst other variables. Client characteristics, project requirements and external factors are considered with general needs for investigating the procurement related factors that affect project performance in this study. Cost related factors of capital cost of the project, maintenance cost, pre-qualification cost, financial risk amongst other variables can influence a client to select a particular procurement method that meets all these client requirements. Time related factors of planning and design time, construction time, early start of project, speed of construction and time overrun can help client to select an appropriate procurement method. Quality related factors of design reliability, aesthetic appearance of the building, workmanship amongst other variables are considered in this study. General needs factors of involvement of parties, their transparency, accountability, safety requirements and flexibility of the procurement process to client charges are also considered in the study. Project characteristics factors considered in this study are project type, size, cost, degree of flexibility, complexity, time constraints, payment method, funding methods and innovative technology. Moreover, external environment factors considered also include nature of the market, government

policies, government as major client, regulating feasibility, technology feasibility amongst other variables. All these above factors can influence the selection of an appropriate procurement method that can also affect project performance.

2.2.3.2.4 Consultancy Services in World Bank Assisted Projects

Literally, consultancy means the act of consulting. It is the process of seeking the advice of a consultant. According to Merriam Webster's Collegiate Dictionary (2003), 'to consult' means 'to ask advice of' or 'to seek the opinion of' and 'consultant' means 'one who consults or gives expert advice'.

World Bank Consulting Services manual (2006) refers consulting Services to services of a professional nature provided by consultants using their skills to study, design, organize, and manage projects, advise Borrowers and when required build their capacity. Also it states that consulting services in Bank financed projects should satisfy the following requirements:

i. Meets high standards of quality

ii. Be impartial(that is delivered by consultant acting independently from any affiliation, economic or otherwise, that may lead to conflict of interest) and

iii. Be proposed, awarded, administered, and executed according to the highest ethical standards.

The World Book Encyclopedia of Science 2000 defines a consultant as "a person who gives professional or technical advice" and consultancy has been defined as "the work or business of a consultant". However consultant is a word that is likely to be misunderstood until one becomes more fully aware of the many kinds of

consultants. It is used in a generic sense and it gets the right meaning only when some prefixes are added like 'management', 'technical', 'investment', 'tax' etc.

A consultant who is an expert in the relevant field or discipline identifies and investigates the problems of clients and on the basis of his expertise; he makes suitable suggestions and also helps in the implementation of recommendations. Consultants give specialized services to clients in the form of advice, information and knowledge. They charge commission or fee for their services.

Selecting a Consultant is one of the most important decisions an Owner or Client makes because the success of any project depends upon obtaining the most appropriate expertise available in terms of skill, knowledge, past experience, managerial abilities and reputation (FIDIC, 2011).

According to Schiele and McCue (2006), consultancy services are provided to organizations by trained individuals who help their client with identifying, analyzing and solving certain problems. Public clients use consulting services for different types of assignments, such as environmental assessment, engineering and architectural planning. Therefore, the performance of technical consultants influence the quality and costs of built facilities (Sporrong, 2011).

It is the responsibility of the purchaser to specify the service to be provided, which is normally done in a contract document. Schiele and McCue (2006) claim that it is the purchasers' job to ensure that the client's needs are communicated and specified in a clear and comprehensive manner so that others can act upon the request and fulfil the specific need. Smeltzer and Odgen (2006) also stress the importance of clear formulations in the contract document. Their research show that professional purchasers perceive that the complexity of acquiring material or

services depends on the clarity and preciseness of the terms of reference (TOR) or statement of work.

The process of procuring is restricted and competition has increased due to many laws and regulations. However, Hoxely (2000) claims that competition can lead to decreased service quality. His theory was based from a quote by the Monopolies Commission. “Price competition might create serious dangers in relation to quality of services of a particularly personal nature or of whose quality the public are generally incapable of judging. Some clients might accept incompetent service at a lower price without appreciating the risk involved.” Bryntse (1996) stated that the procurement of services has become more important due to the regulation of public services sectors and the trend towards outsourcing technical competence.

However, Consulting Services are services for infrastructure projects and other types of projects or activities of the government requiring adequate external technical and professional expertise that are beyond the capability and/or capacity of the Government to undertake such as, but not limited to: (i) advisory and review services; (ii) pre-investment or feasibility studies; (iii) design; (iv) construction supervision; (v) management and related services; and (vi) other technical services or special studies.

2.2.3.2.4.1 Types of consulting services

According to Government of Jamaica (2014)**,** consulting services can be divided into six (6) broad categories, namely:

2.2.3.2.4.1.1 Advisory and Review Services

These services consist of the review and the provision of advice on particular projects or problems. These include planning, system and implementation design,

financial, fiscal, legal and other professional services, as well as management, production, inspection, testing and quality control. They also include such services as appearances before commissions, boards or other judicial bodies to give evidence or otherwise submit professional opinions.

2.2.3.2.4.1.2 Pre-Investment or Feasibility Studies

These are the studies which normally precede decisions to go (or not to go) forward with specific projects. These studies may have as their objectives:

a. To establish investment priorities and sector policies - Studies conducted for this objective include basic resource inventories, such as, river basin surveys, transport sector surveys, and studies of alternative development patterns and of sectors on a regional or nationwide scale;

b. To determine the basic features and the feasibility of individual projects – Studies toward this objective include functional designs, project site selections, architectural and space programming and physical layout of specific projects, preliminary designs and cost estimates, and the economic, financial and environmental impact analyses required for project evaluation; or

c. To define and propose changes in governmental policies, operations and institutions necessary for the successful implementation or functioning of investment projects - Studies undertaken in pursuit of this objective include analyses of project related organizations, administrative problems, planning machinery, regulatory and marketing policies, accounting and management systems, and manpower resources and training requirements.

2.2.3.2.4.1.3 Design

This type of services normally consists of three (3) phases:

a. Pre-Design Phase which establishes the general size and scope of the project and its location on the site. The consulting services under this category include reconnaissance, topographical and other engineering and land surveys, soils investigations, preparation of preliminary architectural/engineering designs, layouts, outline specifications, preliminary cost estimates, and specific recommendations prior to actual design;

b. Basic Design Phase which includes the preparation of detailed plans, designs, working drawings, specifications, detailed cost estimates and tender documents required for invitations of bids for construction works and equipment; and

c. Support Services During Construction which include assistance and advice in securing bids, tabulation and analysis of bid results, and making recommendations on the award of construction contracts, and in preparing formal contract documents; preparation of supplementary drawings required to suit actual field conditions; checking detailed construction and as-built drawings, shop and erection drawings submitted by contractors; making periodic visits to check on the general progress of work and quality of materials and workmanship; observing performance tests and start-up and making report thereon; and making a final inspection and reporting of completed project.

2.2.3.2.4.1.4 Construction Supervision

Consulting services under this category include:

i. Inspection and expediting of the work;

ii. Verification and checking of quantities and qualities of work accomplished by the contractor as against the approved plans, specifications, and programs of work;

iii. Issuance of instructions for correcting on the work;

iv. Verification and recommendation for approval of statements of work accomplished and certificate of project completed by the contractor;

v. Review and recommendation for approval of progress and final billings of the contractor; and

vi. Provision of record or as-built drawings of the completed projects.

The above do not mean direction, superintendence or management of construction.

2.2.3.2.4.1.5 Management and Related Services

The services under this category, on the other hand, include:

i. Sector policy and regional development studies;

ii. Planning, feasibility, market, economic, financial, technical, operations and sociological studies;

iii. Project management, including procurement advisory services, impact monitoring, and post-evaluation services;

iv. Production management, inventory control, and productivity improvement;

v. Marketing management and systems;

vi. Information and communications technology services, including but not limited to, information systems design and development, and network design and installation;

vii. Institutional strengthening, organization development, manpower requirements, training and technology transfer;

viii. General management consultancy; and

ix. Other related services.

2.2.3.2.4.1.6 Other Technical Services or Special Studies

Other technical services include:

i. Institution building, including organization and management studies, and business process re-engineering and development.

ii. Design and execution of training programs at different levels.

iii. Provision of staff to carry out certain functions and to train their replacements; and

iv. Tasks relating to economic and financial studies such as those of tariff structures.

Special studies include the following:

i. Soils investigation;

ii. Studies, tests and process determination performed to establish design criteria for water facilities;

iii. Detailed mill, shop, and / or laboratory inspection of materials and equipment;

iv. Land surveys, establishment of boundaries and monuments, and related office computations and drafting;

v. Parcellary surveys;

vi. Engineering surveys (for design and construction) and photogrammetry;

vii. Assistance in litigation arising from the development or construction of projects and in hearings before various approving and regulatory agencies;

viii. Investigation involving detailed consideration of the operation, maintenance, and overhead expenses; and the preparation of rate schedules; earning and expense statements, feasibility studies, appraisals, evaluations, and material audits or inventories required for certification of force account construction performed by the agencies;

ix. Preparation of environmental statements and assistance to the agencies in public hearings;

x. Preparation of operating instructions and manuals for facilities and training of personnel and assistance in initial operation of facilities

xi. Designs to meet unique and / or above normal requirements brought about by severe earthquakes, tornadoes, or blasts, or satisfy unique or abnormal tolerances, safety requirements, etc.

xii. Site and physical planning.

xiii. Environmental and other aspects of planning.

xiv. Housing.

xv. Interior design.

xvi. Studies on preservation and restoration of historical, cultural, and artworks.

xvii. Landscaping.

xviii. Construction management; and

xix. Defense systems design, including self-reliance defense program.

Other specialized expertise not included in the above categories and to be provided for a client in the performance of a specified task over a specified period of time may also be considered as consulting services.

2.2.3.2.4.2 Procurement of consulting services.

The process of selecting a consultant is based on obtaining a limited number of proposals from a short-list of consultants who have expressed an interest and possess the relevant qualifications. It is time-consuming and expensive to invite and evaluate proposals from all consultants who wish to compete. Selection is, therefore, based on limited competition among qualified firms, which in the procuring entity's view, are capable of delivering the required services at the desired quality level. In keeping with the principles of the Procurement Policy (Consultant Guidelines, 2011), Procuring Entities are required to ensure that the following considerations guide the selection process for the engagement of consultants:

i. High quality services;
ii. Economy and efficiency;
iii. Fairness and equity;
iv. Transparency in the selection process; and
v. Equal opportunity for qualified consultants.

2.2.3.2.4.3 Consultant selection methods

The appropriate method of selection for the procurement of services is related to the nature; size; complexity; likely impact of the assignment; technical; and financial considerations. Based on this, it is necessary to carefully define the

assignment, in particular, the objective and scope of the services, before deciding on the selection method (Government of Jamaica (2014).

The choice of the appropriate method will depend on the nature, size and complexity of the assignment; the likely downstream impact of the assignment and technical and financial considerations (Consultant Guidelines, 2011). The guidelines stipulate six selection methods and they include the following:

(a) Quality Cost-Based Selection (QCBS).

(b) Quality-Based Selection (QBS).

(c) Selection under a Fixed Budget (SFB).

(d) Least-Cost Selection (LCS); and

(e) Selection Based on the Consultants' Qualifications (CQS).

(f) Single Source Selection (SSS)

2.2.3.2.4.3.1 Quality and Cost Based Selection (QCBS)

Quality and Cost based Selection is a method based on the quality of the proposals and the cost of the services offered and the method is appropriate when:

- The type of services is common and not too complex(feasibility studies, supervision of construction work, Technical, Financial or administrative services of non complex nature, procurement and inspection services etc).

- The scope of work of the assignment can be precisely defined and the TOR is specific.

- The client and the consultant can estimate with reasonable precision the staff time, the assignment duration and any other input required by the consultants

- The risk of undesired downstream impact is quantifiable and manageable and where the capacity building program is easy to estimate the duration and staff time effort.

2.2.3.2.4.3.2 Quality Based Selection (QBS)

Quality Based Selection, emphasizes the importance of selecting Consultancy Firms on the basis of qualifications, experience, professionalism and integrity, rather than price, if overall project value and quality is the Client's aim (FIDIC, 2011). QBS is based on evaluation of proposal quality without any initial consideration for cost. The consultant/firm that submitted the highest ranked technical proposal is invited to negotiate its financial proposal and the contract (World Bank, 2011). According to the Consultancy Services Manual (2006) QBS is appropriate when:

- The downstream impact of the assignment can be so large that the quality of the service is of overriding importance for the project.

- The scope of work, the duration of the assignment, and the Terms of Reference (TOR) require a degree of flexibility because of novelty or complexity of the assignments, the need to select among innovative solutions.

- The assignment itself can be carried out in substantially different ways such that cost proposals may not be easily or necessarily comparable.

- The introduction of cost as a factor of selection makes competition unfair.

Consultancy Services Manual (2006) stipulates that QBS is adopted for assignments such as; complex sector and multidisciplinary studies, important and far reaching strategy studies, complex master plans, prefeasibility and feasibility studies, or design of large and complex studies.

2.2.3.2.4.3.3 **Least cost selection** (LCS)

Least Cost Selection is one of the procurement procedures given in the Procurement of Consultancy Services Regulations and may be suitable depending on the nature of the assignment. LCS is only appropriate for selecting consultants for very small assignments, of a standard or routine nature where well established practices and standards exist e.g. standard accounting or simple audit, Engineering designs or supervision of very simple projects, repetitive operations, maintenance work, routine inspection and simple surveys. This selection method may be adopted to capture cost reductions from simple technologies or new methods which quality risks for the final output are negligible (Consultancy Services Manual, 2006).

2.2.3.2.4.3.4 **Fixed Budget Selection (FBS);**

Selection under a fixed budget is appropriate when the budget cannot be exceeded, the objective, TOR and scope of the assignment are very precisely defined; the time and staff month effort required for the consultants can be assessed with precision (Consultancy Services Manual, 2006). According to the manual, to reduce financial risk for consultants and avoid receiving unacceptable technical

proposals, FBS must be used for only well defined simple assignment. Also SFB is used for assignments where there is lack of flexibility in the allocation of funds. Typical assignments awarded under FBS are studies and surveys of limited scope; not too complex feasibility studies, review of existing feasibility studies, technical designs and bidding documents. FBS allows users to plan budget early than allow uncertain outcome of negotiation. The main risk of using FBS is under budgeting the TOR which in turn discourages good consultants from participating. This will ultimately result to poor performances from the awarded contract.

2.2.3.2.4.3.5 Consultants Qualification Selection (CQS)

Selection based on Consultants Qualification applies to small assignments for which the cost of fully fledged selection process would not be justified. The CQS method can substantially reduce the process cost and the time needed to hire a consultant. It is suitable when the past qualifications and experiences of the consultant are crucial to the to the choice while the technical proposal itself is not likely to reveal much additional or decisive information on the suitability of the consultant for the proposed assignment. CQS is used for evaluation studies at critical decision points in the project cycle (review of alternative solution with large downstream effects), high level, short term, expert advice.

2.2.3.2.4.3.6 Single Source Selection (SSS) or direct selection

The World Bank procurement (2006), stipulates that single sourcing can be considered when competition appears unlikely to add significant value to the choice of consultant. Under this selection method, the user requests that an already

identified candidate prepare technical and financial proposals which are then negotiated. Single Sourcing is used when the assignment represents a natural or direct continuation of a previous one awarded competitively and the performance of the incumbent consultant has been very satisfactory; the consultant's prompt availability is essential(e.g. in emergency operation following a natural disaster, a financial crises); if the value of the contract is very small and if there is only one consulting organization that has the qualification or experience required to carry out the assignment.

This method will be used only in exceptional cases, where it provides clear advantage over competition in following cases (only), namely:-

i) for tasks which are a natural continuation of previous assignments and where continuity of technical services is required;

ii) for very small assignments;

iii) in cases of emergency; and

iv) where only one Consultant is qualified or has experience of exceptional worth.

Consultancy Services Manual (2006) states that selection method with quality risk aversion tend to adopt selection methods that promote quality (QBS over QCBS and QCBS over LCS).

2.2.3.3 Effect of Project Risk Factor on selection of procurement method in World Bank assisted projects.

The 20 project risk factors identified in table 2.8 were subjected to Principal Component Factor Analysis with Oblimin rotation method in order to reduce the factors to a considerable number to be used in our research, and to eliminate collinearity between them. In addition, Monte Carlo PCA for Parallel Analysis was used to compare and validate the result from the Principal Component factor analysis. After 30 iterations, the 20 project risk factors were reduced to 4 component factors as listed below:

1. Project completion time and risk avoidance
2. Price certainty for allocation of project responsibility,
3. Clients experience in handling project
4. Contract funding arrangement and quality services

2.2.3.4 Conceptual framework for effect of project risk factors on selection of procurement method in South East Nigeria.

This section presents a conceptual framework for effect of project risk factors on selection of procurement method in South East Nigeria. A concept is an idea, thought or devolution of abstract system of thoughts, by which science investigates, interprets and understands particular segments of reality or phenomena (Eboh, 2009). It is a logical construct derived from sense impressions, precepts (theory) and experiences (empirical), (Babbie, 1986). Therefore, a conceptual framework is a mental imagery of the orientation (descriptive, explanatory or predictive) of the research. It gives shape, form and practicable focus to the research (Eboh, 2009). The main concept of this study is effect of project risk factors on selection of procurement method in South East, Nigeria.

This thesis is based on the concept that project risk factor have effect on selection of procurement method for goods, works and services in South East Nigeria. Also, that the

project team members who have the responsibility of decision making with regard to choice of procurement method should consider the project risk factors to avoid the consequences of wrong or poor procurement pathway.

The conceptual framework is shown on Figure 2.1. It is made up of the independent variables, intervening variables and dependent variable. The independent variables consist of project risk factors which include: Project completion time and risk avoidance, Price certainty for allocation of project responsibility, Clients experience in handling project, Contract funding arrangement and quality services obtained from principal component analysis. The independent variables serve as in put in the decision making for the selection of procurement method. The intervening variable are the type of procurement under consideration namely goods, works and services under consideration. The level of effect is measured by the scores which will result in poor or good choice of procurement method for the goods works or services. Positive effect lead to Good procurement method selection for goods works and services which will result to timely delivery, value for money and quality job. Conversely, negative effect will lead to poor choice of Method which will result in delay in delivery, cost overrun and poor quality job.

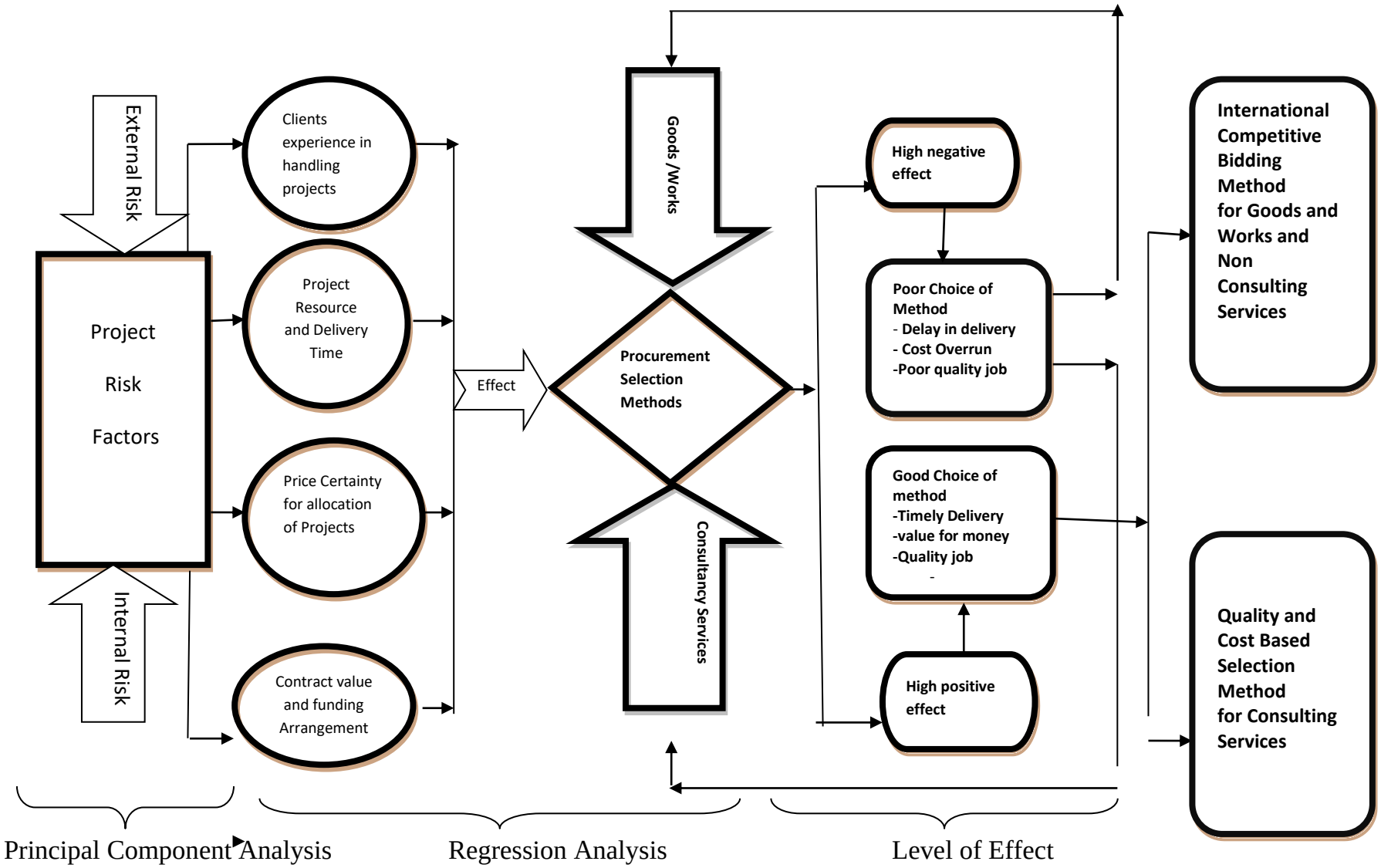
External Risk
Project
Risk
Factors
Internal Risk
Clients experience in handling projects
Project Resource and Delivery Time
Price Certainty for allocation of Projects
Contract value and funding Arrangement
Effect
Goods /Works
Procurement Selection Methods
Consultancy Services
High negative effect
Poor Choice of Method
- Delay in delivery
- Cost Overrun
-Poor quality job
Good Choice of method
-Timely Delivery
-value for money
-Quality job
High positive effect
International Competitive Bidding Method for Goods and Works and Non Consulting Services
Quality and Cost Based Selection Method for Consulting Services
Principal Component Analysis
Regression Analysis
Level of Effect

Figure 2.1: Conceptual frame work for effect of project risk factors on procurement selection method in south east Nigeria.

►

2.3 EMPERICAL FRAMEWORK

Selection of appropriate procurement method for goods, works and services in a donor funded project requires identification and consideration of effect of project risk factors. Maizon *et al*., (2006) presents the various risk factors influencing the selection of procurement systems in the Malaysian construction industry. The selection criteria that are identified as the most common criteria influencing the choice of procurement method are time, controllable variation, complexity, quality level, price certainty, competition, responsibility division, risk avoidance, price completion, government policy and client's familiarity in a procurement method. Osama and Nabil (2013) identified six significant project risk factors that have most influence on the selection of procurement methods in construction projects in Gaza Strip. These project risk factors include: price competition; degree of project complexity; time constrains of project; project size; client's financial capability and client's experience in procurement methods.

Izhar *et al*; 2019 identified the most effective project risk factors influencing the selection of procurement methods in Pakistan public sector. The selection criteria include financial capability and experience of the client, project completion at estimated time and cost, level of Price competition in industry, quality certification, experience of contractor, construction complexity, allocation of responsibility to project stakeholders, nature, and size of the project, procurement policy, and material availability as the of the most effective risk factors to be considered in selection of procurement method in public sector. Franco *et al*., (2002) concluded that twelve factors affecting the selection of procurement method in construction as being applicable in Hong Kong. These factors include:

1. Firms' background
   i. Reputation
   ii. Technical competence/qualification
   iii. Experience with similar project
2. Past performance
   i. Cost control;
   ii. Quality of work;
   iii. Time control.

3. Capacity to accomplish the work
    i. Present workload;
    ii. Availability of qualified personnel;
    iii. Professional qualification/experience.
4. Project approach
    i. Approaches to time schedule;
    ii. Approaches to quality;
    iii. Design approach/methodology.

Thomas *et al.,* (2001) illustrated that project success depends on the selection and use of an appropriate procurement system. The results indicate that there are nine procurement selection criteria commonly used by Australian clients: speed, time certainty, price certainty, complexity, flexibility, responsibility, quality level, risk allocation and Price competition. Only time certainty and price certainty were seen by the respondents as unambiguous criteria, as the completion date and price can be objectively predicted by the client beforehand.

Mahon (2011) confirmed that the procurement selection parameter of client requirement for budget/cost requirements was universally rated as the single most influential parameter on procurement route selection. This was closely followed by client requirement for on time completion. These two parameters were clearly rated as being the most influential in terms of procurement selection. The next most influential parameters (risk factor) were client experience and client requirement for in terms of value for money.

Mortledge *et al*., (2006) summarized that the following project risk factors should be borne in mind when determining the most appropriate procurement method:

i. External factors: consideration should be given to economic, commercial, technological, political, social and legal factors when selecting a procurement method
ii. Client characteristics: a client's knowledge and experience with procuring construction projects will influence the procurement method adopted. Procurement selection is influenced by the culture of the organization and the degree of desired client involvement
iii. Project characteristics: the size, complexity, location and

uniqueness of the project should be considered as this will influence time, cost and risk.

iv. Ability to make changes: changes in projects are inevitable. The desired level of flexibility for the client to make changes during the project will influence the selection of a procurement method

v. Cost: an assessment for the need for price certainty prior to commencement of construction by the client should be undertaken. If price certainty is required, then design must be complete before construction commences and design changes minimized.

vi. Time: most capital works project are required within a specific time frame. If early completion is a critical factor then a procurement method that supports speedy completion may be favored.

Babatunde *et al*., (2010) indicated different traditional methods of contract procurement are the most adopted in project execution in Nigeria. In the study he revealed that project completion at estimated time ranks the highest factor considered for traditional method, while quality assurance ranks highest with non-conventional method. Also the study further revealed that the choice of variants of the traditional procurement method is made in order of consideration of project completion at estimated time; project completion at estimated cost; and availability of information at project inception. He further stated that choice of variants of the non-conventional procurement system is made in order of consideration of quality assurance; and a consideration of either project completion at estimated time or the consideration of the nature of the project. Project completion at estimated cost; minimization of construction time; minimization of design time are also considered as major factors in making choice of the variants of the non- conventional procurement method, indicating that much more factors are considered in making choice of the variants of the non conventional procurement method than the variants of traditional procurement methods in Nigeria. Ogunsanmi *et al.,* 2013 investigated the effects of procurement related factors on procurement selection criteria, tendering methods and variation orders on project performance. The researcher sampled Forty (40) construction organizations in Lagos metropolitan city. He indicated that cost, time, quality related factors, tendering methods and variation orders strongly affect project

performance. He opined that better management of projects in Nigeria, policy makers in government, clients, and private developers into housing projects should give adequate attention for selecting appropriate procurement methods by considering the effect of project risk factors. Idiake *et al*., 2015 revealed that Nigeria construction projects do suffer delays in efficacy & efficiency due to defects in procurement methods. This is the consequence of not considering the effect of project risk factors before making a particular choice of procurement method.

Odhigu and Yahya., (2011) explains that the procurement method is the outcome of a series of decisions which are made during the early stages of a project and it is one of the most important decisions facing the project client. No single procurement system can be applied universally on all construction projects. Each procurement system is chosen for a particular project based on consideration of the effect of risk factors use in selecting the procurement methods and these factors include: Time (Speed); Quality level; Risk allocation/avoidance; Flexibility to change design during both design and construction period; Responsibility; Complexity; Price competition; Certainty of cost and time; Disputes and arbitration; Project type; Client's experience; Experienced contractor availability; Client's willingness to be actively involved; Project site location; Client's trust in other parties; Political constraints; Project size; Regulatory impact; Market competitiveness; Client's requirement for value for money; Material availability; Client's financial capability.

Shiyamini and Rameezdeen (2006) focused on the selection criteria in terms of client requirements, project characteristics, and external environment, thus ensuring that the selection criteria have been focused at macro level. The results of factor analysis revealed nine significant factors from client requirements which are risk management, time availability and predictability, price certainty, Price competition, accountability, flexibility for changes, quality of works, responsibility and parties' involvement, and familiarity. Six factors from the project characteristics which are project cost and funding method, project complexity, project type, time constrains, degree of flexibility, and payment modality. Five factors from the external environment which are market completion, economic conditions and the fiscal policy, technology, socio cultural suitability, and regulatory environment. Husam and Sedki (2009) explained the result is fifteen criteria which are (Quality level, speed, flexibility for changes, technology, complexity, time predictability, certainty of cost, familiarity, responsibility, risk avoidance, accountability, client involvement, Price competition, availability of procurement system in the local market, and legal issues).

Since each procurement system has its own feature and peculiarity, it is very important that the effect of risk factors be considered when selecting the most appropriate procurement approach for a selection of procurement method (Rosli *et al*., 2006).

Love *et al*., (2008) in his study believed that the important risk factors to be considered during the procurement selection process should include: project value, project complexity, project type (standard/novelty), location (regional/local), stakeholder integration, political considerations, client needs, and industry culture. Surprisingly, political considerations and the prevailing industry culture were issues that participants wanted to discuss. It was perceived that the selection of a procurement method was often a 'fait au complait' for the agency. This is because of the requirement for cost certainty and the issues associated with probity and accountability, and thus deemed to be transparent features of the traditional procurement process.

Tran and Molenaar (2012) observed that the four following critical risk factors appear in all delivery method selection process (1) unexpected utility encounter; (2) third-party delays during construction; (3) geotechnical investigation; and (4) delays in reviewing and obtaining environmental approvals. This similarity indicates that these four critical risk factors are essential to consider for all delivery methods. However, it should be noted that the ranking of these factors diverge from one method to other methods. Eyitope *et al*., (2012) finds that a list of thirteen critical criteria was identified. These can be classified into four major areas of core consideration as follows;

A - Project technicality

1. Type/Complexity of the project;
2. Expected performance quality;
3. Design and product specifications;
4. Completion time.

B - Project business case and financing

1. Availability /Funding structure;
2. Number of competitors;
3. Price certainty and market structure.

C - Project risk management

1. Controllable variation;

2. Responsibility division and integration;
3. Risk sharing and allocation.

D - Public policy requirement

1. Specific government directive;
2. Trend in client's familiarity;
3. Political reasons and interference.

The selection of project procurement strategy should necessitate robust analysis of project environment, in terms policies, available resources, risk associated, technicality, and preferred contractual arrangements amongst all parties towards devising a method of project implementation and to achieving project goals of time, cost and quality.

Bhutto *et al.,* (2019) identified client capacity, time and cost overrun, quality certification and control, risk issues, nature and size of project, and government policy issues as project risk factors affecting selection of procurement method in public sector Construction projects. He added that consideration of the identified important risk factors will help public sector clients in the better selection of procurement method for different projects. Understanding the effect of project risk factors will help in selecting effective and efficient procurement method for goods, works and services to handle the project.

2.3.1 Project Risk Factors versus Procurement method Selection

Procurement method selection is highly influenced by project risk factors such as delivery time, quality and quantity of goods and services to be procured, design, natural disaster etc. Considering this risk factors, project team members often seek to select the best method that will help achieve better project performance. Informed decision on the right choice of procurement method to use is based on the need to consider the effect of various project risk factors (Alaeddin G. and Nuhu B. (2015)). The project risk factors were classified into two groups' namely external environment and internal environment (Ratnasabapathy *et al*. 2006). External environment include factors such as economics, politics, finance, legal, nature disasters, technology factors while internal environment are divided into three main factors namely; project characteristics, client's characteristics and client's requirement. He further sub-divided client requirements into cost related factors, time related factors and quality related factors. Figure 1 below shows how project risk factors relate and interrelate with each other and explains the complex and difficult task involved in selecting the right procurement method for goods, works and services.

Selection of procurement method that meets the needs for a particular type of goods works and services calls for employment of sound systematic procedure by clients (Ali *et al*., 2011). The procedure to be selected should ensure that the project risk factors are put into consideration prior to the decision to use a particular procurement method.

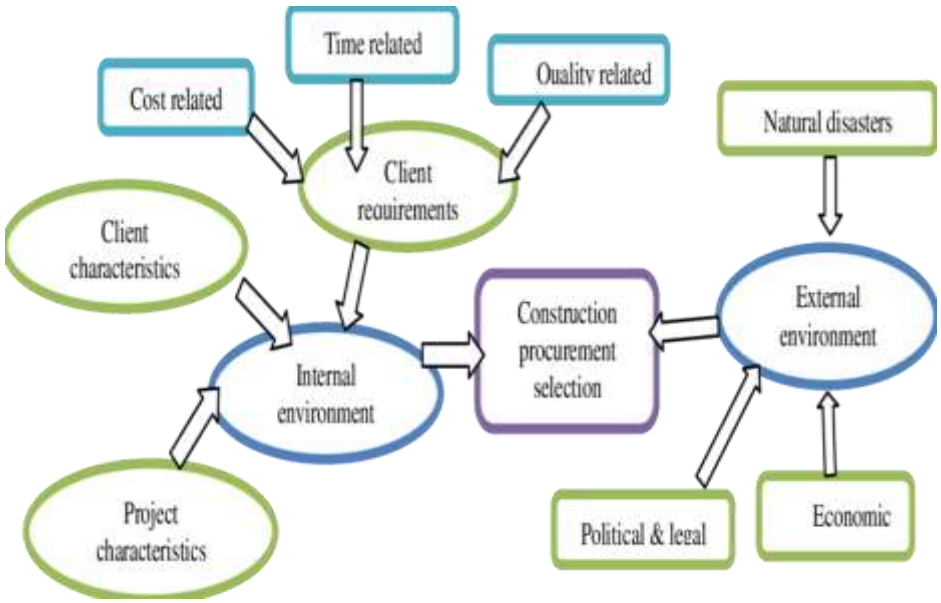

Figure 2.2: Factor effecting selection of a procurement method (Source: Ratnasabapathy *et al*. 2006)

Procurement method selection without consideration of risk factors pose great difficulties to clients and any failure to rise up to this challenge has often resulted in poor project performance (Alaeddin G. and Nuhu B. (2015)). Various attempts have thus been made by researchers over the years towards addressing these procurement issues. Love *et al*. (2008), stated that selection of an appropriate procurement method has two main components. The first component involves analysing and establishing priorities for project objectives and client attitudes to risk. The second involves considering possible options, evaluating them and finally selecting the most appropriate.

2.3.2 Research Gap

Bhutto *et al.,* (2019) dentified client capacity, time and cost overrun, quality certification and control, risk issues, etc as project risk factors affecting selection of procurement method both in public sector Construction projects. Research carried out by Idiake *et al*., 2015 revealed that Nigeria construction projects do suffer delays in efficacy & efficiency due to defects in procurement methods. Osama and Nabil (2013) used relative importance index method (RII) to identified six significant project risk factors that have most influence on the selection of procurement methods in construction projects in Gaza Strip. However, none these researchers had attempted to analyse the effect of project risk factors on procurement selection method in World Bank assisted project in South East Nigeria. This study categorized forty five (45) project risk factors in four groups using component parallel analysis. The effect of this four categories of project risk factors were analysed using regression analysis to identify the various contribution of each of the risk factors and their effect on the selection of procurement method for goods, works and services in World Bank assisted project in South East Nigeria.

2.4 ANALYTICAL FRAMEWORK

2.4.1 Project Risk Factors

While there are a number of published handbooks on project risk factors, Thompson and Perry (1996) stress that there is no “definite” method to carry out analysis of project risk factors. Basically, the method to be applied relies on the research questions that are to be answered. This fact is due to the prevalence of risk factors in all the phases of the life span of every project.

Internal and external risk factors that may affect selection of procurement method for goods, works and services can be identified through content analysis, interviews with subject matter experts, questionnaires, and brainstorming sessions with the project team and key project stakeholders. Tah, *et al*, [1993] observed

that project managers and experts can finalize and deduce perfectly the decision making about all risks in the construction industry by using quantitative or qualitative analysis method

2.4.2 Content analysis

Content analysis is a systematic research tool for analyzing and making inferences from text and other forms of qualitative information (e.g. from interviews focus groups, open ended surveys questions, documents, videos) to categorize, compare and contrast corpus of data (Coe & Scacco 2017). Based on the information obtained from the survey, key trends and themes will be identified through systematic coding. Content analysis has two approaches:

2.4.2.1 Quantitative content analysis,

Quantitative content analyses are based on previous research which allows for formulating of hypotheses among variables. The objective of quantitative content analyses is to obtain replicable and valid inferences from texts to the context of their use (Krippendorff, 2004). The text data will be methodically recorded and categorized for the statistical data analysis.

2.4.2.2 Qualitative content analysis.

Qualitative content analysis focuses on content generated by the existing repository of information such as journals, newspapers, historic documents, written communications through email, letters, etc. Roller and Lavrakas 2015, described qualitative content analysis as an approach to analyze the data that focus on describing the topics that are evident in the context of words and meanings when framed against the research objectives of the study

Qualitative methods are often suitable for small number of texts in the data whereas; quantitative content analysts is suitable for a larger number of textual data. To limits the size of the sample both qualitative and quantitative content analysis researchers sample text and choose text that is relevant for their purpose (White and Marsh, 2006). This provided the patterns and trends for analyzing Project risk factors on procurement selection method in south East Nigeria.

2.4.3 Component Factor Analysis

Factor analysis is an interdependence technique with the primary purpose of defining the underlying structure among the variables in analysis (Gorsuch, 2003). It provides the tools for investigating and analysing the structure of the interrelationships (correlations) among a large number of variables (e.g., test scores, test items, questionnaire responses) by defining sets of variables that are highly interrelated, known as factors and consolidate the variables in a principle manner (Beavers *et al*., 2013). The objective of factorial analysis is to study the underlying relationships in a set of variables, and group them in line with the meaning for what they collectively represent (latent variables). This is achieved by specifying the unit of analysis, achieving data summarization and/or data reduction, variable selection, and using the factors generated from analysis results in subsequent multivariate analyses such as ANOVA and regression (Gorsuch, 1983).

2.4.3.1 Identification of the unit of analysis

Factor analysis was used to identify dimensions that are latent structure of relationships among either variables or respondents by examining the correlations

between the variables or the correlations between the respondents. Factor analyses were applied to a correlation matrix of the variables (project risk factors) which were the unit of analysis of this study (*Hair et al*., 2014).

2.4.3.2 Data summarization/Reduction

The fundamental concept involved in data summarization is the definition of structure. Through structure, the set of variables at various levels of generalization, ranging from the most detailed level (individual variables themselves) to the more generalized level, where individual variables are grouped and then viewed not for what they represent individually, but for what they represent collectively in expressing a concept (Hair, 2014). Also to achieve data reduction representative variables from a much larger set of variables for use in subsequent multivariate analyses will be identified. An entirely new set of variables, much smaller in number, to partially or completely replace the original set of variables are created (Anderson, 2003). The purpose of identification and creating new variable is to retain the nature and character of the original variables, but reduce their number to simplify the subsequent multivariate analysis (Hair, 2014). In this study structures were defined by the interrelatedness among project risk factors (variables) allowing for the specification of a smaller number of dimensions (factors) representing the original set of variables. For example, the twenty (20) project risk factor (variables) derived from content analysis were summarized into four project risk factors namely project completion time and risk avoidance, price certainty for allocation of project responsibility, clients experience in handling project and Contract funding arrangement and quality services.

2.4.3.3 Variable selection

Variables were selected based on having a conceptual basis for any variables to be analyzed. Gorsuch, 2003 noted that factor analysis is most efficient when conceptually defined dimensions can be represented by the derived factors. The potential dimensions that can be identified through the character and nature of the variables submitted were specified. To avoid the possibility of poor result, care was taken to ensure that quality and meaning of the derived factors reflect the conceptual underpinnings of the variables to be selected for the analysis.

2.4.3.4 Use of factor analysis results

Factor analysis, provides a clear understanding of which variables may act in concert and how many variables may actually be expected to have impact in the analysis (Gorsuch, 1983). It also provides the basis for creating a new set of variables that incorporate the character and nature of the original variables in a much smaller number of new variables, whether using representative variables, factor scores, or summated scales.

Factor analysis generates vectors of factor loadings, one vector for each factor, and generates a number that typically is much less than the original number of variables. From the loadings we can construct a ranking in continuous latent space for each factor.

Common factors are interpreted by evaluating the magnitude of their loadings which give the ordinary correlation between an observable attribute and a factor.

Factor loadings may display magnitudes and signs that do not make sense to informed observers and, as a result, may not be easily interpretable in every case.

2.4.3.5 Correlation Analysis

Correlation analysis will be used to determine the degree of relationship between the dependent and independent variables. Hence, the closer r is to zero, the weaker the

association between the ranks in the analysis there exists a correlation coefficient which measures the strength and direction between the variables. The value of correlation coefficient (rs) ranges from -1 to +1 at p = 0.05. A correlation of 1.00 indicates that changes in one variable are always matched by changes in the other or a correlation of -1.00 shows that increase in one variable is matched by decrease in the other variables (Gupta, 2011). For a simple regression analysis, the correlation coefficient between two variables can be computed using the equation

Coefficient Of Correlation r = $\sqrt{\frac{n\,(\sum xy)-(\sum x)\,(\sum y)}{N(\sum x^2)-(\sum x)^2\,n(\sum y^2)-(\sum y)^2}}$ Equation 3.3

Where γ is the dependent variable, X is the independent variable and n is the number the number of paired observations.

The square of the correlation coefficient r^2 provides a measure of percentage of variability in the value of γ that is explained by the independent variables, it is called the coefficient of determination. The possible value of r^2 ranges from 0 to 1.00. The closer r^2 is to 1.00 the closer the percentage of explained variation. A high value of r^2, say 0.8 or more would indicate that the independent variables are good predictors of the dependent variable. A value of say 0.25 or less would indicate a poor indicator, and a value of 0.25 to 0.8 would indicate a moderate predictor.

For the purpose of this study:

Υ = Method of Procurement selection Contract funding arrangement and quality services

X_1 = Project completion time and risk avoidance

X_2 = Price certainty for allocation of project responsibility

X_3 = Clients experience in handling project

X_4 = Contract funding arrangement and quality services

The aim is to statistically and quantitatively establish how critical each project risk factors are for successful selection of procurement method in World Bank assisted project in South East Nigeria.

2.4.3.6 Multiple Regression Model

The multiple regressions was used to measures the relationship existing between three or more variables and to examine the nature of the relationship between a given dependent variable and two or more independent variables in a regression function. The relationship between the explanatory variables and outcome is described by a mathematical model, for example the regression equation that relates the explanatory variables denoted by X's with the outcome denoted by γ. A coefficient of multiple determination R^2 is used to show the percentage of the variation in γ explained by changes in the explanatory variables (Xs'), it is also employed to determine the 'goodness of fit' of the regression line. A number of studies have used the model extensively (Chidiebere-Mark, *et al.,* 2011).

A simple linear regression model is stated as follows;

$$\gamma = \beta_o + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta n Xn + \epsilon_i \qquad \text{Equation 2.4}$$

γ = Dependent variable

$X_1, X_2, \ldots, Xn$ are the independent variables

β_o = a constant value of γ when all X values are 0

$\beta_1, \beta_2, \ldots, \beta n$ are net regression coefficients

For instance, β_o measures the change in X_1 while holding the other values constant.

ϵ_1 = Independent and normally distributed random error term with mean zero

The coefficients (βo, β_1 and β_2) were chosen so that the sum of squared errors is minimized. Given the criterion of least square, the mean of the errors is zero and the errors correlate zero with each independent variable. If the dependent and independent variables are all standardized, the regression coefficients are all standardized. The regression coefficients are called beta weights. A beta weight equals the correlation when there is a single independent variable. If there are two or more independent variables, a beta weight can be greater than +1 or lesser than -1.

2.4.3.7 Analysis of Variance

The Analysis of variance (ANOVA) is a technique of partitioning the total variation of data into useful components, which provide means of measuring different source of variation. They also help to ascertain the tenability of the null hypothesis formulated for study at 0.05 level of probability (Nworuh, 2014).

Table 2.3: Variance Table

Source of Variation	**Sum of square**	**D,F**	**M,S**	**F-ratio**
Regression groups	SSR	K	MSR = SSR/K	F =MSR/MSE

Error	SSE=SST-SSR $= \sum y^2(1-R^2)$	n-k-1	MSE = SSE/n-k-1	
Total	SST = y^2	n-1	-	-

The following calculations are carried out in ANOVA multiple regression.

SSR = Sum of squares of Regression

SSE = Sum of square Error

SST = Sum of Squares of Total variation (Y) or dependent variables.

K = Number of independent Variables (X_{1}-- X_k)

n = Number of observation

In multiple regressions, the *F-test* statistic (F=MSR/MSE) is used in testing the equality of group (respondent) means which under the null hypothesis Ho has F (K, n-k-1) F-distribution critical value based on the chosen α level with k degrees of freedom DFR and DFE.

The null hypothesis states that $Ho_1 = H_{A2} = ... = H_k = 0$,

And the alternative hypothesis simply states that at least one of the parameters large values of the test statistic provide evidence against the null hypothesis.

$H_j \neq 0$, j = 1, 2, ,,, *k.*

Ho is accepted at the significant level if F < Fi – α (k, n-k-1) otherwise, H_o is rejected in favour of H_A: F1-α (k, n-k-1) from the statistical table.

However, the F test does not indicate which of the parameter $Hs_j \neq$ is not equal to zero, only that at least one of them is linearly related to the response variable.

2.4.3.8 Cluster Analysis

Cluster analysis or clustering is a multivariate technique of grouping a set of objects in such a way that objects in the same group (called a cluster) are more similar (in some sense or another) to each other than to those in other groups (clusters). It is a main task of exploratory data mining, and a common technique for statistical data analysis, used in many fields, including machine learning, pattern recognition, image analysis, information retrieval, and bioinformatics. Cluster analysis classifies a set of observations into two or more mutually exclusive unknown groups based on combinations of interval variables. The purpose of cluster analysis is to discover a system of organizing observations, usually people, into groups where members of the groups share properties in common. It is cognitively easier for people to predict behavior or properties of people or objects based on group membership, all of whom share similar properties. It is generally cognitively difficult to deal with individuals and predict behavior or properties based on observations of other behaviors or properties. There are three variations of cluster analysis: Hierarchical Cluster Analysis, K-Means Cluster Analysis and Two Step Cluster Analysis.

For the purpose of this research, The Two Step Cluster Analysis is used; which basically combines the ability of Hierarchical and K-Means Cluster Analysis.

The cluster analysis will help us group the project risk factors around the seven (7) identified World Bank assisted projects in South East Nigeria, and help us determine which project risk factor(s) is/are peculiar to each Project.

2.4.3.9 Descriptive Analysis

Descriptive analyses (statistics) are used to describe the basic features of the data in a study. They provide simple summaries about the sample and the measures. Simple graphics analyses are used to form the basis of virtually every quantitative analysis of data. Descriptive statistics were simply used for describing what is or what the data shows. On the hand, using inferential statistics, conclusions will be drawn that extend beyond the immediate data alone.

Descriptive Statistics were also used to present quantitative descriptions in a manageable form. It is obvious that in a research study of this nature, descriptive statistics help in simplifying and reducing lots of data into a simpler summary. In this study, descriptive analysis is used to analyze the demographic data collected from respondents.

CHAPTER THREE

METHODOLOGY

This chapter outlines the details of the research methodology by presenting research design, population of the study, sampling techniques, sample size, data collection procedure, validity, reliability and data analysis.

3.1 Design

The research design adopted for this study is field survey. This involved oral interview, administration of questionnaires, library research to review the works of other authors in this area.

3.2 Sources of Data

The study made use of both primary and secondary data. The primary data was generated from administering structured and standardized questionnaire on project risk factors that can affect selection of procurement methods in World Bank assisted projects in South East Nigeria. The essence of primary and secondary data is to integrate the benefits of sound theoretical knowledge with current practical realities in the field which will lead to more realistic solutions.

Sources of secondary data include, desk research (analysis of manifest contents of existing literature on the subject matter, journals, standard text books, conference and workshop papers.

3.3 Population of the Study

The population studied in this research work consisted of World Bank assisted projects in South East Nigeria, namely; Nigeria Erosion and Watershed Management Project (NEWMAP), Rural Access and Mobility Project (RAMP II), Third National Fadama Development Project (NFDP- III), Community and Social Development Project (CSDP), Public Sector Governance Reform and Development reform Project (PSGRDP), HIV/AIDS Program Development Project (HPDP II) and Health System Development Project (HSDP). The researcher adopted purposive sampling or judgemental technique to solicit the requisite information from the officials and management members whose core functions entail executing various shades of procurement activities in World Bank assisted project. According to Pfeil and

Zaphiris (2010), purposive sampling is a non-probability sampling technique in which an experienced individual selects the sample based on his or her judgement about some appropriate characteristics required of the sample member. The data collection instrument used was questionnaire.

Based on the administered questionnaire, relevant data such as sex, gender, education background, years of experience in procurement selection, type of organization, type of trainings, and involvement in procurement activities were retrieved. Other information such as the effect of project risk factor on selection procurement method was also extracted. Some experts preferred to be treated as anonymous without reference to their organization in this work.

3.4 Sampling Design and Procedure.

The Researchers used purposive sampling which according to the opinion of Buchanan (2000), samples that satisfy their specific purposes even if they are not fully representative may be selected. Moreover, every possible sample of a given size has an equal chance of being drawn from a population. According to Nworuh G.E (2014), a good sample must be a good representative of the population. The afore-mentioned sampling procedure enabled the researcher to pick up the necessary data which will be processed methodically to achieve information for analysis (Uhegbu, 2009).

The sample size for the study is drawn from the project team of the seven World Bank assisted projects in South East Nigeria. Yamane's (1967) formula as sited by Uhegbu, 2009 was used to calculate the sample size from the population of the project team of the seven World Bank assisted Project in South East Nigeria at 95% confidence level.

$$n = \frac{N}{[1 + N(e^2)]} \quad \text{.....}$$

Equation 3.1

Where N = Population size for the study

n = Sample size for finite population

e = Error limit

1 = Constant

$$n = \frac{40000000}{[1 + 40000000(0.05^2)]} = 400$$

Base on the equation above a sample size of 400 was used to represent the entire population. A total number of Three Hundred and Fifty Nine (359) questionnaires representing 89.75 % were received out of the Four Hundred (400) questionnaires that were issued. The Four Hundred (400) questionnaires were distributed as follows: Sixty (60) to Nigeria Erosion and Watershed Management Project (NEWMA), Fifty Eighty (58) to Community and Social Development Project, Sixty Five (65) to National Fadama Development Project (NFDP-III), Fifty (50) to HIV/AIDS Program Development Project (HPDP), Fifty Five (55) to Health System Development Project (HSDP), Fifty Five (55) to Public Sector Governance Reform Development Project (PSGRDP), Fifty Seven (57) to Rural Access and Mobility Project (RAMP) , Table 3.1 shows the percentage of the received questionnaires to number issued to the various World Bank assisted projects in South East Nigeria.

Table 3.1: Percentage of Questionnaires issued in relation to the number issued to project team Members.

S/n	World Bank Assisted Projects	Concerned Sample size	No of Respondents	Percentages (%)
1	NEWMAP	60	55	91.67
2	CSDP	58	50	86.21
3	NFDP-III	65	60	92.31
4	HPDP	50	47	94.00
5	HSDP	55	50	90.91
6	PSGRP	55	49	89.09
7	RAMP	57	48	84.21
Total		400	359	89.75

The questionnaire was formulated in a simple manner for clarity sake base in analysing the effect of project risk factors on selection of procurement method in World Bank assisted project in South East Nigeria which was the main objective of this research. Furthermore, the questionnaire was prepared in multiple choice formats for the purpose of providing alternative sets of answers that best represent the actual perception and situation on ground.

These alternative set of answers, were outlined in five grade points (1-5) as shown below

Table 3.2: Likert five point grade scales

Views	Grade points
Not at all	1
Rarely	2
Sometimes	3
Often	4
Very often	5

The entire research was carried out in South- east geopolitical zones of Nigeria. Questionnaires were distributed to project team members of the seven World Bank projects domiciled in the Ministries, Departments and Agencies in South East Nigeria. (targeting Project managers, Engineers, Procurement Officers, Economists, Environmentalist, Quantity Surveyors Architects and Accountants) to ensure that their opinion reflects the people's view.

The identified World Bank assisted projects were selected because the researcher felt that the projects represent the population and embrace the technical information the researcher was seeking to obtain.

3.5 Data Collection Instrument

The study used questionnaire based on a five point Likert ordinal scale (ranging from "Not at all' to 'Very Often") to obtain the perception of procurement practitioners and project team members on the effect of project risk on the selection of procurement methods. The questionnaires were administered to Project Managers /Coordinators, Project Engineers, Environmentalists, Economists, Quantity Surveyors, Architects, Procurement Officers, Accountants and other project team

members in World Bank assisted projects in South East Nigeria. The respondents possess technical and professional skills, as well as academic qualification and experience in World Bank assisted projects. A total of 400 questionnaires were evenly distributed amongst the seven (7) identified World Bank assisted project in five states of South East Nigeria. Each State received 80 questionnaires and each world bank assisted project in each state received a minimum of eleven. Three Hundred and Fifty Nine (359) questionnaires representing 89.75 % were returned; Nine (9) were discarded for having errors and not properly filled. A total of Three Hundred and Fifty (350) valid questionnaires were adopted and used for this research.

3.6 Validity and Reliability of the Instrument

To ensure the validity of the instruments (Questionnaire), the study subjected the instruments to face-to-face validity by giving it to procurement experts, project managers and the supervisor. The aforementioned examined the items contained in the questionnaire and ensured that they were in line with the objectives of the study. The structure and language of the questionnaire were also modified as necessary to reflect their corrections. The design instruments were structured in such a way as to minimize the effect of errors of inconsistency and ambiguity. Furthermore, the study made good use of Cronbach's alpha in the test to determine the reliability and internal consistency of the instrument. The authenticity and genuineness of the instrument, both in content and framing, was reflected in the result gathered.

3.7 Method of Data Analysis

In this study Statistical Package for Social Sciences (versions SPSS 23.0) for windows and Microsoft Excel was used to analyse data through:

i. Descriptive Statistics

ii. Factor Analysis

iii. Correlation analysis for reliability

iv. Multiple Regression Analysis.

Cluster Analysis

3.7.1 Descriptive Analysis

Descriptive analyses (statistics) were used to describe the basic features of the data in a study. They provided simple summaries about the sample and the measures. Simple graphics analyses were used to form the basis of virtually every quantitative analysis of data. Descriptive statistics were simply used for describing what was or what the data show. On the hand, using inferential statistics, conclusions were drawn that extend beyond the immediate data alone.

Descriptive Statistics were also used to present quantitative descriptions in a manageable form. It is obvious that in a research study of this nature, descriptive statistics help in simplifying and reducing lots of data into a simpler summary. In this study, descriptive statistics were used to analyse the demographic data collected from respondents.

3.7.2 Factor Analysis

Factor analysis is just such a data reduction technique used for study phenomenon that affected by a small number of factors (latent variables), which cannot be measured directly, but a large number of observable variables, which are a function of those factors (Johnson and Wichern, 2007). It is a family of procedures for removing the redundancy from a set of correlated variables and representing the variables with a smaller set of derived variables, or factors. Alternatively, the factor analysis procedure can be thought of as removing the duplicated

information from among a set of variables, or, we may think of it loosely as the grouping of similar variables.

To select one solution, we embrace an oblimin rotation which seeks to rotate the common factors so that the variation of the squared factor loadings for a given factor is made large. Factor analysis generates vectors of factor loadings, one vector for each factor, and generates a number that typically is much less than the original number of variables. From the loadings we can construct a ranking in continuous latent space for each factor.

Common factors are interpreted by evaluating the magnitude of their loadings which give the ordinary correlation between an observable attribute and a factor.

Factor loadings may display magnitudes and signs that do not make sense to informed observers and, as a result, may not be easily interpretable in every case.

3.7.3 Applications of Factor Analysis

Due to the long list of project risk factors we have adapted for use in this research work, there is need to evaluate the structure and relationship between these factors (variables) and try to reduce them. Factor analysis was used to reduce the number of variables by carefully approving and using only those risk factors that are relevant and that would have significant impact on this research work and in World Bank assisted projects in South East Nigeria. Experienced procurement officers and other project team members contributed positively in reducing the number of factors.

3.7.4 Correlation Analysis

Correlation analysis will be used to determine the degree of relationship between the dependent and independent variables. Hence, the closer r is to zero, the weaker the

association between the ranks in the analysis there exists a correlation coefficient which measures the strength and direction between the variables. The value of correlation coefficient (rs) ranges from -1 to +1 at p = 0.05. A correlation of 1.00 indicates that changes in one variable are always matched by changes in the other or a correlation of -1.00 shows that increase in one variable is matched by decrease in the other variables (Gupta, 2011). For a simple regression analysis, the correlation coefficient between two variables can be computed using the equation:

$$\text{Coefficient Of Correlation } r = \sqrt{\frac{n\,(\sum xy) - (\sum x)\,(\sum y)}{N(\sum x^2) - (\sum x)^2\, n(\sum y^2) - (\sum y)^2}} \qquad \text{Equation 3.2}$$

Where γ is the dependent variable, X is the independent variable and n is the number the number of paired observations.

The square of the correlation coefficient r^2 provides a measure of percentage of variability in the value of γ that is explained by the independent variables, it is called the coefficient of determination. The possible value of r^2 ranges from 0 to 1.00. The closer r^2 is to 1.00 the closer the percentage of explained variation. A high value of r^2, say 0.8 or more would indicate that the independent variables are good predictors of the dependent variable. A value of say 0.25 or less would indicate a poor indicator, and a value of 0.25 to 0.8 would indicate a moderate predictor.

For the purpose of this study:

Υ = Method of Procurement selection Contract funding arrangement and quality services

X_1 = Project completion time and risk avoidance

X_2 = Price certainty for allocation of project responsibility

X_3 = Clients experience in handling project

X_4 = Contract funding arrangement and quality services

The aim is to statistically and quantitatively establish how critical each project risk factors are for successful selection of procurement method in World Bank assisted project in South East Nigeria.

3.7.5 Multiple Regression Analysis

This method would be able to capture analysis which could not be carried out by the use of percentage or averages. The multiple regression measures the relationship existing between three or more variables. It also helps to examine the nature of the relationship between a given dependent variable and two or more independent variables in a regression function.

The Analysis of variance (ANOVA) is a technique of partitioning the total variation of our data into useful components, which provide means of measuring different source of variation (Obi, 1986). However, the procedures for testing the equality of three or more means were done via SPSS statistical tool to ascertain the combine effect of the identified project risk factors on procurement selection method in World Bank assisted project in South East Nigeria. They also help to ascertain the tenability of the null hypothesis formulated for study at 0.05 level of probability (Nworuh, 2014).

Table 3.3: Variance Table

Source of Variation	**Sum of square**	**D,F**	**M,S**	**F-ratio**
Regression groups	SSR	K	MSR = SSR/K	F =MSR/MSE
Error	SSE=SST-SSR $= \sum y^2(1-R^2)$	n-k-1	MSE = SSE/n-k-1	
Total	SST = y^2	n-1	-	-

The following calculations are carried out in ANOVA multiple regression.

SSR = Sum of Squares of Regression

SSE = Sum of Square Error

SST = Sum of Squares of Total variation (Y) or dependent variables.

K = Number of independent Variables (X_{1--} X_k)

n = Number of observation

In multiple regressions, the *F-test* statistic (F=MSR/MSE) is used in testing the equality of group (respondent) means which under the null hypothesis Ho has F (K, n-k-1) F-distribution critical value based on the chosen α level with k degrees of freedom DFR and DFE.

The null hypothesis states that $Ho_1 = H_{A2} = ... = H_k = 0$,

And the alternative hypothesis simply states that at least one of the parameters large values of the test statistic provide evidence against the null hypothesis.

$H_j \neq 0$, j = 1, 2, ,,, *k*.

Ho is accepted at the significant level if F < Fi – α (k, n-k-1) otherwise, H_o is rejected in favour of H_A: F1-α (k, n-k-1) from the statistical table.

However, the F test does not indicate which of the parameter $Hs_j \neq$ is not equal to zero, only that at least one of them is linearly related to the response variable.

$$\gamma = \beta_o + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta n Xn + \epsilon_1 \qquad \text{Equation 3.3}$$

γ = Dependent variable

$X_1, X_2, ..., Xn$ are the independent variables

β_o = a constant value of γ when all X values are 0

$\beta_1, \beta_2, ..., \beta n$ are net regression coefficients

For instance, β_o measures the change in X_1 while holding the other values constant.

ϵ_1 = Independent and normally distributed random error term with mean zero

CHAPTER FOUR

RESULTS AND DISCUSSION

This chapter focuses on presentation, analysis and description of the collected data based on observations from the well-structured questionnaire distributed to respondents. Descriptive analysis were used to describe variables such as, age group, academic qualification and training, profession, years of experience on the job, type of organization where respondents work and the results were presented in tabular format, pie or bar charts and histogram for easier understanding. Frequencies and percentages of each of the variables were also computed. Factor Analysis, Multiple Regression Analysis, and Pearson Correlation were used to analyse the data collected.

4.1.1 Primary Data Presentation and Analysis

4.1.1.1 World Bank assisted project in South East Nigeria

Table 4.1: World Bank Assisted Projects in South East Nigeria

	Frequency	Percent	Valid Percent	Cumulative Percent

Valid	NEWMAP	55	15.7	15.7	15.7
	CSDP	48	13.7	13.7	29.4
	NFDP-III	60	17.1	17.1	46.6
	HPDP	44	12.6	12.6	59.1
	HSDP-AF	50	14.3	14.3	73.4
	PSGRP	48	13.7	13.7	87.1
	RAMP	45	12.9	12.9	100.0
	Total	350	100.0	100.0	

Source: Field Work n=350

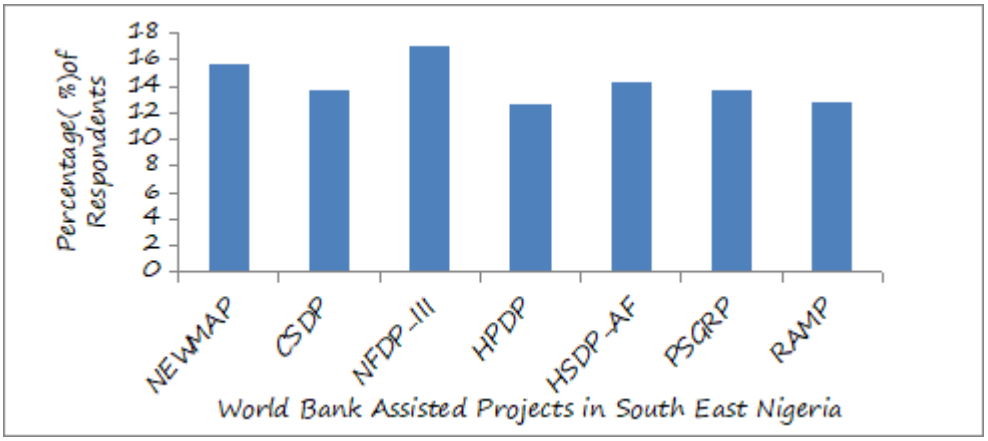

Figure 4.1: Histogram representation of percentage respondents from selected World Bank assisted project in South East Nigeria.

Table 4.1 above shows the number of respondents from each of the Seven (7) identified World Bank assisted project in South East Nigeria. NFDP-III had the highest percentage of respondents (17.10%) followed by NEWMAP with percentage respondents of 15.70%. The lowest percentage of respondents was from HPDP with a percentage of 12.60%. Figure 4.1 is the Histogram representation of percentage respondents from selected World Bank Assisted Project in South East, Nigeria.

4.1.1.2 Position of Respondents.

Table 4.2: Frequency and percentage of respondents in seven World Bank Assisted Project in South Eastern Nigeria.

Project Team Members

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Project Manager	26	7.4	7.4	7.4
	Project Engineers	32	9.1	9.1	16.6
	Environmentalists	33	9.4	9.4	26.0
	Economists	43	12.3	12.3	38.3
	Quantity Surveyors	32	9.1	9.1	47.4
	Architects	31	8.9	8.9	56.3
	Procurement Officers	60	17.1	17.1	73.4
	Accountants	52	14.9	14.9	88.3
	Others	41	11.7	11.7	100.0
	Total	350	100.0	100.0	

Source: Field Work n=350

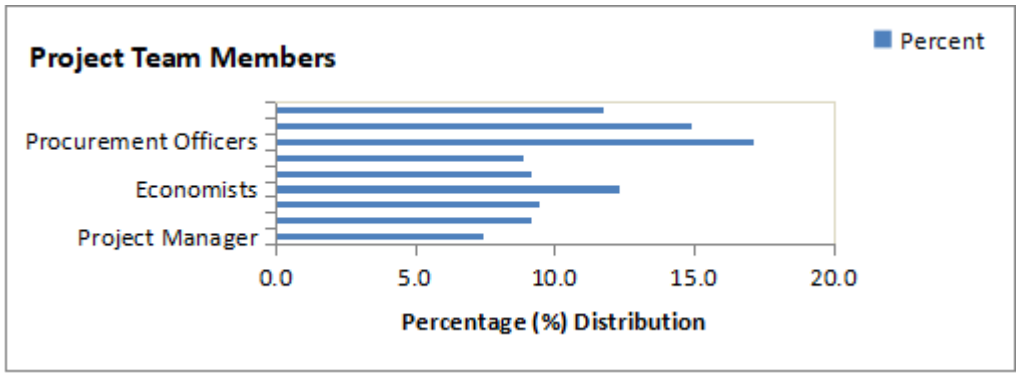

Figure 4.2: Bar Chart showing the frequency and percentage of the Project Team in World Bank assisted project in South East Nigeria

Table 4.2 above show the frequency and percentage project team members in the seven World Bank Assisted Projects that responded to the questionnaire. Out of the a total number of 350 individuals that responded, 7.40% are Project Managers, 9.10 % are Project Engineers and Quantity Surveyors each, 9.40 % are and Environmentalist, 12.30 % are Economist, 8.90% are Architects, 17.10 % are Procurement Officers, 14.90 % are Accountants and 11.70% are respondents from other positions in the Project.

4.1.1.3: Respondents year of experience

Table 4.3: Percentage years of experience by respondents in procurement activities

Years of Experience in Procurement

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No ne	50.00	14.30	14.30	14.30
	1 - 10 Years	183.00	52.30	52.30	66.60
	11 - 20 Years	92.00	26.30	26.30	92.90
	21 - 30 Years	24.00	6.90	6.90	99.70
	Above 30 Years	1.00	0.30	0.30	100.00
	Total	350.00	100.00	100.00	
Source: Field Work n=350					

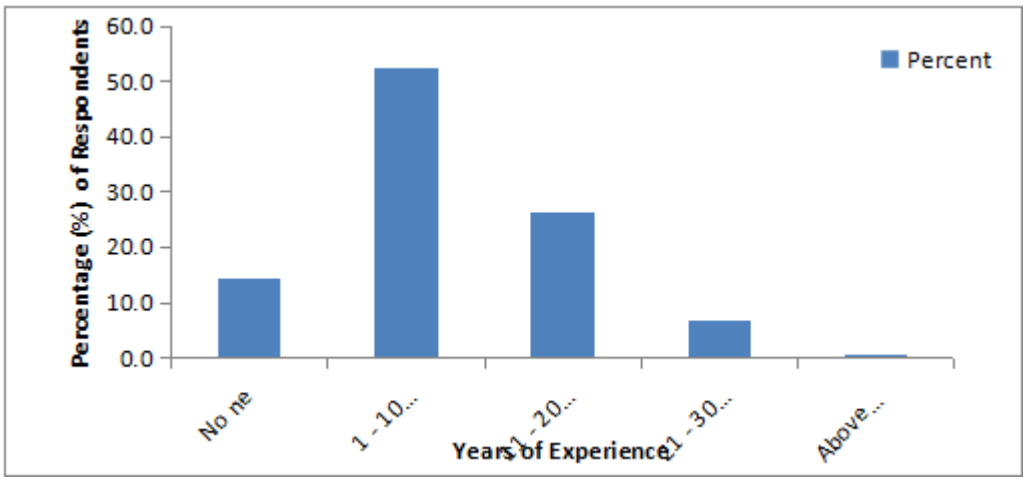

Figure 4.3: Histogram of Percentage years of experience of respondents

Table 4.3 show that 52.30 % of respondents have 1-10 years experience, 26.30 % have 11-20 years experience , 6.90% of the respondents have 21-30 years experience in procurement activities. Among the respondents only 0.30% had between above 30 years experience in procurement activities. Figure 4.4 presents the Histogram of Percentage years of experience of respondents in the Seven (7) identified World Bank assisted projects in South East Nigeria.

4.1.1.4: Respondents Qualification.

Table 4.4**:** Percentage Qualification of Respondents in World Bank assisted project in South East Nigeria**.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	HND	88.00	25.14	25.14	25.14
	BSc / B.Eng	153.00	43.71	43.71	68.86
	MSc / MBA	95.00	27.14	27.14	96.00

PhD	14.00	4.00	4.00	100.00
Total	350.00	100.00	100.00	

Source: Field Work n=350

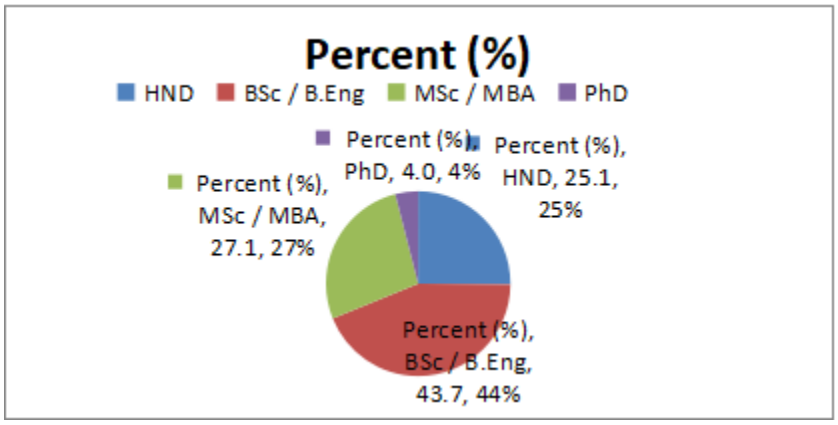

Figure 4.4: Pie Chart representing the percentage (%) distribution of Respondents Qualification

More than 43.71% of the project team in the selected World Bank assisted Projects in South East Nigeria have first degree in their field of study, 27.14 % have Masters degree and 25.14% holds a HND in their field of study. Only 4.00% holds Doctorate degree among the respondents (Table 4.4). In all 100 % of the respondents possess University degree and this support that the information obtained from the research work is from knowledgeable individuals who are professional in handling procurement issues. Figure 4.4 shows the Pie Chart representing the percentage (%) distribution of Respondents Qualification in World Bank assisted projects in South East Nigeria.

4.1.1.5 Respondents Training

Table 4.5: Training of respondents in procurement activities

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Trained	75.00	21.43	21.43	21.43

Trained	272.00	77.71	77.71	99.14
Not Aware	3.00	0.86	0.86	100.00
Total	350.00	100.00	100.00	

Source: Field Work n=350

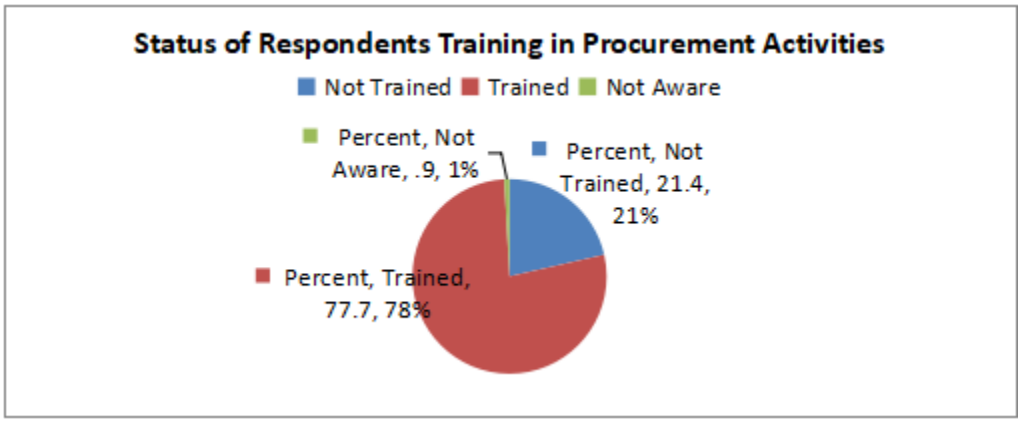

Figure 4.5: Pie Chart of percentage distribution of Respondents training.

A total of 77.71 % of all the respondents for this research work received training in all aspect of procurement (goods, works and Consultancy services) or at least in one aspect of procurement (Table 4.5). It is only a small fraction of the population (21.43 %) who although may have been involved in one aspect of procurement or the other that have not received any form of formal training. Among the respondents only about 0.86 % were no aware of any training. Figure 4.5 is the Pie Chart of percentage distribution of Respondents training among the respondents in Seven (7) identified World Bank assisted Projects in South East Nigeria

4.1.1.6 Category of procurement training received by respondents

Table 4.6 Percentage of procurement training received by category

	Frequency	Percent	Valid Percent	Cumulative Percent

Valid	Goods, Works and None Consulting Services	86.00	24.57	24.57	24.57
	Consulting Services	80.00	22.86	22.86	47.43
	Both	88.00	25.14	25.14	72.57
	None	96.00	27.40	27.40	100.00
	Total	350.00	100.00	100.00	

Source: Field Work n=350

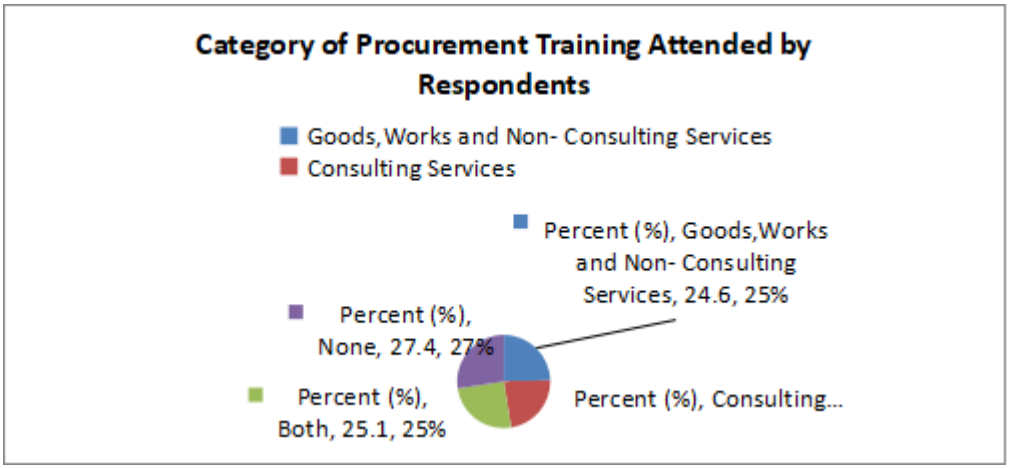

Figure 4.6: Pie Chart category wise distribution of training of respondent in procurement

Analysis shows that 24.57 % of all the respondents received training in Works, Goods and Non Consulting Services only, 22.86 % in Consultancy Services only, 25.14% in both Works, Goods and non consulting Services and Consulting Services (Table 4.6). In all a total of 72.57 % of the respondents had received training in at one category of procurement. The result further show that more respondents are trained in the procurement of Goods, Works and None Consulting Services (24.57 %) than in Consulting Services (22.86 %).The high percentage in the training of respondents in this

category of procurement could be the reason why many procurement practitioners are more conversant with the procurement selection method for this goods, Works and Non-Consulting Services. However, only 27.40% did not receive any formal training in procurement.

4.1.1.7 Involvement of respondents in Procurement method Selection

Table 4.7: Percentage of respondents involved in procurement method selection

Involvement in Procurement Method Selection

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Involved	273.00	78.00	78.00	78.00
	Not Involved	77.00	22.00	22.00	100.00
	Total	350.00	100.00	100.00	

Source field work, n=350

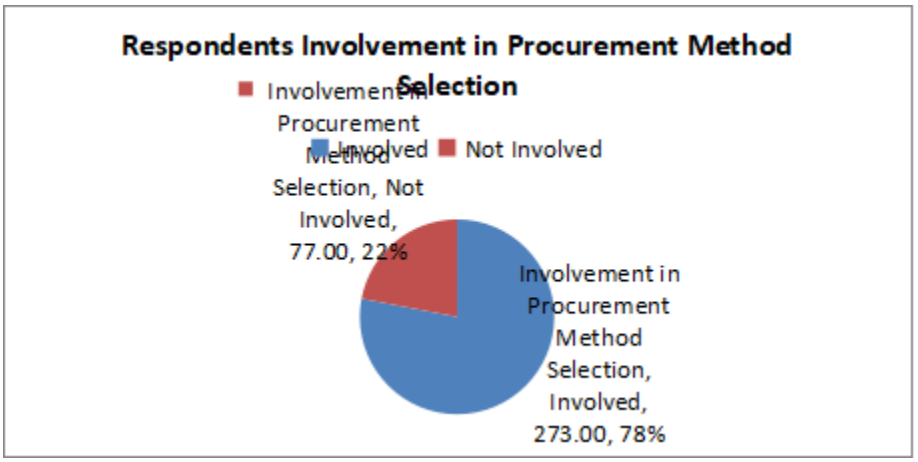

Figure 4.7: Pie Chart of the Percentage Distribution of respondents' involvement in procurement method selection

Table 4.7 Showed that 78.00 percent of all the respondents in the seven selected World Bank assisted project in South East Nigeria are involved in procurement method selection for their projects. However, 22.00 % of respondents were not involved. This shows that not all Project Team are part of the procurement team for their projects. Figure 4.7 is the Pie Chart of the Percentage distribution of respondents' involvement in procurement method selection in the seven selected World Bank assisted project in South East Nigeria.

4.1.1.8 Selection of Procurement Method for Goods for Goods, Works and Non - Consulting Services

Table 4.8: Percentage of respondents preference for methods selection for Goods, Works and Non - Consulting Services

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	ICB	77.00	22.00	22.00	22.00
	NCB	62.00	17.71	17.71	39.71
	NS	65.00	18.57	18.57	58.28
	DC	40.00	11.43	11.43	69.71

FA	26.00	7.43	7.43	77.14
LCB	54.00	15.40	15.40	92.54
LS	14.00	4.04	4.04	96.58
OM	6.00	1.71	1.71	98.29
None	6.00	1.71	1.71	100.00
Total	350.00	100.00	100.00	

Source: Field work. n=350

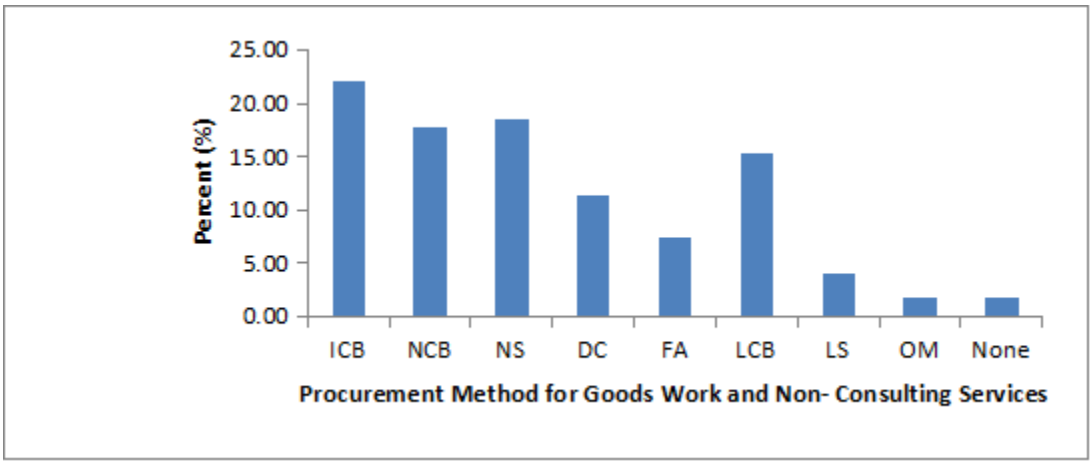

Figure 4.8: Histogram of percentage distribution of Preferred Procurement Selection Method for Goods, Works and Non - Consulting Services.

Analysis of result (Table 4.8) shows that ICB is the most preferred procurement method with the highest percentage value of 22.00 %. National Shopping and National Competitive Bidding were the second and third most preferred procurement methods with values of 18.57 % and 17.71 %, respectively. Local Shopping and Other procurement method were the least preferred procurement method for goods, works and non-consulting services. Figure 4.8 shows the Histogram of percentage distribution of preferred procurement selection method for goods, works and non - consulting services in the seven identified World Bank assisted projects**.**

4.1.1.9 Selection of Procurement Method for Consultancy Services

Table 4.9: Percentage of respondent's preference for selection of procurement method for Consultancy Services

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	QCBS	74.00	21.14	21.14	21.10
	CQS	51.00	14.57	14.57	35.71
	ICS	65.00	18.57	18.57	54.28
	FBS	40.00	11.43	11.43	65.71
	LCS	38.00	10.86	10.86	76.57
	SSS	33.00	9.43	9.43	86.00
	OSM	29.00	8.29	8.29	94.29
	NONE	19.00	5.71	5.71	100.00
	Total	350	100.0	100.0	

Source: Field work. n=350

QCBS = Quality and Cost Based Selection

CQS = Consultant Qualification Selection

ICS = Individual Consultant Selection

FBS = Fisxed Budget Selection

LCS = Least Cost Selection

SSS = Single Source Selection

OSM = Other Selection Methods

NONE = No Method

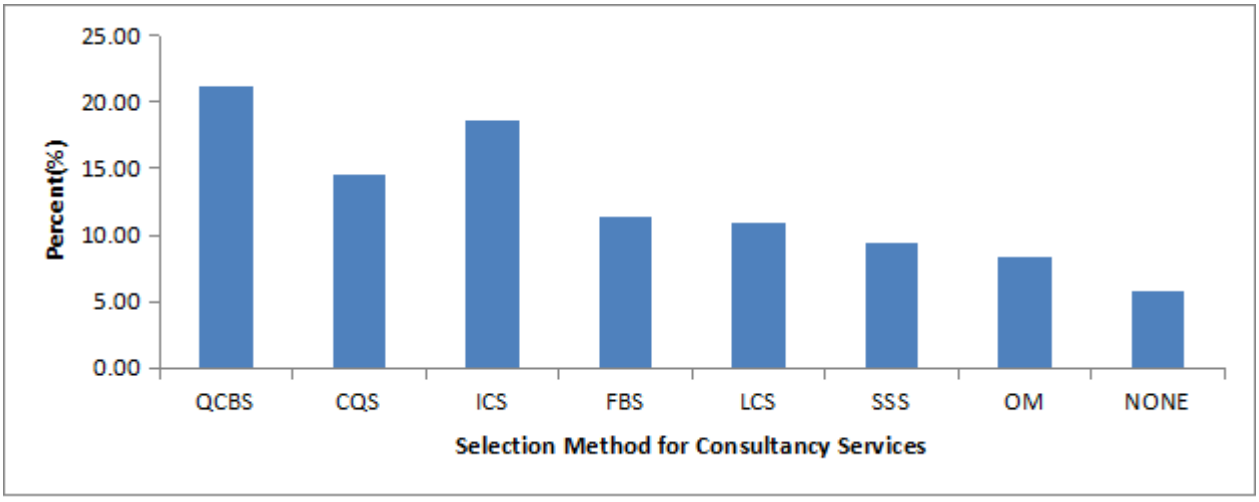

Figure 4.9: Histogram of percentage distribution of Preferred Procurement Selection Method for Consultancy Services.

Analysis of result (Table 4.9) shows that QCBS is the most preferred procurement method with the highest percentage value of 21.14%. ICS and CQS were the second and third most preferred procurement methods with values of 18.57% and 14.57%, respectively .Single Source Selection (SSS) and other procurement method were the least preferred procurement method for consultancy services with values of 9.43% and 8.29 % respectively. Figure 4.9 shows the Histogram of percentage distribution of preferred procurement selection method for consultancy services in the seven identified World Bank assisted projects.

4.1.2 Principal Component Factor Analysis Presentations

The 20 project risk factors identified from journals and existing literatures in Table 2.8 above were subjected to factor analysis – a data reduction technique, to reduce the large number of observations and qualitative variables, and resolve them into distinct pattern of occurrence. Factorial analyses took care of the pattern in relationships, and group them based on certain similarities. The correlated variables in the 20 project risk factors were reduced into smaller set of uncorrelated factor scores.

In carrying out factor analysis on these 20 project risk factors, an initial pilot survey was designed and distributed to 100 respondents. The respondents were chosen across World Bank assisted projects in South East Nigeria used in the research; care was ensured to identify respondents with good knowledge of procurement in World Bank assisted project to provide a high degree of accuracy in the data collected. Out of the 100 pilot surveys distributed, 100 surveys were returned. This represents a 100% return from the experts.

4.1.2.1 Extraction of project risk factors using Principal Component Analysis

Table 4.10: Extraction project risk factors using Principal component analysis

Total Variance Explained							
	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	5.946	29.729	29.729	5.946	29.729	29.729	4.562
2	4.128	20.639	50.369	4.128	20.639	50.369	3.987
3	3.126	15.631	66.000	3.126	15.631	66.000	4.226
4	2.409	12.046	78.046	2.409	12.046	78.046	3.215
5	1.296	6.480	84.526	1.296	6.480	84.526	2.711
6	.831	4.156	88.682				
7	.748	3.741	92.423				
8	.520	2.601	95.024				
9	.369	1.844	96.868				
10	.224	1.119	97.987				
11	.136	.681	98.668				
12	.104	.519	99.187				
13	.071	.353	99.540				
14	.055	.274	99.814				
15	.018	.090	99.904				
16	.010	.048	99.952				
17	.008	.038	99.990				
18	.002	.010	100.000				
19	1.032E-15	5.160E-15	100.000				
20	-7.924E-16	-3.962E-15	100.000				
Extraction Method: Principal Component Analysis.							

Table 4.10 shows the result of extraction project risk factors using Principal component analysis. Out of twenty (20) components or risk factors analyzed only five (5) had a total initial Eigen values greater or equal to 1 in the column for total initial Eigen values. In table 4.1, the total variance explained revealed that Component 1 and 2 had a total initial Eigen value of 5.946 and 4.128 with percentage variance of 29.729% and 20.639%, respectively. Component 3, 4 and 5 had total initial Eigen values of 3.126, 2.409 and 1.296 with percentage variance of 15.631%, 12.046% and 6.480% respectively. The cumulative percentage of variance explained by the five (5) extracted factors was 84.526%. However, Components 6 to 20 were not extracted because each of the

components had Eigen values less than 1. The total cumulative of the un-extracted components was 15.474%. This is a very good loading as the five (5) factors explained a majority of the variance explained by the group of **data.**

4.1.2.2 Component matrix results of project risk factors for selection of procurement method.

Table 4.11: Principal component analysis of project risk factors for selection of procurement method.

Component Matrix[a]					
	Component				
	1	2	3	4	5
Availability of qualified staff	.905				
Quality of Services	.881		-.339		
Delivery time schedule	.805		.410	-.341	
Available resources of project	.773	-.456			
Type of project	.687		.425	.410	
Flexibility for variations in design	.671	.355		-.318	
Risk avoidance	-.659	.460		.331	
Price certainty		.894			
Project expected performance		-.848			
Allocation of responsibility	.313	.813			
Quality level of project	-.419	-.699			.470
Funding arrangement			-.742	.459	
Location of project site	.375		.702		.402
Clients experience		.348	.662	.577	
Availability of technology	.494	.443	-.641		
Political Interest	-.372	-.393	.488		-.381
Delay in project completion time	-.554			.721	
value of contract	.592	-.306		.621	
Natural Disaster				.365	
Complexity of Project		.411	.426		.666
Extraction Method: Principal Component Analysis.					
a. 5 components extracted.					

Table 4.11 shows the un-rotated component matrix factor loadings of each of the five (5) component factors and the default retained factors. Factor loading is highest in component 1 with 15 variables. This followed by Component 2 which had 12 variables factor loadings. Component 3 and 4 had variable factor loading of 9 each. Component 5 had the least factor loading of 4 variables. From the result in figure 4.2 only 4 out of the 5 components are highly or strongly loaded and this indicates there is a strong relationship among the variable of the first four (4) components. On the other the relationship among the variables in component 5 is not strong enough. In view of the foregoing, we want to stick with the number of factors with strongest and best interrelationship.

4.1.2.3 Parallel analysis of project risk factors for selection of procurement method.

Table 4.12: Monte Carlo PCA Parallel Analysis

Principal Components & Random Normal Data Generation

Specifications for this Run:

Ncases 100

Nvars 20

Ndatsets 100

Percent 95

Raw Data Eigenvalues, & Mean & Percentile Random Data Eigenvalues

Root	Raw Data	Means	Prcntyle
1.000000	5.945870	1.905659	2.084989
2.000000	4.127876	1.705707	1.841417
3.000000	3.126203	1.575082	1.662417
4.000000	2.409272	1.463773	1.547299
5.000000	1.296073	1.366678	1.436347
6.000000	.831154	1.276843	1.349517
7.000000	.748199	1.200046	1.258158
8.000000	.520204	1.120074	1.176859
9.000000	.368757	1.053514	1.100806
10.000000	.223882	.976578	1.036825
11.000000	.136182	.907780	.971124
12.000000	.103808	.848245	.917661
13.000000	.070605	.781266	.838063
14.000000	.054715	.722972	.773094
15.000000	.017998	.661026	.718958
16.000000	.009618	.606060	.649020
17.000000	.007633	.549051	.592776
18.000000	.001952	.489385	.544889

19.000000 .000000 .429896 .485062
20.000000 .000000 .360364 .423605
------ END MATRIX -----

The parallel analysis was used as a quality control check to cut down the number of retained factors. Table 4.12 above shows the comparism between the principal component (raw data Eigenvalues) and the generated percentile random data Eigenvalues of the twenty (20) variables. Root 1, 2, 3 and 4 had raw data Eigen values of 5.945870, 4.127876, 3.126203, and 2.409272, which were higher than the corresponding Percentile Random Data Eigenvalues of 2.084989, 1.841417, 1.662417 and 1.547299 for the same roots, respectively. This result of the analysis show that the first 4 component items were probably the most appropriate to be retained. However, starting from root 5 to 20, result shows that the raw data Eigenvalues of the roots were less than their corresponding percentile random data Eigenvalues (see table 4.12).

4.1.2.4 Final Total Variance for Project Risk Factors for selection of procurement method.

Table 4.13: Final Total Variance Project Risk Factors Explained

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	5.946	29.729	29.729	5.946	29.729	29.729	4.685
2	4.128	20.639	50.369	4.128	20.639	50.369	4.265
3	3.126	15.631	66.000	3.126	15.631	66.000	3.470
4	2.409	12.046	78.046	2.409	12.046	78.046	4.050
5	1.296	6.480	84.526				
6	.831	4.156	88.682				
7	.748	3.741	92.423				
8	.520	2.601	95.024				
9	.369	1.844	96.868				
10	.224	1.119	97.987				
11	.136	.681	98.668				
12	.104	.519	99.187				
13	.071	.353	99.540				
14	.055	.274	99.814				
15	.018	.090	99.904				
16	.010	.048	99.952				
17	.008	.038	99.990				
18	.002	.010	100.000				
19	1.032E-15	5.160E-15	100.000				
20	-7.924E-16	-3.962E-15	100.000				

Extraction Method: Principal Component Analysis.

Table 4.13 above shows that out of the twenty (20) components or risk factors analysed the second Oblimm forced the factor analysis to load and retain only four (4) factors that are most appropriate. Results show that Component 1 and 2 had total final Eigen values

of 5.946 and 4.128 with percentage variance of 29.729% and 20.639%, respectively. Component 3 and 4 had total final Eigen values of 3.126 and 2.409 with percentage variance of 15.631%, and 12.046% respectively. The cumulative percentage of variance explained by the four (4) retained factors was 78.046%. However, Components 5 to 20 were not retained. The total cumulative percentage of the un-retained factor components was 21.954%.

4.1.2.5: Final Component Correlation matrix for project risk factors for selection of procurement method.

Table 4.14: Final Component Correlation Matrix

Component Correlation Matrix				
Component	1	2	3	4
1	1.000	.051	.164	.176
2	.051	1.000	.038	.009
3	.164	.038	1.000	.007
4	.176	.009	.007	1.000
Extraction Method: Principal Component Analysis. Rotation Method: Oblimin with Kaiser Normalization.				

Analysis of result of the component correlation matrix obtained from Oblimin with Kaiser Normalization shows the strength of the relationship between the 4 retained factors (Table 4.14). Component 1 and 2, Component 1 and 3, and Component 1 and 4 had very weak positive correlations of 0.051, 0.164 and 0.176, respectively. In the same vein, component 2 and 1, component 2 and 3, and component 2 and 4 had very weak positive correlations of 0.051, 0.038 and 0.007, respectively. Also component 3 and 1, component 3 and 2, and component 3 and 4 had very weak positive correlations of 0.164, 0.038, and 0.007, respectively. Also with weak positive correlations were component 4

and1, component 4 and 2, and component 4 and 3 with correlation values of 0.176, 0.009 and 0.007, respectively.

4.1.2.6: Pattern matrix for project risk factor for selection of procurement method

Table 4.15: Pattern matrix for project risk factor

Pattern Matrix[a]				
	Component			
	1	2	3	4
Delay in project completion time	-.934			
Delivery time schedule	.849		.332	
Risk avoidance	-.778			
Available resources of project	.636			.379
Flexibility for variations in design	.606	.516		
Allocation of responsibility		.899		
Price certainty	-.574	.802		
Quality level of project		-.776		
Project expected performance	.379	-.758		
Availability of technology		.633	-.385	.529
Political Interest		-.518		-.473
Complexity of Project		.439	.302	-.305
Clients experience	-.346		.897	
Type of project		.318	.796	
Location of project site			.775	
Natural Disaster			.513	
Funding arrangement				.923
Value of contract			.383	.861
Availability of qualified staff	.355			.744
Quality of Services	.418			.733
Extraction Method: Principal Component Analysis. Rotation Method: Oblimin with Kaiser Normalization.				
a. Rotation converged in 26 iterations.				

Table 4.15 above shows Pattern matrix of the four retained factors/ components. Factor loading is highest in component 1 with 10 variables. This followed by Component 2 which had 9 variables factor loadings. Component 3 and 4 had variable factor loading of

8 each. From the result in figure 4.6 all 4 components are highly or strongly loaded and this indicates there is a strong relationship among the variable of the first four (4) components.

In component 1out of the 10 loaded variables, 6 variables have loadings above ±0.5 and these include: Delay in project completion time, Delivery time schedule, Risk avoidance, Available resources of project, Flexibility for variations in design with scores of -0.934, 0.849, -0.778, 0.636, 0.606 and -0.574, respectively. Other four (4) variables in component 1 had loadings between ±0.3 and ±0.4. These variables include: Project expected performance, Clients experience, Availability of qualified staff, Availability of qualified staff and Quality of Services with factor loadings of scores 0.379, 0-.346, 0.355 and 0.418, respectively.

In component 2, out of the 9 loaded variables, 7 variables have loadings above ±0.5 and these include: Flexibility for variations in design, Allocation of responsibility, Price certainty, Quality level of project, Project expected performance, Availability of technology and Political Interest with values of 0.516, 0.899, 0.802, -0.776, -0.758, 0.633 and -0.518, respectively. Other two (2) variables in component 2 had loadings between ±0.3 and ±0.4. These variables include: Complexity of Project and Type of project with factor loadings scores of 0.439 and 0.318, respectively.

Component 3 had 8 loaded variables. Four (4) of the variables had loadings above ±0.5 and these include: Clients experience, Type of project, Location of project site and Natural Disaster with values of 0.897, 0.796, 0.775 and 0.513, respectively. Other four (4) variables in component 3 had loadings between ±0.3 and ±0.4. These variables include: Delivery time schedule, Availability of technology, Complexity of Project and Value of contract with factor loadings scores of 0.332, -0.385, 0.302 and 0.383, respectively.

Component 4 of the pattern matrix (table 4.6) also had 8 loaded variables. Five (5) of the variables had loadings above ±0.5 and these include: Availability of technology, Funding arrangement, Value of contract, Availability of qualified staff and Quality of Services with scores of 0.529, 0.923, 0.861, 0.744 and 0.733, respectively. Other three (3) variables in component 4 had loadings between ±0.3 and ±0.4. These variables include: Available resources of project, Political Interest, and Complexity of Project with factor loadings scores of 0.379, -0.473, and -0.305, respectively.

4.1.2.7 Summarized Project risk factors from scores

Table 4.16: Factor Scores and Summarized Project risk factors

Factor No	Items	Scores	Summarized Factor
1	Delay in project completion time Delivery time schedule Risk avoidance Available resources of project Flexibility for variations in design	-0.9340. 849 0.778 0.636 0.606	Project completion time and risk avoidance
2	Allocation of responsibility Price certainty Quality level of project Project expected performance Availability of technology Political Interest Complexity of Project	0.899 0.802 0.776 0.758 0.663 0.518 0.439	Price certainty for allocation of project responsibility
3	Clients experience Type of project Location of project site Natural Disaster	0.897 0. 796 0.775 0.531	Clients experience in handling project
4	Funding arrangement Value of contract Availability of qualified staff Quality of Services	0.923 0.861 0.744 0.733	Contract funding arrangement and quality of services

Table 4.16 above shows the item scores and the summarized name given to each factor number. Loadings ±.50 or greater from figure 4.15 were considered practically significant (Hair, 2014) and this include: Delay in project completion time, Delivery time schedule, Risk avoidance, Available resources of project and Flexibility for variations in design with scores of -0.934, 0.849, -0.778, 0.636 and 0.606, respectively were summarized under the factor heading of Project completion time and risk avoidance.

Factor 2 include: Allocation of responsibility, Price certainty, Quality level of project, Project expected performance, Availability of technology, Political Interest and Complexity of Project with score of 0.899, 0.802, 0.776, 0.758, 0.663and 0.518, respectively were summarized under the factor heading of Price certainty for allocation of project responsibility.

Factor 3 include: Clients experience, Type of project, Location of project site and Natural Disaster with scores of 0.897, 0.796, 0.775 and 0.531, respectively were summarized under the factor heading of Clients experience in handling project.

The forth factor include: Funding arrangement, Value of contract, Availability of qualified staff and Quality of Services with scores of 0.923, 0.861, 0.744 and 0.733, respectively were summarized under the factor heading of Contract funding arrangement and quality services (Table 4.16).

4.1.2.8: Communalities of Project risk factors

Table 4.17: Communalities of Project risk factors for selection of procurement method

Communalities		
	Initial	Extraction
Quality level of project	1.000	0.671
Project expected performance	1.000	0.755
Type of project	1.000	0.879
Clients experience	1.000	0.907
Price certainty	1.000	0.915
Risk avoidance	1.000	0.765
Complexity of Project	1.000	0.456
Delay in project completion time	1.000	0.847
Allocation of responsibility	1.000	0.837
Flexibility for variations in design	1.000	0.766
Natural Disaster	1.000	0.308
Political Interest	1.000	0.531
Quality of Services	1.000	0.908
Avaibility of technology	1.000	0.875
Availability of qualified staff	1.000	0.936
Available resources of project	1.000	0.812
Delivery time schedule	1.000	0.938
Funding arrangement	1.000	0.873
Location of project site	1.000	0.728
value of contract	1.000	0.900
Extraction Method: Principal Component Analysis.		

Table 4.17 above describes how much of the variance in each item was explained, and how well each item was represented in the Total Explained Variance (**Table 4.13)**. Only one variable (Natural Disaster) had an extraction value as low as 0.3 which implies that

item did not fit well with other items in the component. All other 19 variable had high loading. The items we have chosen and used in formulating our Project risk factors for the selection of procurement method are those with the highest loadings in the Communality (Table 4.17).

4.1.3 Extent of Effect of Project Risk Factors in World Bank Assisted Projects in South East Nigeria.

4.1.3.1 Extent of Effect of Project Completion and Risk Avoidance Risk Factor

Table 4.18: Effect of Project completion time and risk avoidance on procurement selection method

Project completion time and risk avoidance (X1)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Low Effect	10	2.9	2.9	2.9
	Low Effect	40	11.4	11.4	14.3
	Some Effect	115	32.9	32.9	47.1
	High Effects	110	31.4	31.4	78.6
	Very High Effect	75	21.4	21.4	100.0
	Total	350	100.0	100.0	

Source: Field work. n=350

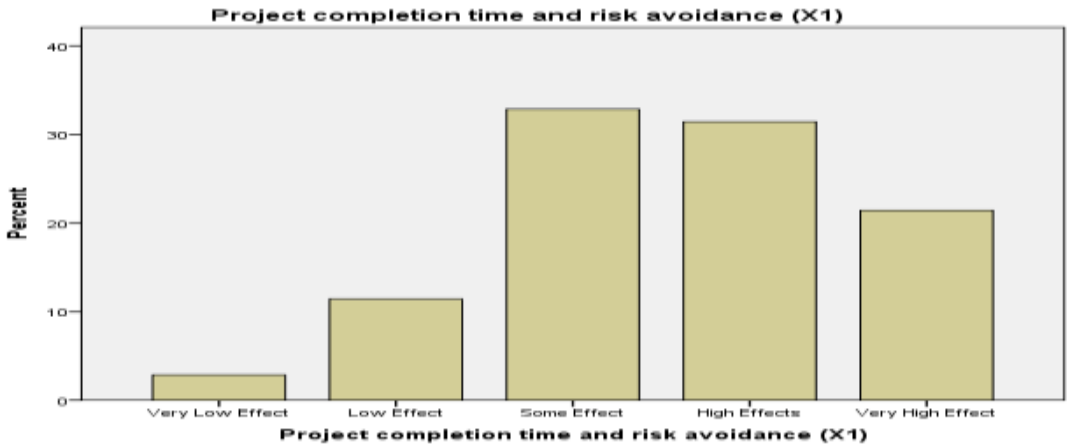

Figure 4.10: Histogram of extent of effect of project completion time and risk avoidance Risk on selection of procurement method

Table 4.18 shows the result of the analysis for the extent of effect of Project Completion and Risk Avoidance project risk factor. A total of 32.90% of the respondents agreed that project completion time and risk avoidance had some effect on procurement selection method in World Bank assisted project. These were closely followed by 31.40 % and 21.40 % that agreed that the above risk factor had high and very high effect, respectively. Only 11.40 % and 2.90 % of respondents said that project completion time and risk avoidance low and very low effect.

4.1.3.2 Extent of Effect of Price Certainty and Allocation of Project Responsibility Risk Factor on Procurement Selection Method

Table 4.19: Price Certainty and Allocation of Project Responsibility Risk Factor on Procurement Selection Method.

Price certainty for allocation of project responsibility (X2)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Low Effect	4	1.1	1.1	1.1
	Low Effect	42	12.0	12.0	13.1

	Some Effect	116	33.1	33.1	46.3
	High Effects	155	44.3	44.3	90.6
	Very High Effect	33	9.4	9.4	100.0
	Total	350	100.0	100.0	

Source: Field work. n=350

Figure 4.11: Histogram of Extent Effect of Price Certainty and Allocation of Project Responsibility Risk Factor on Procurement Selection Method.

Table 4.19 above shows the result of the analysis for the extent of effect of price certainty and allocation of project responsibility project risk factor on procurement selection method. A total of 44.30% of the respondents agreed that price certainty and allocation of project responsibility had high effect on procurement selection method in World Bank assisted project in South East Nigeria. These were closely followed by 33.10 % that agreed that the above risk factor had some effect and 9.40 % of respondents that agreed that the price certainty and allocation of project responsibility had very high effect. Also 12.00 % of respondents said that price certainty and

allocation of project responsibility had low effect. However, only 1.10% said price certainty and allocation of project responsibility have very low effect.

4.1.3.3 Extent of Effect of Clients Experience in Handling Projects Risk Factor on Procurement Selection Method.

Table 4.20: Extent of Effect of Clients Experience in Handling Projects Risk Factor on Procurement Selection Method

Clients experience in handling project (X3**)**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Low Effect	2	.6	.6	.6
	Low Effect	38	10.9	10.9	11.4
	Some Effect	151	43.1	43.1	54.6
	High Effects	131	37.4	37.4	92.0
	Very High Effect	28	8.0	8.0	100.0
	Total	350	100.0	100.0	

Source: Field work. n=350

Figure 4.12: Histogram of Extent of Effect of Clients Experience in Handling Projects Risk Factor on Procurement selection method.

Table 4.20 shows the result of the analysis for the extent effect of clients experience in handling projects risk factor on procurement selection method in World Bank assisted projects in South east Nigeria. A total of 43.10% of the respondents agreed that extent of effect of Clients experience in handling projects risk factor had some effect. These were closely followed by 37.40 % that agreed that the above risk factor high effects and 8.00 % of respondents that agreed that the extent of effect of clients experience in handling projects risk factor had very high effect. Also 10.90 % of respondents said that extent of effect of clients experience in handling projects risk factor had low effect. However, only 0.60 % said that extent of effect of clients experience in handling projects risk factor had very low effect on selection of procurement method. Figure 4.20 is the histogram representation of extent of effect clients experience in handling projects risk factor in World Bank assisted project in South East Nigeria.

4.1.3.4 Extent of Effect of Contract Funding Arrangement and Quality of Services Risk Factor on Procurement selection method

Table 4.21: Extent of Effect on Contract Funding Arrangement and Quality of Services on Procurement Selection Method

Contract funding arrangement and quality services (X4)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Low Effect	36	10.3	10.3	10.3
	Low Effect	113	32.3	32.3	42.6
	Some Effect	106	30.3	30.3	72.9
	High Effects	73	20.9	20.9	93.7
	Very High Effect	22	6.3	6.3	100.0
	Total	350	100.0	100.0	

Source: Field work. n=350

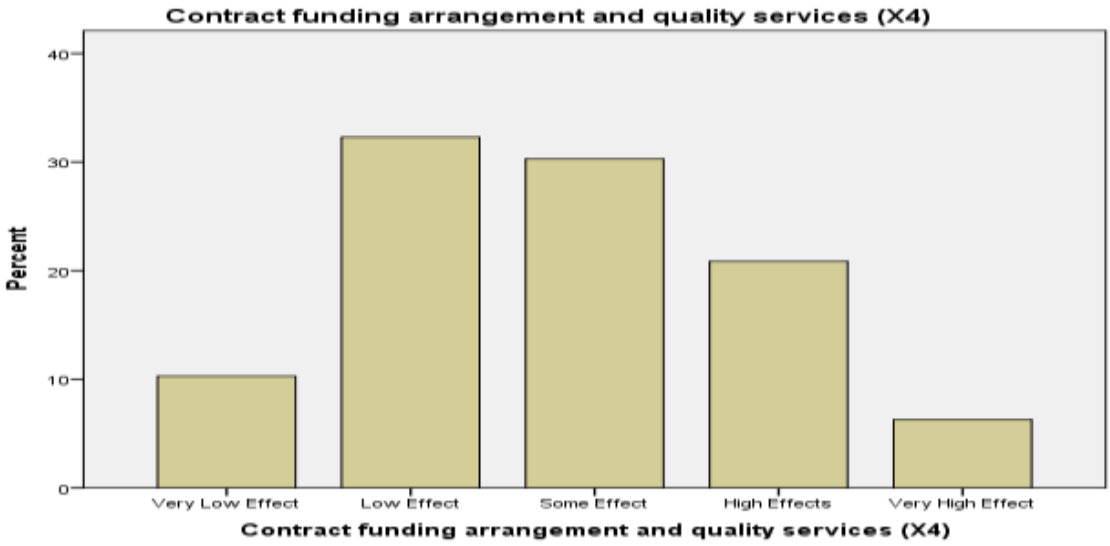

Figure 4.13: Histogram of Extent of Effect on Contract Funding Arrangement and Quality of Services on Procurement Selection Method

Table 4.21 above shows the result of the analysis for the extent of effect of contract funding arrangement and quality of services risk factor on selection of procurement method in South East Nigeria. A total of 32.30% of the respondents agreed that contract

funding arrangement and quality of services risk factor had low effect on procurement selection in World Bank assisted projects. This was closely followed by 30.30 % that agreed that the above risk factor had some effect and 20.90 % of respondents that agreed that the extent of effect of contract funding arrangement and quality of services risk factor had high effects. Also 6.30 % of respondents said that contract funding arrangement and quality of services risk factor had very high effects. However, only 10.30 % said extent of effect of contract funding arrangement and quality of services risk factor had very low effect on selection of procurement method in South East Nigeria.. Figure 4.21 is histogram representation of contract funding arrangement and quality of services risk factor on selection of procurement method in World Bank assisted project in South East Nigeria

4.1.4 Model Estimation of Effect of Project Risk Factors on Procurement Selection Methods

4.1.4.1 International Competitive Bidding (ICB) Procurement Selection Method for Good, Works and Non Consulting Services.

4.1.4.1.1 Relationship Model Estimation and Interpretation

Table 4.22: Link between the predictor variables using Pearson Correlations

Correlations

		Y	X1	X2	X3	X4
Pearson	Y	1.000	.433	.427	.392	.433

Correlation	X1	.433	1.000	.205	.101	-.005
	X2	.427	.205	1.000	.016	-.092
	X3	.392	.101	.016	1.000	.067
	X4	.433	-.005	-.092	.067	1.000

Source: SPSS 23.0

The data collected were subjected to multiple regression analysis in order to analyse the hypothesis and research questions outlined in chapter one of this research thesis. Table 4.22 above shows the correlation coefficients between the project risk factors (X1, X2, X3 and X4); which gives a very low correlation between the independent variables, and this does not affect our multiple regression model (No multicollinearity). Also, there was a positive correlation between the predictor variables and the outcome (Y); making the independent variables a good predictor for selection of procurement method in World Bank assisted projects in South East Nigeria.

4.1.4.1.2 Testing the strength of combined Project Risk Factors correlation with the Selection of ICB Procurement Method

Table 4.23: Model Summary for selection of ICB Procurement Method

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.794[a]	.630	.626	1.13767	.630	147.038	4	345	.000

a. Predictors: (Constant), X4, X1, X3, X2

b. Dependent Variable: Y

Source: SPSS Version 23.0

From table 4.23 above, the study found out that the relationship between project risk factors (independent variables) combined and ICB selection method (dependent variable) is 0.794 which was a very strong relationship. The R Square value tells us how much of the variance in the dependent variable is explained by the model (the predictors). Explicitly, it explains how much the independent variables explain the dependent variable. What this means is that our model, using Project completion time and risk avoidance, Price certainty for allocation of project responsibility, Clients experience in handling project, and Contract funding arrangement and quality of services explains only about 63.00 % of the variance in selection of ICB procurement method. This was a high percentage. It shows that much of the independent variables (Project completion time and risk avoidance, Price certainty for allocation of project responsibility, Clients experience in handling project, Contract funding arrangement and quality services) explain much of the dependent variable (selection of procurement method); hence only 37.00% was probably explained by other things. This indicates that our model was a good fit in determining the dependent variable. The result helps to validate the correlation result of table 4.23 which showed positive correlation between the independent variables and the dependent variable.

4.1.4.1.3 Assessment of statistical significance of variables for ICB procurement method.

Table 4.24: Anova

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	761.243	4	190.311	147.038	.000[b]
	Residual	446.532	345	1.294		

	Total	1207.774	349			

a. Dependent Variable: Y

b. Predictors: (Constant), X4, X1, X3, X2

Table 4.24 represents the ANOVA report on the general model for selection of ICB procurement method. In this ANOVA table (Table 4.24), we have an outcome with the Probability value less that 0.05; we would thus say that there is a statistical significance for this model. Thus, the combination of all the project risk factors (variables) significantly (F=147.038; P=0.000<0.05) predicts the ICB procurement method (dependent variable). We thus conclude from this model that the collective project risk factors (Project completion time and risk avoidance, Price certainty for allocation of project responsibility, Clients experience in handling project, Contract funding arrangement and quality of services) have effect on selection of procurement method in World Bank assisted projects in South East Nigeria.

4.1.4.1.4 Testing for relative contributions of the individual project risk factors for selection of ICB procurement method.

Table 4.25: Coefficients for regression model

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics		
		B	Std. Error	Beta	T	Sig.	Zero-order	Tolerance	VIF
1	(Constant)	5.769	.806		7.154	.000			
	X1	.221	.023	.322	9.570	.000	.433	.948	1.054

X2	.276	.023	.397	11.816	.000	.427	.950	1.053
X3	.205	.021	.324	9.812	.000	.392	.985	1.015
X4	.271	.020	.449	13.632	.000	.433	.987	1.013

From table 4.25, the result showed that independent variable X_2 (Price certainty for allocation of project responsibility) with a coefficient value of 0.276 made the first and second highest contributions, followed by X_4 (Contract funding arrangement and quality services) with coefficient values of 0.271. X_1 (Project completion time and risk avoidance) and X_3(Clients experience in handling project) with coefficient values of 0.221 and 0.205, respectively were third and fourth in terms of contribution to the dependent variable. This means that all the variables namely: Project completion time and risk avoidance (β_1=0.221, t = 9.570, P<0.05), price certainty for allocation of project responsibility ($\boldsymbol{\beta}_2$ = 0.276, t = 11.816, P<0.05), contract funding arrangement and quality services (β_3 = 0.205, t = 9.812, P<0.05) and Clients experience in handling project (β_4 = 0.271, t = 13.632, P<0.05), made significant contribution to selection of ICB procurement method in World Bank assisted project in South East Nigeria. The resulting multiple regression equation is given as:

$$\curlyvee = 5.769 + 0.221 + 0.276X_2 + 0.205\ X_3 + 0.271X_4$$

The equation can thus be readily used to predict effect of project risk factors on selection of ICB procurement methods in World Bank assisted projects in South East Nigeria.

4.1.4.2 Quality and Cost Based Selection (QCBS) Procurement Selection Method for Consulting Services.

4.1.4.2.1 Relationship Model Estimation and Interpretation

Table 4.26: Link between the predictor variables using Pearson Correlations for QCBS procurement method

Correlations

		Y	X1	X2	X3	X4
Pearson Correlation	Y	1.000	.406	.364	.338	.422
	X1	.406	1.000	.037	-.002	.103
	X2	.364	.037	1.000	.002	-.027
	X3	.338	-.002	.002	1.000	.021
	X4	.422	.103	-.027	.021	1.000

Source: SPSS 23.0

Table 4.26 shows the correlation coefficients between the project risk factors; which gives a very low correlation between the independent variables, and this does not affect our multiple regression model (No multicollinearity). Also, there were positive correlation between the four predictor variables (X_1, X_2, X_3, and X_4) with values of 0.406, 0.364, 0.338 and 0.422, respectively and the outcome (Y). Table 4.26 shows the link between the predictor variables using Pearson Correlations.

4.1.4.2.2 Testing the strength of combined Project Risk Factors correlation with the Selection of QCBS Procurement Method

Table 4.27: Model Summary for selection of QCBS procurement method

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change

1	.742[a]	.551	.545	1.25435	.551	105.656	4	345	.000

a. Predictors: (Constant), X4, X3, X2, X1

b. Dependent Variable: Y

Source: SPSS Version 23.0

From table 4.27 above, the relationship between project risk factors (independent variables) combined and QCBS selection method (dependent variable) is 0.742 which was a moderately strong relationship. However, the R Square value was 0.545 and the significant factor change of 0.000. Explicitly, R Square value explains how much the independent variables is explain by the dependent variable. This means that using Project completion time and risk avoidance, Price certainty for allocation of project responsibility, Clients experience in handling project, and Contract funding arrangement and quality services, explains only about 54.50 % of the variance in selection of QCBS procurement method.

4.1.4.2.3 Assessment of statistical significance project risk factors on selection of QCBS procurement method.

Table 4.28: Anova for selection of QCBS procurement method

ANOVAa

Model	Sum of Squares	df	Mean Square	F	Sig.

1	Regression	664.954	4	166.238	105.656	.000[b]
	Residual	542.821	345	1.573		
	Total	1207.774	349			

a. Dependent Variable: Y

b. Predictors: (Constant), X4, X3, X2, X1

Table 4.28 represents the ANOVA report on the general model for selection of QCBS procurement method. In this ANOVA table (Table 4.28), we have an outcome with the Probability value less that 0.05; we would thus say that there is a statistical significance for this model. Thus, the combination of all the project risk factors (variables) significantly (F=105.656; P=0.000<0.05) predicts the QCBS procurement method (dependent variable) for consultancy services.

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1. 4.1.4.2.4 Testing for relative contributions of the individual project risk factors for selection of QCBS procurement method.

Table 4.29: Coefficients for regression model

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	6.211	.934		6.647	.000		
	X1	.222	.023	.354	9.736	.000	.988	1.012
	X2	.249	.026	.361	9.981	.000	.998	1.002
	X3	.213	.023	.330	9.148	.000	1.000	1.000
	X4	.258	.023	.388	10.692	.000	.988	1.012

From table 4.29, the result showed that independent variable X_4 (Contract funding arrangement and quality of services) with positive coefficient values of 0.258. This was followed by X_2 (Price certainty for allocation of project responsibility) and X_1 (Project completion time and risk avoidance) had positive coefficient values of 0.249 and 0.222, respectively. The lowest coefficient correlation was X_3(Clients experience in handling

project) with a positive coefficient value of 0.213. This means that Project completion time and risk avoidance (β_1=0.222, t = 9.736, P<0.05), Price certainty for allocation of project responsibility ($\boldsymbol{\beta_2}$ = 0.249, t = 9.981, P<0.05), Contract funding arrangement and quality services (β_3 =-0.213, t = 9.418, P<0.05), Clients experience in handling project (β_4 = 0.258, t = 10.692, P<0.05), made significant contribution to selection of QCBS procurement method. All the project risk factors had significant (P<0.05) effect and contributed 74.50% to successful selection of QCBS procurement methods in World Bank assisted projects in South East Nigeria. The resulting multiple regression equation was given as:

$$\Upsilon = 6.211 + 0.222X_1 + 0.249X_2 + 0.213X_3 + 0.258X_4$$

The equation can thus be readily used to predict effect of project risk factors on selection of QCBS procurement methods for consultancy services in World Bank assisted projects in South East Nigeria.

4.1.5 Ranking of Project Risk Factors for Selection of ICB Procurement Method for Goods, Works and Non Consultancy Services

Table 4.30: Ranking of Project Risk Factors for Selection of ICB Procurement Method

S/N	Project Risk Factors	Pearson Correlation	Ranking
1	Project completion time and risk avoidance (X_1)	0.433	1
2	Contract funding arrangement and quality of services (X_4)	0.433	1
3	Price certainty for allocation of project responsibility (X_2)	0.427	2
4	Clients experience in handling project (X_3)	0.392	3

The result from Pearson ranking correlation on table 4.30 shows that project completion time and risk avoidance and contract funding arrangement and quality services ranked first with the value of 0.433 each for the selection of ICB procurement method for goods, works and non consultancy services in World Bank assisted projects in South East Nigeria. The second and third positions were occupied by the factors price certainty for allocation of project responsibility and Clients experience in handling with Pearson correlations of 0.427 and 0.392, respectively (table 4.30).

4.1.6 Ranking of Project Risk Factors for Selection of QCBS Procurement Method for Consultancy Services

Table 4.31: Ranking of Project Risk Factors for Selection of QCBS Procurement Method

S/N	Project Risk Factors	Pearson Correlation	Ranking
1	Contract funding arrangement and quality services (X_4)	0.422	1
2	Project completion time and risk avoidance (X_1)	0.406	2
3	Price certainty for allocation of project responsibility (X_2)	0.364	3
4	Clients experience in handling project (X_3)	0.338	4

Pearson ranking correlation on table 4.31 showed that Contract funding arrangement and quality of services (X_4) ranked first with a value of 0.422 for the selection of QCBS procurement method for consultancy services in World Bank assisted projects in South East Nigeria. The second and third positions were occupied by the factors Project completion time and risk avoidance (X_1) and Project completion time and risk avoidance (X_1) with Pearson correlations of 0.406, and 0.364 respectively (table 4.31). The fourth and last position was occupied by Clients experience in handling project (X_3) with a correlation of 0.338.

4.1.7 Hypothesis Testing

Research Hypothesis 1:

(1) H_{01}: Project risk factors do not have any significant effect on the selection of a procurement method for good, works and non consulting service in World Bank assisted project in South East Nigeria.

H_{1a}: Project risk factors have significant effect on the selection of a procurement method for good, works and non consulting service in World Bank assisted project in South East Nigeria.

In order to test the null hypothesis stated above, we use the F-test based on the Analysis of Variance (ANOVA) table for the **Assessment of statistical significance of variables for ICB procurement method (**Table 4.24).

The model of the effect of project risk factors on the selection of procurement method for goods and works using ICB reached statistical significance at (sig =0 .000) which is less than the significance level of 5% (P<0.05). Therefore, we reject the null hypothesis H_{01} and accept the alternative hypothesis H_{1a} which states that Project risk factors have significant effect on the selection of a procurement method for good, works and non consulting service in World Bank assisted project in South East Nigeria.

Research Hypothesis 2:

H_{02}: Project risk factors do not have any significant effect on the selection of a procurement method for consultancy services in a World Bank assisted project in South East Nigeria.

H_{02a}: Project risk factors have significant effect on the selection of a procurement method for consultancy services in a World Bank assisted project in South East Nigeria.

In order to test the null hypothesis stated above, we use the F-test. Based on the Analysis of Variance (ANOVA) for selection of QCBS procurement method table (4.27) on page 126. the F-test showed that project risk factors had significant effect on Selection of QCBS procurement method for consultancy services in World Bank assisted projects in South East Nigeria. This because the model reached statistical significance at (sig =0 .000) which is less than the significance level of 5% ($P<0.05$). Therefore, we reject the null hypothesis H_{02} and accept the alternative hypothesis H_{2a} which states that Project risk factors have significant effect on the selection of a procurement method for consultancy service in World Bank assisted project in South East Nigeria.

Research Hypothesis 3:

H_{03}: Project risk factors have no significant contribution to procurement method selection in World Bank assisted projects in South East Nigeria.

H_{03a}: Project risk factors have significant contribution to procurement method selection in World Bank assisted projects in South East Nigeria.

Coefficient of regression model for selection of ICB Procurement method on table 4.25 showed that project risk factors which are the predictor variables made contributions ($X_1 = 0.221$, $X_2 = 0.276$, $X_3 = 0.205$ and $X_4 = 0.271$) to the selection of procurement method (Y) which is dependent variable. Also Coefficient of regression model for selection of QCBS procurement method for consultancy

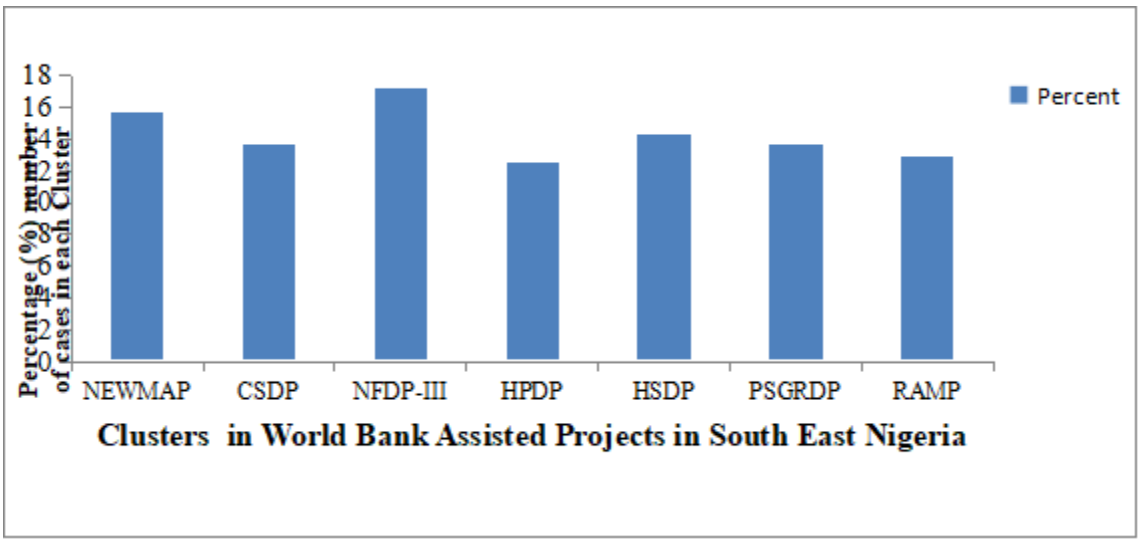
services on table 4.29 also showed that project risk factors which are the predictor variables made contributions ($X_1 = 0.222$, $X_2 = 0.249$, $X_3 = 0.213$ and $X_4 = 0.258$) to the selection of procurement method (Y) which is dependent variable. This was evident in the fact that no factor score between the independent variables were over 0.5 for the two procurement method selection (ICB and QCBS) and Variance Inflation Factors (VIF) was a little above 1.0 for both ICB method of selection and for QCBS selection method (Hair, 2014). Hence we reject the null hypothesis and accept the alternative hypothesis which states that project risk factors have significant contribution to selection of procurement methods in World Bank assisted project in South East Nigeria.

4.1.8 Cluster Analysis Result Interpretations

Table 4.32: Cluster Distribution in World Bank assisted projects in South East Nigeria

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEWMAP	55	15.71	15.7	15.7
	CSDP	48	13.71	13.7	29.4
	NFDP-III	60	17.14	17.1	46.5
	HPDP	44	12.57	12.6	59.1
	HSDP	50	14.29	14.3	73.4
	PSGRDP	48	13.71	13.7	87.1
	RAMP	45	12.86	12.9	100
	Total	350	100	100	

Source: SPSS Version 23.0



Source: SPSS Version 23

Figure 4.21: Percentage number of case within different clusters of World Bank assisted projects in South East Nigeria.

Table 4.32 shows the result of the 350 cases categorized into Seven World Bank assisted projects in South East Nigeria. Third National Fadama Development Project (NFDP-III) had the highest distributions of 60 representing 17.10 % out of 350 cases in all the clusters. This was followed by Nigeria Erosion and Watershed Management Project (NEWMAP) and Health System Development Project (HSDP) clusters which had total number of 55 and 50 persons representing 15.70 % and 14.29 %, respectively. Community and Social Development Project (CSDP) and Public Sector Governance Reform Development Project (PSGRDP) have equal distribution of 48 each representing 13.70 %. Rural Access and Mobility Project (RAMP) is the smallest distribution of 45 representing 12.86 %. A total combined number of 350 cases were involved in the analysis. All cases were included in the cluster formation because they have valid values for all variables.

4.1.8.1 Variations of the continuous variable (critical project risk factors) within the Clusters of World Bank assisted Projects in South East Nigeria.

Table 4.33: Variations of project risk factors within the clusters seven World Bank assisted projects.

s/n	Project	X_1			X_2			X_3			X_4		
		δ	$\bar{X}$	CV%	δ	$\bar{X}$	CV%	δ	$\bar{X}$	CV%	Δ	$\bar{X}$	CV%
1	NEWMAP	2.51	18.97	13.23	2.78	20.30	13.69	2.91	20.60	14.13	3.04	19.78	15.37
2	CSDP	2.42	18.87	12.82	2.45	20.91	11.72	2.73	20.38	13.40	3.12	20.22	15.43
3	NFDP-III	2.70	18.76	14.39	2.84	20.05	14.16	2.86	20.36	14.05	3.07	20.70	14.83
4	HPDP	2.82	19.10	14.76	2.86	20.60	13.88	3.68	20.44	18.00	3.66	20.51	17.84
5	HSDP	2.88	18.73	15.38	2.69	20.84	12.91	2.46	21.33	11.53	3.16	20.63	15.32
6	PSGRDP	2.29	19.33	11.85	2.12	19.88	10.66	2.63	20.61	12.76	3.00	19.21	15.62
7	RAMP	3.14	18.72	16.77	2.54	20.21	12.57	2.68	20.49	13.08	3.52	18.98	18.55

Where:

δ = standard deviation

$\bar{X}$ = Mean for data set

CV = Coefficient of variation

X_1 = Project completion time and risk avoidance

X_2 = Price certainty for allocation of project responsibility

X_3 = Clients experience in handling project

X_4 = Contract funding arrangement and quality services

Table 4.33 shows the Coefficient of variations of the four project risk factors at simultaneous 95% confidence intervals for the entire population of the seven World Bank assisted projects in South East Nigeria. X_4 had the highest coefficient of variations of 15.37 % within NEWMAP (cluster 1), this was closely followed by X_3 and X_2 with coefficient of variations of 14.13% and 13.69%, respectively. X_1 had the lowest coefficient of variations of 13.23 % within the NEWMAP cluster.

Within the CSDP (cluster 2), X_4 also had the highest coefficient of variations of 15.43 % followed by X_3 and X_1 with coefficient of variations of 13.40 % and 12.82 %, respectively. X_2 had the lowest coefficient of variations of 11.72 % within the CSDP cluster.

Table 4.33 shows that within the NFDP-III (cluster 3), X_4 had the highest coefficient of variation of 14.83 % followed by X_1 with coefficient of variation of 14.39 %. X_2 and X_3 had the third and fourth highest coefficient of variation of 14.16 % and 14.05 %, respectively in the NFDP-III cluster.

In HPDP (cluster 4), X_3 had the highest coefficient of variation (CV) of 18.00 % followed by X_4 with the Coefficient of variation of 17.84%. X_2 and X_3 trailed with CV of 14.76% and 13.88 % in the third and fourth position.

The highest coefficient of variation in HSDP (cluster 5) was from X_1 with a value of 15.38 %. X4 and X_2 followed with coefficient of variation of 15.32 % and 12.91%, respectively. The lowest coefficient of variation in HSDP came from X_3 was 11.53 %.

In cluster 6 (PSGRDP), X_4 maintains the highest coefficient of variation with a value of 15.62 %. This followed by X_3 and X_1 with coefficient of variations of 12.76% and 11.85 %, respectively. The lowest coefficient of variation of 11.85 % was from X_2 in cluster 6.

The highest variation in RAMP cluster 7 was X_4 with coefficient of variation of 18.55 %. This was followed by X_1 and X_3 with coefficient of variations of 16.77 % and 13.08 %, respectively. X_2 had the lowest variation in cluster 7 with coefficient of variation of 12.57 %.

4.2: Discussion of Results

4.2.1 Project Risk factors

Many risk factors are inherent in all projects. Out of the 45 project risk that affect the selection of procurement methods that were uncovered from literatures and journals, content analysis which is a systematic research tool for analyzing and making inferences from text and other forms of qualitative information was used to reduce the risk factors from 45 to 20 (Table 2.1). The twenty variables were further subjected to factorial analysis to identify the underlying structures among the 20 variables (project risk factors). Initially, a total of five (5) factors with Eigen values greater than 1 were extracted. The five (5) extracted factors had a cumulative percentage of 84.526% of the variance explained. This was a very good loading as much of the variance was explained by the group of data (Beavers *et al.*, 2013). The actual Eigen values of the five (5) variables were compared with Eigen values generated randomly. Out of the five variables, only four (4) variables of the raw data Eigen values were comparatively larger than the percentile random data Eigen values produced from parallel analysis and these components were retained as the most appropriate as suggested by Hayton *et al.*, 2004. The final total variance explained after a second rotation with factor analysis retained only four factors was 78.046%. Comparatively this was lower than the 84.526% explained by the initial 5 factor solution; however, the percentage variance explained by the four factor solution was still very high. The results were in agreement with Hair *et al.,* 2014 which stipulates that any decision on the number of factors to be retained should be based on the consideration that such factors should have Eigen values greater than 1.0

and should meet a specified percentage of variance explained, usually 60% or higher.

Pattern matrix for project risk factors had four components. Ten variables were loaded in component 1 with six variables (delay in project completion time, delivery time schedule, risk avoidance, available resources of project and flexibility for variations in design) with loadings above ±0.50. Loadings ±0.50 or greater are considered practically significant, while the remaining four variables namely: project expected performance, client's experience, availability of qualified staff and quality of services loaded below ±0.5 were considered to be at minimal level did not form the basis for interpretation of structure (Table 4.15). In component 1, variables above the threshold (±0.5) were summarized under the factor heading of project completion time and risk avoidance**.** Similarly, component 2 had 9 variables and 7 of the variables namely: allocation of responsibility, price certainty, quality level of project, project expected performance, availability of technology, political Interest and complexity of project. These variables had loadings above ±0.50 were considered practically significant, while two variables namely: Complexity of project and clients experience loaded below the threshold ±0.50 and was considered to meet the minimal level for structure interpretation for component 2. Also component 3 had 8 loaded variables. Four of the variables namely: clients experience, type of project, location of project site and natural disaster were above ±0.50 were significant and summarized under the factor heading of clients experience in handling project. The remaining four variable namely: availability of technology, delivery time schedule, value of contract and complexity of project were loaded between ±0.30 and ± 0.40 and were below the threshold for consideration for structure interpretation.

The final component in the pattern matrix, component 4 had 8 loaded variables, five of which were above ±0.50 and were summarized as summarized under the factor heading of contract funding arrangement and quality of services. These variables include: funding

arrangement, value of contract, availability of qualified staff and quality of services. The remaining three variables (available resources of project, political interest and complexity of project) with factor loadings between ±0.30 and ± 0.40 were not included in the structure interpretation (Table 4.15).

The twenty (20) project risk factors (variables) identified in this research work were classified or summarized into four top most loadings in each component namely: project completion time and risk avoidance, price certainty for allocation of project responsibility, clients experience in handling project, contract funding arrangement and quality of services. These four set of variables are entirely new, much smaller in number and partially or completely replaced the original set of 20 variables. The purpose of identifying and creating these new variables was to retain the nature and character of the original variables, but reduce their number and simplify the subsequent multivariate analysis (Johnson and Wichern, 2007).

4.2.2 Extent of Occurrence of Effect of Project Risk factors on Procurement Method Selection in South East Nigeria.

Results showed that all the four project risk factors occurred in each of the seven World Bank assisted projects in South East Nigeria (table 4.26). A total of 88.50 % of respondents agreed that Clients experience in handling projects risk factor occurred in selection of procurement methods in World Bank assisted project in South East Nigeria. The high percentage of respondents showed that factors related to client characteristics strongly affected the selection of procurement method in World Bank assisted project in South East Nigeria. This was mainly due to client interference and satisfaction which were considered very important by Respondents.

A total of 86.80 % respondents agreed that Project risk factors related to price certainty and allocation of project responsibility had occurrence in their projects. This value was

not unexpected considering the role price and its related factor play on the selection of procurement method in World Bank assisted projects in South East Nigeria (Mahon, 2011). The researcher confirmed that the procurement selection parameter of price certainty and allocation of responsibility requirements was universally rated as the single most influential parameter and was considered as one of the most important criteria for decision on procurement route selection.

On the other hand, 85.70 % respondents agreed that project completion time and risk avoidance had occurrence in procurement method selection.

The lowest and fourth in extent of occurrence was contract funding arrangement and quality of services risk factor with a total of 57.60 % of the respondents. It should be noted that factors related to project funding though important was determine by the donor that have the responsibility of funding each projects and may not be the of very much concern to the project team that have the responsibility to select the method.

4.2.3 Collective Contributions of Project risk factors for Selection of ICB and QCBS procurement selection method in South East Nigeria

The combined strength of the relationship between project risk factors (independent variables) and ICB procurement selection method (dependent variable) was very strong relationship with a value of 0.794. However, R Square value was 0.630 with F-change of 147.038. The F-Change is significant at 00% which indicates that 63.00 % of the variance in the selection procurement method in World Bank assisted projects in South East Nigeria was explained by the model using project completion time and risk avoidance, price certainty for allocation of project responsibility, clients experience in handling project, and contract funding arrangement and quality of services which were the predictor variables. The remaining 37.00% of variance was probably explained by other things. In view of the foregoing, the predictor variables model was a good fit in determining the

dependent variable as demonstrated by the positive correlation between the independent variables and the dependent variable.

For Quality and Cost Based selection (QCBS), the combined strength of the relationship between project risk factors (independent variables) and this procurement selection method (dependent variable) had strong relationship with a value of 0.745. However, the R Square value was 0.545 with F Change of 105.656 The F-Change is significant at 95% confidence level which indicates that only 54.50 % of the variance in the dependent variable (Procurement selection method) was explained by the model using the predictor variables. The remaining 45.50% of variance was probably explained by other things. In view of the foregoing, the predictor variables (Project completion time and risk avoidance, price certainty for allocation of project responsibility, clients experience in handling project, and contract funding arrangement and quality of services) model may not be a very good fit in determining the dependent variable hence the weak positive correlation between the independent variables and the dependent variable.

In the assessment of statistical significance**,** the ANOVA results in tables 4.25 and 4.30 showed that the combination of all the project risk factors (variables) significantly ($F=147.038$; $P=0.000<0.05$) predicts the ICB and for QCBS ($F=105.656$; $P=0.000<0.05$) procurement methods (dependent variable), respectively have effect in procurement selection of method in World Bank assisted projects in South East Nigeria. The empirical result is consistent with the theoretical postulations of the model.

4.2.4 Individual Contributions of Project risk factors for Selection of ICB and QCBS procurement selection method in South East Nigeria.

The study found out that among the independent variable price certainty for allocation of project responsibility (X_2) had the highest effect on selection of ICB

procurement method with a coefficient value of 0.276 followed by contract funding arrangement and quality of services (X_4) with coefficient values of 0.271. The third and fourth highest effect was from project completion time and risk avoidance (X_1) and clients experience in handling project (X_3) with coefficient values of 0.221 and 0.205, respectively. All the independent variables contributed significantly ($P<0.05$) to selection of ICB procurement method in procurement selection in World Bank assisted project in South East Nigeria. This result confirms the works of Mahon (2011) which showed that the most influential universally rated parameter on procurement route selection for goods and works were budget/cost followed by quality of service and client requirement.

On the other hand, the independent variable that had the highest effect for the selection of procurement method for the Consultancy services using quality and cost based selection (QCBS) method was contract funding arrangement and quality of services (X4) with a coefficient value of 0.258. This was followed by price certainty for allocation of project responsibility (X_2) and project completion time and risk avoidance (X_1) with coefficient values of 0.249, and 0.222, respectively in the second and third position. The fourth highest effect of project risk factors on selection of QCBS as a procurement method were from clients experience in handling project (X_3) with a coefficient value of 0.213. This result underscores the importance of given consideration to contract funding and quality of service, and completion time for any consultancy services activity before settling for the use of QCBS as a procurement selection method (Izhar *et al*., 2019).

4.2.5 **Relationship between project risk factors and selection of procurement methods in World Bank assisted projects in South East Nigeria.**

Result of analysis in table 4.26 shows that relationship between the independent variable and the dependent variables (Selection of ICB procurement method**)** for

goods, works and non consultancy services can be expressed in a multiple in multiple regression equation:

$\Upsilon = 5.769 + 0.221X_1 + 0.276X_2 + 0.205\ X_3 + 0.271X_4$

Also, the result of analysis in table 4.31 showed that the effect of project risk factors on selection of QCBS procurement methods for consultancy services in World Bank assisted projects in South East Nigeria can be predicted using the multiple regression equation.

$\Upsilon = 6.211 + 0.\ 222X_1 + 0.249X_2 + 0.213X_3 + 0.258X_4$

Where Υ = Procurement Selection methods

X1 = project completion time and risk avoidance

X2 = Price certainty for allocation of project responsibility,

X3 = Clients experience in handling project

X4 = contract funding arrangement and quality services

The two equations showed that price certainty for allocation of project responsibility made the highest contribution in selection of ICB procurement method for goods, works and non consultancy services. This underscores the importance of price certainty as factor in the choice of procurement of goods, works and non consultancy services. On the other hand, for consultancy services, the most important factor in the selection of QCBS procurement method was contract funding arrangement and quality services. For the selection of QCBS the lowest in terms of effect was Clients experience in handling project.

4.2.6 Project risk factors important to each of the World Bank project in South East Nigeria.

The coefficient of variation **(**Table 4.28) showed that project completion time and risk avoidance (X_4) had the highest variance in NEWMAP (cluster 1), CSDP (cluster 2), NFDP-III (cluster 3), PSGRDP (cluster 6) and RAMP (cluster 7) with coefficient of variations of 15.37 %, 15.43 %, 14.83 %, 15.62 % and 18.55 %, respectively. The result showed that the project risk factor X_4 was more heterogeneous than X_3, X_2 and X_1 among the clusters 1, 2, 3, 6 and 7 of World bank assisted project in South East Nigeria (Gupta, 2011). On the other hand X_3 had the highest coefficient of variation in HPDP (cluster 4), with a value of 18.00 %, while X_1 was highest in HSDP (cluster 5) with a value of 15.38 %. X_1 had the lowest coefficient of variation in NEWMAP of 13.23 % within the NEWMAP cluster, while X_2 had the lowest value of 11.72 %, 11.85 % and 12.57 % within the CSDP (cluster 2), PSGRDP (cluster 6) and RAMP (cluster 7), respectively . The lowest Coefficient of variation in NFDP-III (cluster 3), HPDP (cluster 4) and HSDP (cluster 5) was X_3 with coefficient of variations of 14.05 %, 13.88 %, and 11.53 %, respectively. Comparatively, X_3 were more homogenous in clusters 3, 4, and 5. All the clusters at 95% confidence intervals for the entire population of the seven World Bank assisted projects in South East Nigeria showed project completion time and risk avoidance (X_4) had the highest coefficient of variation was more heterogeneous.

4.2.7 Ranking of Project Risk Factors in relation to their importance to selection of procurement method in World Bank assisted project in South East Nigeria.

Both project completion time and risk avoidance (X_1) and contract funding arrangement and quality of services (X_2) ranked first with the value of 0.433 among other project risk factors. These two factors were the most important for all

respondents in the selection of ICB procurement method for goods, works and non consultancy services. This was mainly due to the importance of timing in project delivery and factors related to contract funding arrangement and quality of the services which the procurement strategy or selection method will eventually deliver. This result disagrees with Shiyamini and Rameezdeen (2006) that ranked factors related client requirements in the first position instead of time.

The second position was occupied by price certainty for allocation of project responsibility. The parameter of budget/cost requirements was universally rated as the single most influential parameter and was considered as one of the most important criteria for judgment on procurement route selection. Clients experience in handling projects on the other hand were ranked third.

The ranking of effect of project risk factor on the selection of QCBS procurement method for consultancy services, contract funding arrangement and quality of services ranked first with Pearson correlation value of 0.422. The result highlighted the importance of quality in the choice of procurement method for consultancy services. Quality is also affected by the type of technology and complexity of the project. The result disagrees with Husam & Sedki (2009).

Generally, it should be noted that the major determinant of procurement strategy or procurement selection method for consultancy services is the funding arrangement of the Donor Agent (World Bank, AfDB, ADB, etc). Others include the value of contract, availability of qualified staff and quality of services

Project completion time and risk avoidance is ranked as the second most important factor that affects QCBS procurement selection method with a value of 0.406. Project completion time is among the four major areas of core consideration for selection of procurement method (Odhigu and Yahya, 2011).

Effect of price certainty for allocation of project responsibility ranked third for the

selection of QCBS procurement method for selection of consultancy services with a value of 0.364. The researcher observed that the ranking of project risk factors diverge from one method to another.

Clients experience in handling project was ranked to the fourth position with a correlation coefficient of 0.338 in terms of its effect in the selection of QCBS procurement method. This parameter is very important when considering value for money.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1 Conclusion

The objective of this research was to analyze the effect of project risk factors on the selection of procurement method in South East Nigeria. Twenty (20) project risk factors (variables) identified in this research work were classified or summarized into four set of entirely new variables namely: project completion time and risk avoidance (X_1), price certainty for allocation of project responsibility(X_2), clients experience in handling project(X_3), contract funding arrangement and quality of services (X_4).

Regression analysis showed that project risk factors (independent variables) and International Competitive Bidding (ICB) and Quality and Cost Based selection (QCBS) procurement selection method (dependent variable) in the Seven World Bank assisted projects in South East Nigeria had a very strong relationship with a value of 0.794 and 0.707 at 95% confidence level, respectively.

The study found out that among the project risk factors considered, project completion time and risk avoidance (X_1) and Contract funding arrangement and quality of services (X_4) had the highest effect on selection of ICB procurement method with a coefficient value of 0.433 each followed by price certainty for allocation of project responsibility (X_2) with coefficient values of 0.427. The third highest effect was from clients experience in handling project (X_3) with coefficient values of 0.392.

On the other hand, the independent variable that had the highest effect for the selection of procurement method for the Consultancy services using quality and cost based selection (QCBS) method was contract funding arrangement and quality of services (X_4) with a coefficient value of 0.422. This was followed by project completion time and risk avoidance (X_1) with a coefficient value of 0.406. The third and fourth highest effect of were from price certainty for allocation of project responsibility (X_2) and clients experience in handling project (X_3) with coefficient values of 0.364 and 0.338 respectively.

Based on the result of this research, we drew the following conclusion: that individually and Collectively, all the four Project Risk factors (Project completion time and risk avoidance, Price certainty for allocation of project responsibility, Clients experience in handling project, Contract funding arrangement and quality services) significantly ($p< 0.05$) had effect on selection of procurement method in World Bank assisted projects in South East Nigeria.

There is significant difference between project risk factors and selection of procurement methods for goods, works, and consultancy service in World Bank assisted project in South East Nigeria. The knowledge of effect project risk factors will enhance appropriate selection of ICB and QCBS procurement method in World Bank assisted projects in South East Nigeria by project team members and procurement experts in particular.

5.2 Recommendations

Based on the result of the research, summary of findings and conclusion, the researcher recommends the following:

1. That World Bank assisted projects in South East Nigeria should consider project risk factors prior to selection of appropriate procurement method for goods, works and consulting services. This is because failure to give consideration to the risk factors may lead to wrong choice of procurement pathway.
2. That in further study, a confidence level of 99% ($P<0.01$) should be used to determine if the project risk factors will have more significant effect on procurement selection methods in South East Nigeria.
3. That further study be carried out to determine other risk factors that have effect on selection of procurement method in World Bank assisted projects in South East Nigeria. This is because our model only explains 63.00% and 54.50% of the variance in our dependent variable for ICB and QCBS procurement selection methods, respectively. There is the need for further studies to determine the factor (s) that determined the remaining 37.00% and 45.50% for ICB and QCBS procurement selection methods, respectively.

5.3 Contribution to Knowledge

1. Identification of four major project risk factors that affect procurement selection methods namely: Project resource and delivery time, Price certainty for allocation of project responsibility, Clients experience in handling project and Contract value and funding arrangement.

2. The study has created awareness on the effect of variables which must be taken into consideration prior to selection of procurement method to ensure successful

implementation of both government and Donor funded projects in South East Nigeria.

3. To select ICB as a procurement method for goods, works and non consultancy services, procurement practitioners and other project team members should first consider the effects timing in project delivery and factors related to contract funding arrangement and quality of services.

4. Also to select QCBS as procurement method for consultancy services, the project risk factor namely: contract funding arrangement and quality of services should first be considered.

REFERENCES

Abbasi, G. Y., Abdel-Jaber, M. S. & Abu-Khadeje, A. (2005) ―Risk analysis for the major factors affecting the construction industry in Jordan, *Emirates Journal for Engineering Research*, 10 (1), 41-47

Abu Bakar, A., Osman, O., Bulba, A., (2009). Procurement selection practices in post disaster project management: A case study in banda aceh, Indonesia. Fifth International Conference on Construction in the 21st Century (CITC-V) "Collaboration and Integration in Engineering, Management and Technology", Istanbul, Turkey.

Acquaye, J.A. (2011). Guide to practice of procedures in public procurement of works. RoystackStyle Publications, Accra.

African Development Bank, (2012a) *Rules and procedures for procurement of goods and works, Procurement and Fiduciary Services Department (ORPF)*

Aghajanian, S and Shevchenko-Perepy, R. (2018). An Empirical Procurement Risk Management Framework in Supply Chain Networks : *A Hybrid Approach. Industrial Engineering & Management Systems.* 17. 730-744. 10.7232/iems.2018.17.4.730.

Akech, J.M. M (2005). Development partners and governance of public procurement in Kenya: enhancing democracy in the administration of aid. Int. law Politics. 37(4):829-868.

Akpan, E. O. and Ezenwa, E. F. (2002): Project Management theory and practice. FUTO Press Limited. Federal University of Technology Owerri, Nigeria.

Akindoyeni, A. (2011). The management of abandoned projects. *Journal of the Nigerian Institute of Building*, Maiden edition, 1(2), pp. 16-20.

Akintoye, A.S. & MacLeod, M.J. (1997) ―*Risk analysis and management in construction*‖ *International Journal of Project Management Vol. 15, No. 1, pp. 31-38*

Alaeddin, G. and Nuhu B. (2015). The influence of procurement methods on project performance: A conceptual framework. *NICMAR-Journal of Construction Management*, Vol, XXX, (3), pp. 1-10

Alhassan, D. and Aminu, M. B. (2015). Risk factors influencing construction procurement performance in Nigeria. *Arid zone Journal Engineering Technology and Environment.* Vol. 11: 77-88.

Anderson, T. W. (2003). Introduction to Multivariate Statistical Analysis, 3rd ed. New York: Wiley.

Arrowsmith, S., and Hartley, K. (2002). Public Procurement (4th Ed.).Northampton, MA: Elgar.

Babbie, E. (1986). The practice of social research. Belmont, California: Wadsworth Publishing Co. Inc.

Banaitiene, N. and Banaitis, A. (2012). Risk management in construction projects, [Availableonline]http://cdn.intechopen.com/pdfs/38973/InTechRisk_management_in_construction_projects.pdf Accessed on 15/07/2013

Babatunde, S. O., Opawole, A., & Ujaddughe, I. C. (2010). An appraisal of project procurement methods in the Nigerian construction industry. *Civil Engineering Dimension*, 12(1), pp. 1–7.

Baloi, D. (2012). Risk Analysis Techniques in Construction Engineering Projects

Journal of Risk Analysis and Crisis Response: Volume 2, Issue 2, August 2012, Pages 115 – 123.

Baloi, D. and Price, A.D.F. (2003). Modelling Global Risk Factors Affecting Construction Cost Performance, *International Journal of Project Management*, 21, 261 – 269.

Basheka B. C. and Bisangabasaija E. (2010): Determinants of unethical public procurement in local government systems of Uganda: a case study. *International Journal of Procurement Management* vol. 3, issue 1, 91-104.

Beavers, Amy S.; John W. Lounsbury, Jennifer K. Richards, Schuyler W. Huck, Gary J. Skolits, and Shelley L. Esquivel. (2013). Practical considerations for using exploratory factor analysis in educational research. Practical Assessment, Research and Evaluation .

Bhutto, I, Memon, N, Khoso, Ali, L, M., Khahro, S. (2019). Factors Affecting Selection of Procurement Method in Public Sector Construction Projects.

Bryntse, K. (1996). "The Purchasing of Public Services: Exploring The Purchasing Function in a Service Context." *European Journal of Purchasing and Supply Management,* 2: 193–201.

Buchanan, T. (2000). Potential of the Internet for personality research. In M. H. Birnbaum (Ed.), Psychological experiments on the Internet (pp. 121–140). San Diego, CA: Academic Press.

Buertey, J.I.T., Abeere-Inga, E., Kumi, T.A. (2012a) ―*Successful delivery of infrastructural projects: Epistemic overview of cost risk and uncertainties*‖ *Journal of Civil Engineering and Architecture, Volume 6, No. 9 (Serial No. 58), pp. 1218–1229, ISSN 1934-7359, USA.*

Cartlidge, D. (2009): Quantity Surveyor's pocket book. Elsevier Ltd, Great Britain

Chapman, C., and Ward, S. (2003). Project risk management. Processes, techniques and insights. 2nd ed. Chichester: John Wiley & Sons.

Chen, H., Hao G., Poon S.W., Ng F.F., (2004.). Cost Risk Management in West Rail Project of Hong Kong", AACE Internat. Trans.,

Chia, S.E., (2006). Risk Assessment Framework for Project Management. IEEE, 376-379,

Chidiebere-Mark, N.M., Oguoma, N., Onyeneke, R.U. & Henri-Ukoha, A. (2014). Factors influencing the disbursements of loans from selected commercial banks to small-scale and medium-scale agro-based enterprises in Imo State, Nigeria. Agricultura Tropica et Subtropica, 47 (2), 72-78.

Chileshe, N. and Yirenkyi-Fianko, A.B. (2011); *Perceptions of threat risk frequency and impact on construction projects in Ghana: Opinion survey findings, Journal of Construction in Developing Countries, Vol. 16(2), 115–149, 2011.*

Coe, K., and Scacco, J. M. (2017). Content Analysis, Quantitative. The International Encyclopedia of Communication Research Methods, 1–11.

Cooper, D.F. and Chapman C.B (1987) Risk analysis for large projects: models, methods and cases, Wiley, Chichester.

Dada, M.O. (2012), A second look: Stakeholders' Perceptions of Some Issues in Design – Bid-Build Effects of variation order factors on project performance.

Day, W. (1998). Performance over price. American School & University, http://www.asumag.com/magazine/Archives/0898profsvcs.html.

Eboh, E.C. (2009). Social and Economic Research: Principles and Methods, (2nd edition). African Institute for Applied Economics, Enugu , Nigeria.

Ehsan, N., Alam, M., Mirza, E., Ishaque, A. (2010). Risk management in construction industry‖ *Engineering Management Department, Center for Advanced Studies in Engineering, Islamabad, Pakistan*

Elkingtin P. and Sallman C., (2002). Managing project risks: a case study form the utilities sector. *International Journal of Project Management*. Vol. 20, No. 1, pp. 49-57.

Eyitope, A., Ojo, S., Ajibola, M., Gbadebo, R., (2012). Critical selection criteria for appropriate procurement strategy for project delivery in Nigeria. *Journal of Emerging Trends in Economics and Management Sciences (JETEMS)*,

pp.422-428.

FIDIC (2011); Quality Based Consultant Selection guide

https://en.wikipedia.org/wiki/Kruskal%E2%80%93Wallis_one-way_analysis_of_variance Criteria For Selection Of Design And Build Procurement Method - Scientific Figure on ResearchGate. Available from: https://www.researchgate.net/figure/Factor-Effecting-Selection-Of-A-Procurement-Method_fig1_303818282 [accessed 2 Jun, 2021]

Flanagan, R. (1993). Risk Management and Construction, Oxford, Blackwell Science Ltd.

Government of Jamaica (2014). Revised Handbook of Public Sector Procurement Procedures, Minister of Finance & the Public Service, Retrieved from https://mof.gov.jm/procurement/revised-handbook-of-public-sector-procurement-procedures.html

Gorsuch, R. L. (2003). Factor analysis. In A. Shinka and W. F. Velicer(Vol.Eds). *Handbook of Psychology:Vol.2. Research methods in psychology*(pp.143-164). Hoboken, NJ: Wiley.

Gorsuch, R. L (1983). Common factor analysis versus component analysis: Some well a little known facts. *Multivariate Behavioral Research, 25(1)* 33-39.

Gupta, S. C. (2011). Fundamentals of Statistics. Himalaya Publishing House.

Hair, J. F., Black, W. C., Babin, B. J., Anderson R. E. (2014). Multivariate Data Analysis (7th ed.). Pearson Education Limited Edinburgh Gate Harlow Essex CM20 2JE

Hayton, J. C; Allen, D and Scapello, V. (2004). Factor Retention Decisions in Exploratory Factor Analysis: A Tutorial on Parallel Analysis. *Organizational Research Methods* 7(2):191-205

Hickson, D.J., Butler, R.J., Cray, D., Mallory, G.R., Wilson, D.C. (1986), Top Decisions: Strategic Decision-making in Organizations. San Francisco: Jossey-Bass Publishers.

Hillson, D.A., S. Grimaldi, and C.Rafele. (2006). Managing project risks using a cross risk breakdown matrix. Risk Management 8: 61–76.

Hoxley, M. (2000) 'Are competitive fee tendering and construction professional service quality mutually exclusive?', Construction Management and Economics, 18 (5) 599-605

Hughes, E. J.(2012). Design-Bid-Build v. Guaranteed Maximum Price Contracting: The Basics for Owner's Counsel *New York Law Journal* .pg.16

Husam, D and Sedki E.R. (2009). Identification of procurement system selection criteria in the construction industry in Iraq by using Delphi method [J], 2009, Department of engineering Affairs, Baghdad University, Baghdad, Iraq

Idiake. J. E. (2015). "A Comparative Analysis of Traditional and Design & Build Methods of Procurement in the Nigerian Construction Industry",*International Journal of Construction Engineering and Management*, Vol. 4, (1), pp.1-12.

Izhar, H. B., Nafees, A. M., Ali, R. K., Muhammad, A. L., and Shabir, H. K. (2019),' Factors Affecting Selection of Procurement Method in Public Sector Construction Projects' 10th International Civil Engineering Conference (ICEC-2019) "Technological Transformation of Civil Engineering" February 23-24, 2019, Karachi, Pakistan.

Johnson, Richard A.; Wichern and Dean W. (2007). Applied Multivariate Statistical Analysis (6th Edition) . Madison, Wisconsin: Pearson.

Kahneman, D., and Tversky, A. (1979). On the interpretation of intuitive probability: A reply to Jonathan Cohen. Cognition, 7(4), 409–411. https://. https://doi.org/10.1016/0010-0277(79)90024-6.

Karim, N.A., Rahman, A.I., Memmon,A.H., Jamil, N., Azis, A.A.A., (2012) . Significant risk factors in construction projects: Contractor‘s perception‖ 2012 IEEE Colloquium on Humanities, Science and Engineering Research (CHUSER 2012), December 3-4, 2012, Kota Kinabalu, Sabah Malaysia

Kidd, A. (2005) .The definition of procurement and supply chain management– CIPS document‖ In Procurement professional magazine, CIPS Australia: August 2005, available online at www.cipsintelligence.cips.org/opencontent (assessed on 22/06/2013)

Klemetti A. (2006). Risk management in construction project networks. Helsinki University of Technology Laboratory of Industrial Management Report.

Kpodo, S. (2011). General risk management principles: The quantity surveyor Issue 1, June 2011

Krippendorff, K. (1980). Content Analysis: An Introduction to its Methodology. Beverly Hills: Sage Publications.

Kwakye, A.A. (1997). Construction project administration in practice, *Longmans*

Larmour (2011). A study of procurement routes and their use in the commercial sector, PhD thesis, Interdisciplinary Design for the Built Environment.

Lee, C. K., Yiu, T. W., & Cheung, S. O. (2015). Perceived risks, obligations, and uncertainties: Antecedents of unpaid contractors' intention to suspend works against non-payment.Implementing Innovative Ideas in Structural Engineering and Project Management, ISEC 2015. ISEC Press

Love, P., Davis, P., Baccarini, D., Wilson, G., and Lopez, R., (2008). Procurement selection in the public sector: a tale of two states. Clients

driving innovation: Benefiting from Innovation Conference, Gold Coast, Australia.

Luu, D. T.; NG, S. T.; Chen, S. E. (2005). Formulating procurement selection criteria through case based reasoning approach. *Journal of Computing in Civil Engineering, v. 19, n.3, 269-276.*

Lyons, T. and Skitmore, M. (2004). Project risk management in the Queensland engineering construction industry: A survey.*International Journal of Project Management* 22(1):51-61.

Mahmood, S. A. I. (2010). Public procurement and corruption in Bangladesh. Confronting the challenges and opportunities. *Journal of public administration and policy research,* 2(6), 103-111.

Mahon, C. (2011). Key Procurement Selection Criteria of Auckland Interior Fitout Clients: An Empirical Study. A Report for Industry Project CONS 7819 Submitted in Partial Fulfilment of the Requirements for the Degree of Bachelor of Construction, Unitec New Zealand, Auckland

Maizon, H.; Melissa, C. Y.; NG, C. Y.; NG, S. H.; Shim, M. H.; Tay, L. Y. (2006). Factors Influencing the Selection of Procurement Systems by Clients. Proceeding of International Conference on Construction Industry 2006, Padang, Indonesia, 21st June – 25th June 1-10.

Makabira D.K. and Ester Waiganjo, (2014). "Role of Procurement Practices on the Performance of Corporate Organizations in Kenya: A Case Study of Kenya National Police Service*," International Journal of Academic Research in Business and Social Sciences*, Human Resource Management Academic Research Society, *International Journal of Academic Research in Business and Social Sciences*, vol. 4(10), pages 369-385, October.

Masterman, J.W.E. (2002). *An introduction to building procurement systems, 2nd edition. Spon Press, London.*

Mathonsi, M. O. and Thwala, W. D. (2012), Factors influencing the selection of procurement systems in the South African construction industry. *African Journal of Business Management,* v. 6, n. 3, p. 583-594.

Merriam Webster's Collegiate Dictionary, (2003). Eleventh ed. Merrian Webster Incorporated, Springfield, Massachusetts, USA.

Mitchell V.W, (1994). Problems and Risks in the Purchasing of Consultancy Services. *Service Industries Journal* 14(3):315-339, DOI:10.1080/02642069400000036. The University of Sydney

Mortledge, R., Smith, A. and Kashiwagi, D.T. (2006). Building Procurement. Oxford: Blackwell.

Moshini, R.A. (1993), Knowledge-based design of project procurement process, *Journal of Computing in Civil Engineering*, ASCE, 7(1), 107-122

Mustafa, M. A. and AI-Bahar, J. F. (1991). 'Project risk assessment using the analytic Hierarchy process' lEE Transactions of Engineering Management 38 (1991) 46-52

New South Wales Government, (2008). Procurement practice guide: Procurement method selection. NSW Client Support Centre, Britain

Nworuh, G.E. (2014) "Basic Research Methodology for Researchers' trainees and trainers in management science (2nd edition)": Abix printers Nigeria, Owerri Nigeria.

Obi, I.U. (1986) Statistical Methods of Detecting Differences between Treatment Means. Snapp Press Limited, Enugu, 2-28.

Odeyinka, H.A., Lowe, J. Kaka, A. (2008). An evaluation of risk factors impacting construction cash flow forecast. *Journal of Financial Management of Property and Construction, Vol. 13 No. 1*

Odhigu, F., and Yahya, A., (2011). Cost benefit analysis of procurement systems and the performance of construction projects in East Malaysia. *Journal of Information Management and Business*, pp. 181-192.

Ojo, S.O. Adeyemi, A. Y. and Fagbenle, O. (2006), The Performance of Traditional Contract Procurement in Housing Projects in Nigeria. *Civil Engineering Dimension*, 11 (2), 106-102.

Ogunsanmi, O.E., Iyagba, R.O.A. and Omirin, M.M. (2003), A comparative Study of the Performance of Traditional and Labour only Procurements in Nigeria. *Journal of Nigeria Institute of Building*, 12-27.

Ogunsanmi O (2013) Effects of Procurement Related Factors on Construction Project Performance in Nigeria, Ethiopian *Journal of Environmental Studies and Management* Vol. 6 No.2 20]

Onosakponome, F.O., Yahya, A., Abdul Rani,S.N., Shaikh,M.J. (2011) ―Cost benefit analysis of procurement systems and the performance of construction projects in East Malaysia‖ Information Management and Business Review, Vol. 2, No. 5, pp. 181-192, May 2011

Osama I. E and Nabil I. E (2013). "Factors Affecting the Selection of Procurement Methods in the Construction Projects in Gaza strip" The Islamic University – Gaza, Faculty of Engineering Higher Education Deanship, Construction Project Management. Thesis.

Oxford Advanced Learners Dictionary (2006) 8th edition

Padiyar, V., Shankar, T. and Varma, A. (2004). Risk management in PPP. IL & FS Infrastructure development Corporation limited, accessed via www.globalelearninghouse.org.

Peter E.D. L; Peter, D. and David J. E. (2008). Uncertainty avoidance: public sector clients and procurement selection. *International Journal of Public Sector Management* 21(7):753-776

Perry, J.G. and Hayes, R.W. (1985), Risk and its management in construction projects‘‘, Proceedings of Institution of Civil Engineers, Part 1, June, pp. 499-521.

Pfeil.U , Arjan.R and Zaphiris.P (2009). Age differences in online social networking – A study of user profiles and the social capital divide among teenagers and older users in MySpace Computers in human behavior Vol 25 p 643 – 654

Project Management Institute (PMBOK" Guide), (2008): A Guide to the Project Management Body of Knowledge, Upper Darby, PA.

Project Management Institute (PMI), (2013): A guide to the project management body of knowledge, 4th Edition, Project Management Institute, Inc. USA

Public Procurement Authority (PPA): (2007), *Annual Report 2007*

Ratnasabapathy, S., Rameezdeen, R. and Gamage, I. (2006) "Macro level factors affecting the construction procurement selection: Amulti criteria model", pp. 581-591.

Raz, T. and Hillson, D. (2005). A Comparative Review of Risk Management Standards. *Risk Management* 7(4):53-66.

Renuka, S. M., Umarani,C., Kamal, S. (2014). A Review on Critical Risk Factors in the Life Cycle of Construction Projects. *Journal of Civil Engineering Research.* 2014; 4(2A): 31-36

Rezakhani, P. (2012) ―Classifying key risk factors in construction projects‖, Buletinul Institutului Politehnic Din Iaş iPublicat de UniversitateaTehnică „Gheorghe.

Rodriguez, J. (2012), Common Causes for a change order. Retrieved on 20th October 2012 from http://construction.about.com/od/claims.managem ent/a/common causes. For.A. change.order.htm

Roller L. & Lavrakas U. (2015).Applied Qualitative Research Design: A Total Quality Framework Approach, pp. 241-244.

Roodhooft , F. & Abbeele, A. V. D. (2006). Public procurement of consulting services Evidence and comparison with private companies. *International Journal of Public Sector Management*, *19*(5), 490-512.

Rosli, A., Mustapa, M., and Abd Wahid, S., (2006). Bills of quantities – Are they still useful and relevant today? Paper presented at International Conference on Construction Industry, Padang, Indonesia.

Sallas-Mensah, S. (2012) ―Consolidating the gains of Ghana's public procurement reforms through innovative approaches‖, Public Procurement Authority Electronic Bulletin, Vol.3, Issue 6

Saunders, M., Lewis, P., Thornhill, A. (2009), Research methods for business students, 5th Edition. Pearson Education Limited, England

Schiele, J.J. and McCue, C.P. (2006). "Professional service acquisition in public sector procurement: A conceptual model of meaningful involvement." *International Journal of Operations and Production Management*, 26 (3): 300-325.

Schwalbe, K, (2004). Information Technology Project Management, Thomson Course Technology, Boston, 4th Edition.

Scott S.G., and Bruce R.A. (1995) Decision making style: the development and assessment of a new measure. *Educ Psychol Manag* 55:818–831

Shafik, M., and Martin, P., (2006). The impact of procurement methods on the Scottish house building industry. In: Boyd, D (Ed) Procs 22nd Annual ARCOM Conference, 4-6 September 2006, Birmingham, UK, Association of Researchers in Construction Management: pp. 81-90.

Shen, L. Y. , Wu, G. W. C. , Ng, C. S. K. (2001). Risk Assessment for Construction Joint Ventures in China**.** *Journal of Construction Engineering and Management 127(1)* DOI:10.1061/(ASCE)0733-9364(2001)127:1(76).

Shiyamini, R., and Rameezdeen, R., (2006). Multiple decisive factor model for construction procurement system selection. *Proceedings of the COBRA 2006 Conference,* UK.

Skorupka, D. (2009): Method of planning construction projects, Taking into account risk factors‖ B a d a n i a O p e r a c y j n e I D e c y z j e Nr. 3

Smeltzer, L.R and Ogden J.A (2006). Purchasing Professionals' Perceived Differences between Purchasing Materials and Purchasing Services. *Journal of Supply Chain Management* 38(1):54 – 70, DOI:10.1111/j.1745-493X.2002.tb00120.x

Soyombo, O.A. and Ogunsanmi, O.E. (2011). "Evaluation of the Impact of Procurement Systems on Project Outcome". An Unpublished M.Sc. Dissertation of the Department of Building, University of Lagos, Lagos

Sporrong, J.(2011). Criteria in Consultant Selection: Public Procurement of Architectural and Engineering Services. *Australasian Journal of Construction Economics and Building* 11(4)DOI:10.5130/ajceb.v11i4.2297.

Stonebumer, G., Goguen, A., & Feringa, A. (2002). Risk management guide for IT Systems. Washington, DC: National 855Institute of Standards and Technology (NIST) U.S. Dept. of Commerce. Publication No. 800–3

Sudic, S., Cirovic, G., and Mitrovi, S. (2013): Risk analysis and management on public private partnership projects (PPP) in Serbia. Organization, Technology and Management in Construction: *An International Journal, Vol.5 (1) 2013*

Tadayon, M., Jaafar, M., Nasri, E. (2012)*:* An Assessment of risk identification in large construction projects in Iran‖ Journal *of Construction in Developing Countries, Supp.* 1, 76

Tah, J. H., Thorpe, A., and McCaffer, R. (1993). Contractor project risks contingency allocation using linguistic approximation. Computing systems in engineering, 4(2), 281-293.

Tah, J.H.M., and V. Carr. (2001). Towards a framework for project risk knowledge management in the construction supply chain. Advances in Engineering Software 32: 835-46.

Tate, L.W., Ellram, M. L. and Dooley, J. K. (2014), "The impact of transaction costs and institutional pressure on supplier environmental practices", *International Journal of Physical Distribution & Logistics Management*, Vol. 44 No. 5, pp. 353-372. https://doi.org/10.1108/IJPDLM-12-2012-0356

Thai, K.V. (2001). Public procurement re-examined. *Journal of public procurement Vol*. 1, Issue 1, 9-50

The Chartered Institute of Building (CIOB), (2010). A report exploring procurement in the construction industry. Understanding procurement methods in practice: An alternative perspective, UK.

Thomas, NG., Luu, D., and Chen, S., (2001). Decision criteria and their subjectivity in construction procurement selection. *The Australian Journal of Construction Economics and building*, pp.70-80.

Thompson, P.B., and W. Perry (1992). "Competing conceptions of risk". http://www.piercelaw. edu/risk/vol7/fall/thompson.htm

Tran, D., and Molenaar, K., (2012). Critical risk factors in project delivery method selection for highway projects. Construction Research Congress, ASCE 2012, pp. 331- 340.

Turpin, M. and Marais, M.. (2004). Decision-making: Theory and practice. University of Pretoria, DOI:10.5784/20-2-12.

Uhegbu, A. N (2009), Research and Statistical methods in library and information science Barloz Publishers Inc: ISBN978-32431-7-9.

Uzonwanne F.C (2016). Influence of age and gender on decision-making models and leadership styles of non-profit executives in Texas, USA. Int J Organ Analysis 24(2):186–203. Emerald Insight

Wang, Y., Patel, S., & Patel, D. (2004). A Layered Reference Model of the Brain. IEEE Transactions on Systems, Man, and Cybernetics, 36(2), 124-133.,

Waters D. (2004). Introduction To Supply Chain Management, (2rd Edition), Pal grave Macmillan, Britain.

Westland J. (2006). Project Management Life Cycle: A Complete Step-by-step Methodology for Initiating Planning Executing and Closing the Project. Kogan: Page Limited

White, M. and Marsh, E. (2006).Content Analysis: A Flexible Methodology. *Journal of Library Trends VL. (55):* 10.1353/lib.2006.0053.

Windapo, A., Olugboyega, O. and Adediran, A. (2019), "Procurement strategies influencing small andmedium contractor development in South Africa",Proceedings of the Institution of CivilEngineers-Management, Procurement and Law, Vol. 172 No. 6, pp. 253-263.

World Bank, (2012). Financial management and procurement in World Bank operations, Annual report for FY 2011.

World Bank (2011): Guidelines - Procurement of goods, works, and non-consulting Services under IBRD Loans and IDA Credits & Grants by World Bank Borrowers

World Bank, (2006). Guidelines: procurement under IDRB loans and IDA credits, World Bank. www.worldbank.org

World Bank (2006*).*Consultancy Services Manual *: A comprehensive guide to the selection of consultants.*

World Bank, (2004). Country procurement assessment report, Nigeria.

World Bank (2003): Nigeria country procurement assessment report – 2003 main report vol. 2

World Bank (2000). Country Assessment Report for Nigeria.

The World Book Encyclopedia of Science. (2000). Chicago.

www.http// article.sapub.org/image/10.5923.c.jce.201401.07_003.gif

Zid, C. and Ali, R. S.. (2016): Facilitate Risk Management in Construction Process by Using Hierarchical Risk Breakdown Structure. *International Journal of Scientific and Research Publications*, Volume 6, Issue 7, July 2016 703

Zou, P.W.X., Zhang, G., Wang, J. (2006). Identifying key risks in construction projects: life cycle and stakeholder perspective. Sydney: Faculty of Built Environment, University of New South Wales

APPENDIX A

QUESTIONNAIRE

Federal University of Technology Owerri (FUTO)

Dear Respondent,

This questionnaire is part of my research paper in partial fulfilment of my postgraduate study in Project Management (MSc) in the department of Project Management Technology, Federal University of Technology Owerri. The purpose of this research is to investigate (analyse) the Effect of Project risk factors in the selection of procurement method in World Bank assisted projects in South East Nigeria. The information and response gathered will be used for academic purposes only, and will be kept strictly confidential. The survey will take about 15-20 minutes to complete and your participation in this survey is appreciated.

Thank you.

Yours faithfully

Njoku, E.C.

For further clarification and inquires please contact:

ecnjoku2004@gmail.com , +2348115313889

QUESTIONNAIRE

SECTION A - Information from the Respondent

Please respond to the questions by ticking "x" in the appropriate box for each item

1. Which of the following World Bank assisted project are you attached to:

□ Nigeria Erosion and Watershed Management Project (NEWMAP)-

□ Third National Fadama Development Project (Fadama III)

□ Community and Social Development Project (CSDP)

□ Public Sector Governance Reforms and Development Project (PSGRDP)

□ HIV/AIDS Program Development Project (HPDP 2)

□ Health System Development Project (HSDP)

□ Others *(please specify)…….

2. Please select the profession that suit you best

□ Project manager □ Engineer □ Environmentalist □ Economist
□ Architect □ Quantity surveyor □ Procurement officer □ Accountant
□ Others *(please specify)…….

3. Please select your highest academic qualification

□ PhD □ MSc/MBA □ B. Eng/B. Tech/ BSc
□ HND □ WASC/NECO □ Others *please specify+…….

4. Have you attended any specific training in procurement of Goods, works and services? (please tick "**x**" in the appropriate box)

□ Yes □ No

5. If yes, which of the following procurement trainings did you attend? (please tick "**x**" in the appropriate box)

 Procurement of goods and works and non consulting services

 Procurement of consultancy services None Others (please specify)……

[[

6. Please have you ever been involved in procurement selection process for your project?
   Yes No

7. How many years of experience do you have in the procurement of goods, works and consultancy services? (please tick "**x**" in the appropriate box)

   None 1-10 years 11-20 years 21-30 years 31 years and above

8. Please which of the following is the default procurement method you normally use for:
   Goods, works and non consultancy services? (please tick "**x**" in the appropriate box)

 International Competitive Bidding (ICB) Limited International Bidding (LIB)
 National Competitive Bidding (NCB) National Shopping (NS) Direct Contracting (DC)
 Force Account (FA) Local Competitive Bidding (LCB)
 Local shopping (LS) others (please specify)…….

9. Please which of the following is the default procurement method you normally use for Consultancy services? (please tick "**x**" in the appropriate box)

 Quality and Cost Based Selection (QCBS) Quality Based Selection
 Consultant Qualification Selection Individual Consultant Selection (ICS)
 Fixed Budget Selection (FBS) Least Cost selection (LCS)
 Single Source Selection (SSS) Others (please specify) ----------
   --

10. Please tick "**x**" in the box below the total envelope of your project
    US$ 0 – US$100M US$101 million – US$200 Million US$ 201million– US$ 300 million
    US$ 301million- US$ 400 million Above US$ 400million.

SECTION B: Effect of Risk Factors on World Bank assisted projects In South East Nigeria

Part A

1. For each of the following statements listed below, indicate the extent of occurrence of the following project risk factors in the selection of procurement method in your project. In the 5-points scale provided, mark a cross (X) at the point that represents your feeling.

Not at all (NAA)	Rarely(R)	Sometimes (S)	Often (O)	Very often (VO)
1 point	2 points	3 points	4 points	5 points

FACTORS		LIKERT SCALE				
A	**PROJECT COMPLETION TIME AND RISK AVOIDANCE**	**5**	**4**	**3**	**2**	**1**
1	Delivery time schedule					
2	Available resources for a project					
3	Flexibility of variations in design					
B	**PRICE CERTAINTY FOR ALLOCATION OF PROJECT RESPONSIBILITY**	**NAA**	**R**	**S**	**V**	**VO**
1	Allocation of responsibility					
2	Price certainty					
3	Availability of technology					
4	Complexity of Project					
C	**CLIENTS EXPERIENCE IN PROJECT HANDLING**	**NAA**	**R**	**S**	**V**	**VO**
1	Clients experience					
2	Type of project					
3	Location of project site					

4	Natural Disaster					
D	**FUNDING ARRANGEMENT AND CONTRACT VALUE**	**NAA**	**R**	**S**	**V**	**VO**
1	Funding arrangement					
2	Value of contract					
3	Availability of qualified staff					

2. For each of the following statements listed below, indicate the effect of risk factors in the selection of ICB procurement method in your project. In the 5-points scale provided, mark a cross (X) at the point that represents your feeling.

Very low effect (VLE)	Low effect (LE)	Some effect (SE)	High effect (HE)	Very high effect (VHE)
1 point	2 points	3 points	4 points	5 points

FACTORS		LIKERT SCALE				
A	**PROJECT COMPLETION TIME AND RISK AVOIDANCE**	**5**	**4**	**3**	**2**	**1**
1	Delivery time schedule					
2	Available resources for a project					
3	Flexibility of variations in design					
4	Delay in project completion time					
5	Risk avoidance					
B	**PRICE CERTAINTY FOR ALLOCATION OF PROJECT RESPONSIBILITY**	**VLE**	**LE**	**SE**	**HE**	**VHE**
1	Allocation of responsibility					
2	Price certainty					
3	Availability of technology					

4	Complexity of Project					
C	**CLIENTS EXPERIENCE IN PROJECT HANDLING**	**VLE**	**LE**	**SE**	**HE**	**VHE**
1	Clients experience					
2	Type of project					
3	Location of project site					
4	Natural Disaster					
D	**FUNDING ARRANGEMENT AND CONTRACT VALUE**	**VLE**	**LE**	**SE**	**HE**	**VHE**
1	Funding arrangement					
2	Value of contract					
3	Availability of qualified staff					

1. For each of the following statements listed below, indicate the effect of risk factors in the selection of QCBS procurement method in your project. In the 5-points scale provided, mark a cross (X) at the point that represents your feeling.

Very low effect (VLE)	Low effect (LE)	Some effect (SE)	High effect (HE)	Very high effect (VHE)
1 point	2 points	3 points	4 points	5 points

FACTORS		LIKERT SCALE				
A	**PROJECT COMPLETION TIME AND RISK AVOIDANCE**	**5**	**4**	**3**	**2**	**1**
1	Delivery time schedule					
2	Available resources for a project					
3	Flexibility of variations in design					

4	Delay in project completion time					
5	Risk avoidance					
B	**PRICE CERTAINTY FOR ALLOCATION OF PROJECT RESPONSIBILITY**	**VLE**	**LE**	**SE**	**HE**	**VHE**
1	Allocation of responsibility					
2	Price certainty					
3	Availability of technology					
4	Complexity of Project					
C	**CLIENTS EXPERIENCE IN PROJECT HANDLING**	**VLE**	**LE**	**SE**	**HE**	**VHE**
1	Clients experience					
2	Type of project					
3	Location of project site					
4	Natural Disaster					
D	**FUNDING ARRANGEMENT AND CONTRACT VALUE**	**VLE**	**LE**	**SE**	**HE**	**VHE**
1	Funding arrangement					
2	Value of contract					
3	Availability of qualified staff					
4	**Contract funding arrangement and quality services**					

APPENDIX B: SPSS ANALYSIS OF RESULT

FACTOR ANALYSIS

Notes

Output Created		19-MAR-2021 12:01:34
Comments		
Input	Active Dataset	DataSet2
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	100
Missing Value Handling	Definition of Missing	MISSING=EXCLUDE: User-defined missing values are treated as missing.
	Cases Used	PAIRWISE: Correlation coefficients for each pair of variables are based on all the cases with valid data for that pair. The factor analysis is based on these correlations.

Syntax		FACTOR /VARIABLES B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B11 B12 B13 B14 B15 B16 B17 B18 B19 B20 /MISSING PAIRWISE /ANALYSIS B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B11 B12 B13 B14 B15 B16 B17 B18 B19 B20 /PRINT UNIVARIATE INITIAL CORRELATION SIG DET KMO EXTRACTION ROTATION /FORMAT SORT BLANK(.3) /PLOT EIGEN /CRITERIA MINEIGEN(1) ITERATE(50) /EXTRACTION PC /CRITERIA ITERATE(50) DELTA(0) /ROTATION OBLIMIN /METHOD=CORRELATION.
Resources	Processor Time	00:00:00.34
	Elapsed Time	00:00:00.28
	Maximum Memory Required	48768 (47.625K) bytes

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	5.946	29.729	29.729	5.946	29.729	29.729	4.685
2	4.128	20.639	50.369	4.128	20.639	50.369	4.265
3	3.126	15.631	66.000	3.126	15.631	66.000	3.470
4	2.409	12.046	78.046	2.409	12.046	78.046	4.050
5	1.296	6.480	84.526				
6	.831	4.156	88.682				
7	.748	3.741	92.423				
8	.520	2.601	95.024				
9	.369	1.844	96.868				
10	.224	1.119	97.987				

11	.136	.681	98.668				
12	.104	.519	99.187				
13	.071	.353	99.540				
14	.055	.274	99.814				
15	.018	.090	99.904				
16	.010	.048	99.952				
17	.008	.038	99.990				
18	.002	.010	100.000				
19	1.032E-15	5.160E-15	100.000				
20	-7.924E-16	-3.962E-15	100.000				

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

Component Correlation Matrix

Component	1	2	3	4	5
1	1.000	-.034	-.169	.153	.057
2	-.034	1.000	-.152	-.042	.290
3	-.169	-.152	1.000	-.054	.020
4	.153	-.042	-.054	1.000	.085
5	.057	.290	.020	.085	1.000

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

Notes

Output Created		03-MAY-2021 06:23:35
Comments		
Input	Active Dataset	DataSet8
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	351
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on cases with no missing values for any variable used.
Syntax		REGRESSION /DESCRIPTIVES MEAN STDDEV CORR SIG N /MISSING LISTWISE /STATISTICS COEFF OUTS CI(95) R ANOVA COLLIN TOL CHANGE ZPP /CRITERIA=PIN(.05) POUT(.10) CIN(95) /NOORIGIN /DEPENDENT Y /METHOD=ENTER X1 X2 X3 X4 /PARTIALPLOT ALL /SCATTERPLOT=(*ZPRED ,*DRESID) /RESIDUALS NORMPROB(ZRESID) /CASEWISE PLOT(ZRESID) OUTLIERS(3) /SAVE PRED ZPRED ADJPRED MAHAL COOK ICIN RESID ZRESID SRESID.
Resources	Processor Time	00:00:02.86
	Elapsed Time	00:00:01.27
	Memory Required	4112 bytes
	Additional Memory Required for Residual Plots	1064 bytes
Variables Created or Modified	PRE_1	Unstandardized Predicted Value
	RES_1	Unstandardized Residual
	ADJ_1	Adjusted Predicted Value
	ZPR_1	Standardized Predicted Value
	ZRE_1	Standardized Residual
	SRE_1	Studentized Residual
	MAH_1	Mahalanobis Distance
	COO_1	Cook's Distance
	LICI_1	95% Individual Confidence Interval Lower Bound for Y
	UICI_1	95% Individual Confidence Interval Upper Bound for Y

Correlations

Correlations

		Y	X1	X2	X3	X4
Pearson Correlation	Y	1.000	.433	.427	.392	.433
	X1	.433	1.000	.205	.101	-.005
	X2	.427	.205	1.000	.016	-.092
	X3	.392	.101	.016	1.000	.067
	X4	.433	-.005	-.092	.067	1.000
Sig. (1-tailed)	Y	.	.000	.000	.000	.000
	X1	.000	.	.000	.030	.464
	X2	.000	.000	.	.384	.043
	X3	.000	.030	.384	.	.104
	X4	.000	.464	.043	.104	.

Source: SPSS Version 23.0

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	X4, X1, X3, X2[b]	.	Enter

a. Dependent Variable: Y

b. All requested variables entered.

Source: SPSS Version 23.0

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.794[a]	.630	.626	1.13767	.630	147.038	4	345	.000

a. Predictors: (Constant), X4, X1, X3, X2

b. Dependent Variable: Y

Source: SPSS Version 23.0

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	761.243	4	190.311	147.038	.000[b]
	Residual	446.532	345	1.294		
	Total	1207.774	349			

a. Dependent Variable: Y

b. Predictors: (Constant), X4, X1, X3, X2

Source: SPSS Version 23.0

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% idence Interval for B		Collinearity Statistics		
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Tolerance	VIF
1	(Cons	5.769	.806		7.154	.000	4.183	7.355			
	X1	.221	.023	.322	9.570	.000	.176	.267	.433	.948	1.054
	X2	.276	.023	.397	11.816	.000	.230	.321	.427	.950	1.053
	X3	.205	.021	.324	9.812	.000	.164	.246	.392	.985	1.015
	X4	.271	.020	.449	13.632	.000	.232	.310	.433	.987	1.013

a. Dependent Variable: Project Team Members

Source: SPSS Version 23.0

Appendix C: EXCEL SUMMARY OF RESPONDENTS OPINION

S/N	X1	X2	X3	X4	Y	S/N	X1	X2	X3	X4	Y
1	17	22	23	23	26	25	19	18	19	15	23
2	19	18	23	22	26	26	15	19	17	10	21
3	20	19	23	22	27	27	21	22	22	25	27
4	15	16	16	23	21	28	20	18	19	20	23
5	20	20	20	17	24	29	16	19	20	20	24
6	19	22	15	17	26	30	20	24	19	15	25
7	20	20	18	19	26	31	19	23	21	17	25
8	20	25	21	15	25	32	19	18	22	22	26
9	18	20	18	20	22	33	13	21	15	18	20
10	19	21	22	25	28	34	20	24	20	17	25
11	19	17	17	15	21	35	22	20	25	15	26
12	17	16	25	20	23	36	22	17	25	22	27
13	19	19	21	25	26	37	16	18	20	17	23
14	16	20	20	22	24	38	18	21	15	21	23
15	20	20	17	20	24	39	15	19	10	19	21
16	22	22	20	16	25	40	20	17	19	19	22
17	18	21	20	15	23	41	21	18	18	22	25
18	20	20	20	10	23	42	17	15	21	25	24

19	21	21	24	20	25	43	19	22	20	20	27
20	23	20	25	15	25	44	17	18	23	18	26
21	19	19	20	21	25	45	20	23	23	22	28
22	20	15	18	22	24	46	16	20	24	21	24
23	17	20	24	25	27	47	18	22	18	20	25
24	18	25	20	20	26	48	18	18	22	23	27
49	15	17	20	23	23	74	14	15	24	22	25
50	18	23	22	24	27	75	19	21	20	24	26
51	22	25	24	23	29	76	18	17	23	24	26
52	19	20	25	22	27	77	21	22	23	21	27
53	22	21	15	23	27	78	18	19	17	23	25
54	20	20	19	16	24	79	18	18	22	21	26
55	18	24	21	22	28	80	16	23	15	20	25
56	23	19	22	20	27	81	22	19	17	22	25
57	14	22	22	22	25	82	16	16	20	18	23
58	23	20	22	19	27	83	16	20	23	19	23
59	17	23	22	19	25	84	24	24	15	20	26
60	16	21	19	22	25	85	23	25	21	23	29
61	20	19	19	19	26	86	21	19	23	22	25
62	22	21	15	16	25	87	21	17	22	18	24
63	14	23	16	20	25	88	18	15	22	23	26
64	14	18	18	25	23	89	13	17	19	23	24
65	19	16	21	15	22	90	23	20	20	25	28
66	17	21	18	20	27	91	19	22	23	20	28

67	21	20	16	20	25	92	19	22	20	18	26
68	18	17	13	19	24	93	18	22	23	20	28
69	23	22	23	18	28	94	15	15	22	23	26
70	12	22	24	14	22	95	22	20	25	19	27
71	17	20	21	19	25	96	22	20	22	23	27
72	16	25	23	20	27	97	19	23	25	16	25
73	19	22	22	21	27	98	16	25	24	22	27
99	19	14	22	21	22	124	22	23	23	19	26
100	21	18	24	24	28	125	17	21	20	20	26
101	15	21	20	22	25	126	15	20	23	20	26
102	20	20	15	21	24	127	23	23	25	22	30
103	16	23	10	23	24	128	22	23	20	18	26
104	23	25	25	19	29	129	22	25	15	22	27
105	22	20	19	20	27	130	21	23	21	23	27
106	17	15	17	15	23	131	15	19	22	21	23
107	22	22	16	25	26	132	20	20	24	23	26
108	17	23	21	25	27	133	22	22	23	22	27
109	14	16	22	20	24	134	15	15	21	22	24
110	21	22	23	15	25	135	21	19	20	22	27
111	18	23	23	23	27	136	15	23	22	20	24
112	15	15	22	19	23	137	22	15	22	25	26
113	17	17	23	21	26	138	20	20	20	15	20
114	23	21	22	19	24	139	25	21	23	20	25
115	22	23	19	18	26	140	18	21	21	15	24

116	19	20	23	20	24	141	17	23	22	25	27
117	20	20	22	20	24	142	17	16	20	10	22
118	18	21	23	20	24	143	16	20	22	16	24
119	19	18	20	23	24	144	19	24	19	16	24
120	15	23	20	17	24	145	21	22	23	21	25
121	20	18	20	20	24	146	21	25	23	17	26
122	16	17	22	20	25	147	18	25	15	19	26
123	23	17	20	17	24	148	21	21	22	16	26
149	18	23	21	19	25	174	19	22	22	20	27
150	17	23	23	15	25	175	21	23	22	21	27
151	21	21	21	19	25	176	22	20	19	24	23
152	15	21	17	20	26	177	17	20	19	22	23
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155	18	22	20	25	25	180	21	17	21	21	23
156	21	22	20	25	27	181	20	20	20	18	24
157	18	24	24	18	25	182	20	22	15	21	23
158	17	22	22	23	27	183	20	22	20	19	24
159	22	22	24	23	28	184	21	23	18	23	26
160	15	22	23	23	26	185	17	22	24	22	28
161	22	19	22	22	26	186	19	22	21	17	24
162	22	25	20	15	27	187	17	22	24	16	25
163	23	22	25	20	27	188	22	22	23	19	28
164	16	14	25	25	23	189	19	22	23	23	28

165	19	17	15	25	25	190	19	24	20	21	25
166	22	22	15	17	24	191	22	22	25	22	29
167	18	18	20	20	25	192	19	21	18	20	25
168	23	21	25	17	26	193	20	22	21	15	25
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173	20	23	23	20	27	198	22	21	22	21	27
199	21	23	23	21	27	224	18	25	20	20	26
200	15	22	23	23	28	225	19	18	19	15	23
201	17	22	23	23	26	226	15	19	17	10	21
202	19	18	23	22	26	227	21	22	22	25	27
203	20	19	23	22	27	228	20	18	19	20	23
204	15	16	16	23	21	229	16	19	20	20	24
205	20	20	20	17	24	230	20	24	19	15	25
206	19	22	15	17	26	231	19	23	21	17	25
207	20	20	18	19	26	232	19	18	22	22	26
208	20	25	21	15	25	233	13	21	15	18	20
209	18	20	18	20	22	234	20	24	20	17	25
210	19	21	22	25	28	235	22	20	25	15	26
211	19	17	17	15	21	236	22	17	25	22	27
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256	23	19	22	20	27	281	22	19	17	22	25
257	14	22	22	22	25	282	16	16	20	18	23
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259	17	23	22	19	25	284	24	24	15	20	26
260	16	21	19	22	25	285	23	25	21	23	29
261	20	19	19	19	26	286	21	19	23	22	25
262	22	21	15	16	25	287	21	17	22	18	24

263	14	23	16	20	25	288	18	15	22	23	26
264	14	18	18	25	23	289	13	17	19	23	24
265	19	16	21	15	22	290	23	20	20	25	28
266	17	21	18	20	27	291	19	22	23	20	28
267	21	20	16	20	25	292	19	22	20	18	26
268	18	17	13	19	24	293	18	22	23	20	28
269	23	22	23	18	28	294	15	15	22	23	26
270	12	22	24	14	22	295	22	20	25	19	27
271	17	20	21	19	25	296	22	20	22	23	27
272	16	25	23	20	27	297	19	23	25	16	25
273	19	22	22	21	27	298	16	25	24	22	27
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300	21	18	24	24	28	325	17	21	20	20	26
301	15	21	20	22	25	326	15	20	23	20	26
302	20	20	15	21	24	327	23	23	25	22	30
303	16	23	10	23	24	328	22	23	20	18	26
304	23	25	25	19	29	329	22	25	15	22	27
305	22	20	19	20	27	330	21	23	21	23	27
306	17	15	17	15	23	331	15	19	22	21	23
307	22	22	16	25	26	332	20	20	24	23	26
308	17	23	21	25	27	333	22	22	23	22	27
309	14	16	22	20	24	334	15	15	21	22	24
310	21	22	23	15	25	335	21	19	20	22	27
311	18	23	23	23	27	336	15	23	22	20	24

312	15	15	22	19	23	337	22	15	22	25	26
313	17	17	23	21	26	338	20	20	20	15	20
314	23	21	22	19	24	339	25	21	23	20	25
315	22	23	19	18	26	340	18	21	21	15	24
316	19	20	23	20	24	341	17	23	22	25	27
317	20	20	22	20	24	342	17	16	20	10	22
318	18	21	23	20	24	343	16	20	22	16	24
319	19	18	20	23	24	344	19	24	19	16	24
320	15	23	20	17	24	345	21	22	23	21	25
321	20	18	20	20	24	346	21	25	23	17	26
322	16	17	22	20	25	347	18	25	15	19	26
323	23	17	20	17	24	348	21	21	22	16	26
349	18	23	21	19	25						
350	17	23	23	15	25						