ABSTRACT

Title of Document: VALUE ENGINEERING DECISIONEERING: A RISK MANAGEMENT TOOL IN THE PROJECT MANAGEMENT OFFICE - CASE STUDY OF ELECTRICITY DISTRIBUTION COMPANIES IN NIGERIA

Habeeb Adekunle Quadri,
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Directed By: Professor Gregory Beacher, Department of Civil and Environmental Engineering

The Project Management Office is in its early adopter stage worldwide most especially in developing economies. The Wall Street crash in the 1930s led to the emergence of corporate governance to contain agency problems which resonates with the recent global economic recession induced by recklessness in decision making, which now requires unconventional but methodical engineering approach to business decisions.

The unprecedented proliferation of the PMO in the last decade is an indication of its continued growth and relevance as Center of Excellence in achieving business goals. Value

Engineering is a function-oriented problem-solving methodology the PMO can integrate as a risk management strategy in decision-making to optimize scarce resources for operational excellence and long-term growth.

The objective of this research is to propose the adoption of VE as a risk management tool in the PMO and provide a framework to facilitate its adoption and application as a risk management tool in the PMO. This will result in the discovery of a new, consistent and repeatable decision making process capable of enhancing the PMO efficiency and the overall corporate performance.

This research case-studied the PMO of Abuja Electricity Distribution Company and Kano Electricity Distribution Company in Nigeria. Electricity industry in Nigeria enjoyed an excruciating monopoly for over a century, bad leadership and inept project governance led to its privatization in 2013. The quests by the new investors to discover new tools and strategies to achieve higher returns on investment heralded the establishment of the PMO to leverage its capabilities to execute change management and build leadership competencies.

The research revealed the major drivers propelling and constraints hindering the successful adoption and application of VE in the PMO. However, the research discovered that prudent integration of VE as a risk management tool in the PMO will competitively reposition the electricity distribution companies, *ceteris paribus*.

This research contributed to the body of knowledge in the theoretical underpinnings of the PMO and risk management literature. However, testing and validating the effective-

ness of VE methodology as a risk management tool in the PMO overtime, become the objective of further research by the researcher or other researchers.

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By:

Habeeb Adekunle Quadri

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Advisory Committee
Professor Gregory Baecher (Chair)
Professor Alireza Khaligh (Dean's Rep)
Professor Qingbin Cui
Professor Michelle Bensi
Professor Gerry Galloway
Professor Evans Ashigwuike (External Member, Abuja-Nigeria)

Dedication

This dissertation is dedicated to my Parents; Fatai Adebola and Kehinde Christiana. My Children; OluwaTomiwa Naomi, OluwaMayowa Churchill and OluwaTimilehin Donald.

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Table of Contents

List of Tables

List of Figures

List of Abbreviation

VE	-	Value Engineering
VA	-	Value Analysis
VM	-	Value Management
SAVE	-	Society of American Value Engineers
CSF	-	Critical Success Factor
PMO	-	Project Management Office
PMI	-	Project Management Institute
IVM	-	Institute of Value Management
ESP	-	Earnings per share
GPM	-	Gross profit margin
FAST	-	Function Analysis System Technique
PO	-	Project Office
IEA	-	International Energy Agency
NGEU	-	Nigeria Government Electricity Undertaking
PWD	-	Public Works Department
ECN	-	Electricity Corporation of Nigeria
NESCO	-	Nigerian Electricity Supply Company
NDA	-	Niger Dams Authority
EPIC	-	Electric Power Implementation Committee
NEPP	-	National Electric Power Policy
IPP	-	Independent Power Producers
NERC	-	Nigerian Electricity Regulatory Commission
NEBT	-	Nigerian Bulk Electricity Trading Plc
KEDCO	-	Kano Electricity Distribution Company
DISCO	-	Electricity Distribution Company
NEPA	-	National Electric Power Authority
AEDC	-	Abuja Electricity Distribution Company
BEDC	-	Benin Electricity Distribution Company
EKEDC	-	Eko Electricity Distribution Company
EEDC	-	Enugu Electricity Distribution Company
IBEDC	-	Ibadan Electricity Distribution Company
IKEDC	-	Ikeja Electricity Distribution Company
JEDC	-	Jos Electricity Distribution Company
KEDC	-	Kaduna Electricity Distribution Company
KEDCO	-	Kano Electricity Distribution Company
PHEDC	-	Port-Harcourt Electricity Distribution Company
YEDC	-	Yola Electricity Distribution Company
R&D	-	Research and Development
DISCOS	-	Distribution Companies
SEIS	-	Sahelian Energy and Integrated Services Ltd
KCETAS	-	Kayseri ve Civari Electric T.A.S
KPIs	-	Key Performance Indicators
PMCoE	-	Project Management Center of Excellence

ERM	-	Enterprise Risk Management
RMP	-	Risk Management Process

Chapter 1: Introduction

1.1 Research Background and Motivation

Value Engineering (VE) has been defined as a systemic application of technique by multi disciplined teams to identify the functions of a products or services; establish a worth for that function; generate alternative by creative thinking, and provide inherent secondary functions at the lowest overall cost (Simpkins, 2000:3). Value Engineering is a multi-dimensional problem-solving mechanism that can be deployed to improve the value of a product, system, process or service.

The application of value engineering in organizations creates a change, and given the right enabling environment, value engineering is a creative and disciplined process that affords an organization the opportunity to streamline operational deliverables, add value and save cost with no effect on quality, performance or customer satisfaction (Amrute et al, 2014). Behrouz (2017) noted that there should be a clear, detailed and systemic process to control and minimize throwaways, curtail risks, control operations and find cost cutting procedures in every project.

Value engineering (VE) originated from the US manufacturing sector between the mid-to-late 1940s (Zimmerman, & Hart, 1982). The construction industry adopted VE in the early 1970s (Dell'Isola, 1982) when the industry was eager to come up with a conceptual risk-free framework to improve the value of project outcomes. Afterwards, VE went viral on a global scale as it was adopted in other western countries like the UK and Europe, which led to the establishment of Value Engineering Association in 1966 (Kelly et

al, 2007). Norton and McElligott (1995) noted how the success of Value Engineering practice led to the acceptance of the methodology as a strategic business tool in organizational repositioning process.

The value engineering approach was adopted in Australia and Japan with evidence of its applications in China by 1978 (Alalshikh, et al., 2008). Within the Arabian construction sector, Value Engineering started to surface in the mid-1980s (SAVE, 2007). Lawrence D. Miles is acknowledged as among the foremost advocates of Value Engineering. He proposed the use of Value Engineering at General Electric to improvise the desire for a methodology that could be used to ensure that modifications within a project should occur intentionally rather than by chance. In 1959, the Society of American Value Engineers (SAVE) proposed a standard Value Engineering application framework to regulate the guiding principles. As expected, a broad variance of standard applications of the conceptual principles of VE process and interpretation came forth. There has been debate in the UK with regard to the use of "Value Engineering" and "Value Management" (*i.e.* whether there is any difference between the two). Kelly et al. (2007) stated that the concept "Value Methodology" is generally used in the US in place of "Value Management".

1.1.1 Value Engineering Vs Value Management

This issue was justified by the decision of the Value Engineering Association to change its name to the Institute of Value Management. Kelly et al. (2007) were of the opinion that "Value Management" rather than "Value Engineering" should be used to integrate all of the parts associated with a project instead of concentrating primarily on the cost component. However, SAVE International has chosen to use the concept "Value

Methodology" as all-inclusive in integrating a project. Value Methodology can then be defined as a structured, disciplined procedure aimed at increasing the value of a project outcome over time.

To clarify the ongoing argument, SAVE International (2007) emphasized that the concept of "Value Methodology" may be applied alongside other nomenclatures as "Value Analysis" (VA), "Value Engineering" (VE) and "Value Management" (VM). SAVE stated that these concepts could be swapped with "Value Methodology". SAVE was of the opinion that Value Methodology can be used in a broader range of applications such as industrial or consumer products, construction projects, manufacturing processes, business procedures, service industry etc.

The foregoing debate suggests that efforts have not been made to ascertain the impact of the different nomenclatures used, and as such there is no apt justification for the difference. There exist two main approaches in value study thinking: that of United States (SAVE International and its affiliates), which described function analysis as the groundwork of the value management process. The second is that of Europe and Australia/New Zealand where value methodology is called value management and also regarded as a management style. There exists no better approach for value study with regard to the name, the culture and the thought process that gave rise to these variations in the first place (Alalshikh et al., 2008).

During the 1998 conference of SAVE, the Gulf Chapter was initiated with the aim to provide opportunities for engineers, architects, managers, administrators and others to create an environment for professionals to take cognizance of Value Engineering (VE)

principles and applications in the Arabian context. In establishing the Gulf Chapter of SAVE International, a crucial challenge was the need for "a concentrated effort at popularizing value engineering strategy within the Arabian Gulf countries to enhance project delivery through the proper use of value methodology principles (SAVE, 2008). In this research, Value Engineering (VE) nomenclature will be used with occasional reference to value engineering as value methodology or value management.

1.1.2 Value Engineering in Nigeria

With respect to Nigeria today, the system of value engineering is quintessential to enhance service delivery most especially in the electricity industry. The need to adopt value engineering as a catalyst in the quest to methodically reduce cost to meet the demand of the electricity customers and other stakeholders without trading off quality and performance cannot be overemphasized.

Given the growing number of complex projects the world over, the universal urge for a new methodology to seamlessly deliver project outcomes continues to grow. Good project governance is driven by the assumption that an organization is in need of a mechanism and/or a platform to standardize the methodology, create value, revamp processes, and streamline policies to reposition the organization to realize its strategic business goal in the best interest of all the stakeholders (Dai & Wells, 2004; Aubry, Hobbs, & Thuillier, 2007; Müller, 2009). The global yearning for improved organizational performance was interpreted as a call for the institutionalization of the PMO as a business strategy.

Like VE, the impulse for instituting the PMO within the organizational structure is grounded on the desire to systemically enhance the development and implementation of project portfolios to minimize the number of ongoing projects that fail to meet the expectations of customers and stakeholders as a result of budget overruns or unsatisfactory delays (Aubry et al., 2008). As such, the PMO has become a vital tool for organization transformation in both the public and private sectors. The increasing number of certified Nigerians as Project Management Professionals (PMP), indicates that the practice of project management and the adoption of the PMO in Nigeria are welcome ideas. This is viewed as an efficient new mechanism to develop and enhance management and leadership capabilities to ensure that various sectors of the Nigerian economy execute capital projects efficiently to achieve developmental objectives.

The growth in global popularity of the PMO with its wide array of purposes in organizations has helped organizations to develop key project management competencies. Therefore, establishing the right PMO while incorporating value engineering as a science that develop and execute project portfolio based on full analysis and full consultation as a means to mitigate the risk contents ensures that the project is well conceptualized from the initial stage, which increases the chances of excellent decisions, successful execution and value optimization. As such, the tools and techniques underpinning value engineering are potentially valuable while establishing and specifying the roles of the PMO in organizations. Due to the fact that organizations seek continuous improvements while the current project engineering needs in organizations will often be different from their needs in

the short to medium time, value engineering becomes a necessary project management tool.

1.1.3 Value Engineering Gaps

Analysis by Meera (2013, 55) in the Ministry of Public Work (MoPW) in UAE has shown that there are many gaps in project management practices and value engineering bridges the gap with improved efficiencies through the establishment of the PMO with the right roles and the right strategy. Meera (2013, 57) pointed out that executives at MoPW ensured the PMO was established as an affiliate of the Strategic Planning Department to enhance the strategic alignment of business units strategy with the organization strategy for holistic strategic direction at the rate of efficiency and effectiveness never seen before in the history of MoPW. It was concluded that the business objectives could only be attained with the adoption of the PMO as a business strategy.

Value engineering has become the interest of researchers relatively recently but not much empirical research work has been done on VE and the PMO in Nigeria and Africa. There is a little literature on VE in Nigeria especially as it relates to being used as a tool to mitigate risks inherent in project portfolio planning and execution management, which may have to do with the rate of acceptability and applicability of the concept in Nigeria.

As Umar (2015) stated, “the key barriers to the adoption of value engineering are lack of qualified value engineering practitioners, lack of commitment to detailed implementation of value management processes, lack of time due to rushed designs and diffi-

culties in involving key stakeholders in project management processes". Adewumi (2016) opined that, application of value engineering in project planning, implementation, monitoring and evaluation in Nigeria is almost non-existence.

Kolo and Ibrahim (2010) opined that, social and habitual resistance to change, legal and contractual constraints, high cost of integrated software for professionals, lack of enabling environment in policies and government legislations toward the adoption of value engineering and lack of trained professionals to explore the tools of value engineering are the rationale for its late adoption in Nigeria. These assertions on value engineering and project management in the Nigerian context, amplify the need to verify the readiness of value engineering in Nigeria as a risk management technique capable of enhancing the PMO efficiency and corporate performance.

As organizations seek to increase profitability, various business strategies and techniques are employed to remain competitive. Thus, every organization seeks to retain its customers and the competitive edge by providing goods that are of value to customers, this has not been the case in the energy sector in Nigeria where the industry still struggles to satisfy customers despite the privatization.

Historically, the Nigerian energy sector has witnessed ill-conceived transformations since 1896 when the first electricity was generated in Nigeria. In 2013 the energy sector was privatized and unbundled into eleven electricity distribution companies, one transmission company and six generating companies in the quest for operational efficiency. However, inadequate power supply, cost reflective tariff, lack of network mainte-

nance, bureaucratic bottleneck, corruption, lack-lustered attitude of electricity employees are major problems of the sector.

1.2 Research Problems and Solutions

The contribution of the power sector to the socio-economic and welfare development of any nation cannot be underestimated. Nigeria is blessed with enormous energy resources both renewable and non-renewable. Yet, Nigeria cannot generate electricity for more than 10 per cent of the population. In 2007, the Nigerian government made a policy that henceforth "procurement of public assets and services' must be through the application of 'value for money' standard and practice, aimed at improving service delivery. This policy paved the way for gradual adoption and application of VE in Nigeria.

As Nsiah-Asare (2016:4) further asserted, efficient public procurement system is vital to achieve value for money and accelerated growth and development. The inherent cost concept and the need to minimize risks militating against economic growth and development makes value engineering a tool to achieve cost reduction and customer satisfaction in the electricity industry in Nigeria.

Umaru (2010:19) opined that the culture of poor quality has been the problem of service delivery in Nigeria, which contrasts sharply with the developed nations where large improvements have been made in quality service delivery nearly in all economic activities. Nigeria is trapped in a critical power crisis due to inefficient electricity generation and distribution resulting in frequent power outages because the energy sector operates well below its installed capacity.

South Africa with a population of 56.7m (2017) has a power generating capacity of 51,000MW (2018) and is planning to construct additional power generating capacity of 40,000MW by 2025. While Nigeria, the most populated black nation in the world with a population of about 200m, including being the country with the highest power generating potentials in Africa, only has power generating capacity of 6,900MW as of 2018.

Given the deteriorating power supply and unsatisfactory performance of the energy sector, one could conclude that the pursuit of quality has not been met because recurrent power problem has impeded productive activities especially in the industrial sector which depend largely on energy to operate machineries. One is therefore compelled to ask, given the above stated government procurement policy to enhance value for money, what are the prospects of VE in the energy sector in Nigeria, most especially in the PMO of electricity distribution companies?

Available literature in Nigeria either focuses on the practice of the PMO or explores the applicability of value engineering in the construction companies in Nigeria. In view of this lingering problem in the energy sector and electricity distribution sub-sector, this research seeks to empirically investigate and proffer solutions to facilitate the adoption of VE as a risk management tool in the project management offices (PMO) of Abuja Electricity Distribution Company and Kano Electricity Distribution Company.

1.3 Research Purpose and Objectives

The purpose of this research is to propose the prudent adoption and implementation of value engineering decision-making process as a risk management tool can improve the PMO efficiency in making risk-averse investment decisions.

In other words, how can the PMO, enabled by value engineering decisioneering enhance reasonable project portfolio investment options with multiplier effects on the strategic performance the portfolio was designed to achieve. The objective required to meet this purpose is to develop a new framework that facilitates the adoption of VE as a risk management tool in the PMO of the electricity distribution companies in Nigeria.

Specifically, the following objectives guide this study:

1. To examine the drivers of initiating VE in the PMO.
2. To ascertain factors constraining the successful adoption of VE in the PMO.
3. To discover the themes and the features aiding the adoption of VE in the PMO
4. To examine the prerequisites to adopt and implement of VE in the PMO.
5. To examine the role of VE as a risk management tool in the PMO.

1.4 Research Assumptions and Limitations

The following assumptions have been proposed to meet the objectives of the study.

- There is no significant difference between employees' perception of the adoption and application of value engineering.

- There is a positive relationship between management support for the adoption and application of value engineering.

- A positive relationship between the culture of electricity distribution company business objectives and the application of value engineering.

- An enterprise-wide PMO regardless of the mandates (project, program, portfolio), and the structure (projectized, matrix and functional).

One overriding limitation is that literatures on value engineering in Nigeria are meager. Hence, the dearth of previous research works on VE and the PMO in Nigeria seems an imposed limitation on the dissertation research. Consequently, the researcher who is based in Nigeria had to embark on occasional visits to the libraries of the Oxford University and London School of Economics in the United Kingdom. In addition, given the human nature, there is a tendency to obtain biased information which is common to any research and may affect the validity of the results. However, to mitigate the effect, only experienced PMO professionals and stakeholders at Abuja Electricity Distribution Company and Kano Electricity Distribution Company will be surveyed.

1.5 Structure of the Study

This section provides detailed framework of the study.

Chapter one presents an introductory overview of the concepts driving the dissertation including the objectives that guide the research.

Chapter two examines the literature for insight into the concepts that underpin the research. It provides theoretical understanding of the evolution and methodology of value engineering and the project management office.

Chapter three presents the methodology adopted in the course of this research, including the design and methods of data collection and analysis.

Chapter four reviews the power sector in Nigeria with historical analysis of electricity distribution in Nigeria and the organizational overview of Kano Electricity Distribution Company and Abuja Electricity Distribution Company.

Chapter five focuses on the models and methodologies of the PMO and risk management practice in organizations.

Chapter six presents the research results, analysis and presentation.

Chapter seven dwells on the research findings with a view to relate this study with the findings of other researchers**.**

Chapter eight summarizes the research with emphasis on the framework to guide the adoption and application of VE as a risk management tool in the PMO of electricity

distribution companies case-studied. Conclusions are drawn and the policy implications of the study revealed which serve as the basis for recommendation and further research.

1.6 Key Concepts

Value: Value is the relationship between the contribution of the function to satisfy the need and the cost of the function. It is the ratio between function and cost.

Value Engineering (**VE**): Value Engineering is a multi-dimensional problem solving process that improves the functional value of any product, process, service or system.

Value Management: Value Management improves and sustains a desired balance between wants and needs and the resources required to achieve it. Value management is based on the principle of value addition, where the objective is on the solution rather than achieving innovation within the organization.

Value Methodology: It is a systemic approach that seeks to improve the value of a project, product, systems or service by streamlining the process in a sequential manner.

Value for Money: It is the utility derived from the money spent. A measure of quality and satisfaction that evaluates the monetary cost of an item given subjective factors such as fitness for purpose and lifecycle costs.

Job Plan: A problem solving process organized in a logical and sequential manner with emphasis on the appraisal of multiple options. Job Plan is the centerpiece and/or the basis of the value management approach.

Function Analysis: A technique that evaluates the value by analyzing the functions. It explores functions by asking: ‘what does it do?’ and then examine how these functions are achieved.

Project Management Office: An integral part of an organization that provides policies, procedures, tools, techniques, principles, best practice, methodologies, training, mentoring and coaching to ensure the implementation of projects delivery quality and values.

Risk Management: The application of tools, techniques and processes to manage risks inherent in project management or service delivery for efficiency.

Chapter 2: Literature Review

2.1 Value Engineering Methodology

To provide a clear understanding of the word 'value engineering', there is the need to first of all understand the concept of value. Value is defined as the quantum of "satisfaction achieved" at a minimum cost. Shillito and De Marle (1992) noted that individuals are motivated and inspired by the need to get value, their argument is that value comes to the mind when individuals need something. Interestingly, value is seen also as a major enhancer or moderator between supply and demand (see Ashworth and Hogg, 2000; Value Management Practice Guidelines, 2009). Equation 2.1 revealed the expression of value as a function and cost.

Value = Function/cost, …….. 2.1

Where;

Function is the specific reason something is fitted or exists, and Cost entails any direct payment made to obtain something or any direct payment for services rendered.

Value was depicted as the fair return, an equivalent in goods or services for the exchange of something by the Society of American Value Engineers (SAVE). The Institute of Value Management (IVM) maintained that value is the relationship between satisfaction derived from a need and the resources deployed in providing the needs. Equation 2.2 clearly illustrates this;

$$\textbf{Value} = \frac{\text{Satisfaction derived from the need}}{\text{Resources deployed in getting it.}}$$

Social scientists, scientists and engineers view value from the point of products and services, as such; value engineering becomes an instrument employed towards the improvement of value (Shillito and Marle, 1992). This was echoed by the Institute of Value Management (2008), which maintained that the word value established a relationship between needs and the resources deployed in meeting those needs.

Value management as a concept aimed at reconciling the divergent view of what constitute value to facilitate and assist the organization in achieving its stated goals and objectives. The concept of value engineering is not new. Its dates back to early 1940s when Miles formally introduced the concept of value engineering. The author explained that, value engineering includes the medium, procedures and actions targeted at providing a holistic solution to problems. These processes are structured into a job plan that includes Pre-Workshop, the Workshop, and the Post-Workshop stage (see SAVE, 2007).

Several researchers and scholars have described value engineering in various ways with regards to the scope, the context and the environment of the authors. As such, there is no universal definition of value engineering. However, VE strength lies in its ability to design alternatives and recommends the alternatives based on the necessities of the function (Chougule and Kallurkar, 2012).

Value engineering can also be seen as a technique that maximizes the functional value of a project outcome through effective coordination of its lifecycle decisions against a "value system" determined by the client from the conceptual stage to the end-users through audit (Abdulaziz, 2006; Odeyinka, 2006; Sharma & Srivastava, 2011).

Value engineering can also be seen as an innovative problems solving technique that aims at maximizing the functional values of a project outcome. It involves a structured process that appraises the existing problems and solutions through the examination of the value requirements of the clients (see Rohn, 2004; Male et al, 1998). The human element of the process i.e. teamwork was re-emphasized by Abdulaziz (2006) as a major success criterion of value engineering.

The definitions above point to the fact that VE encourages teamwork by improving the working relationship of the project team while at the same time improving service delivery by achieving better "value for money". In spite of the benefits of applying value engineering in project management and evaluation, the concept has not been accepted or embraced by most organizations in different parts of the world. For instance, Leeuw (2001) argued that in most of the developing countries, VE has not been embraced both in the private and public sector. The leading factor might be linked to the fact that value engineering often focused on cost more than the functionality and profitability being a major factor in the private sector. However, value engineering has largely been embraced in most developed countries especially in the United State of America, Australia, Japan, and the United Kingdom.

Therefore, the objective of VE is to provide service and product with high quality or value at the lowest possible overall cost. Beside designing a systematic way of cost minimization and ensuring service and product quality, there are other important variables considered important in the practice of value engineering as highlighted in figure 1 below and will be discussed (Abdulaziz, 2006; Odeyinka, 2006; Sharma & Srivastava, 2011; Yekini et al, 2015).

The theoretical framework of value analysis is presented in figure 1 below.

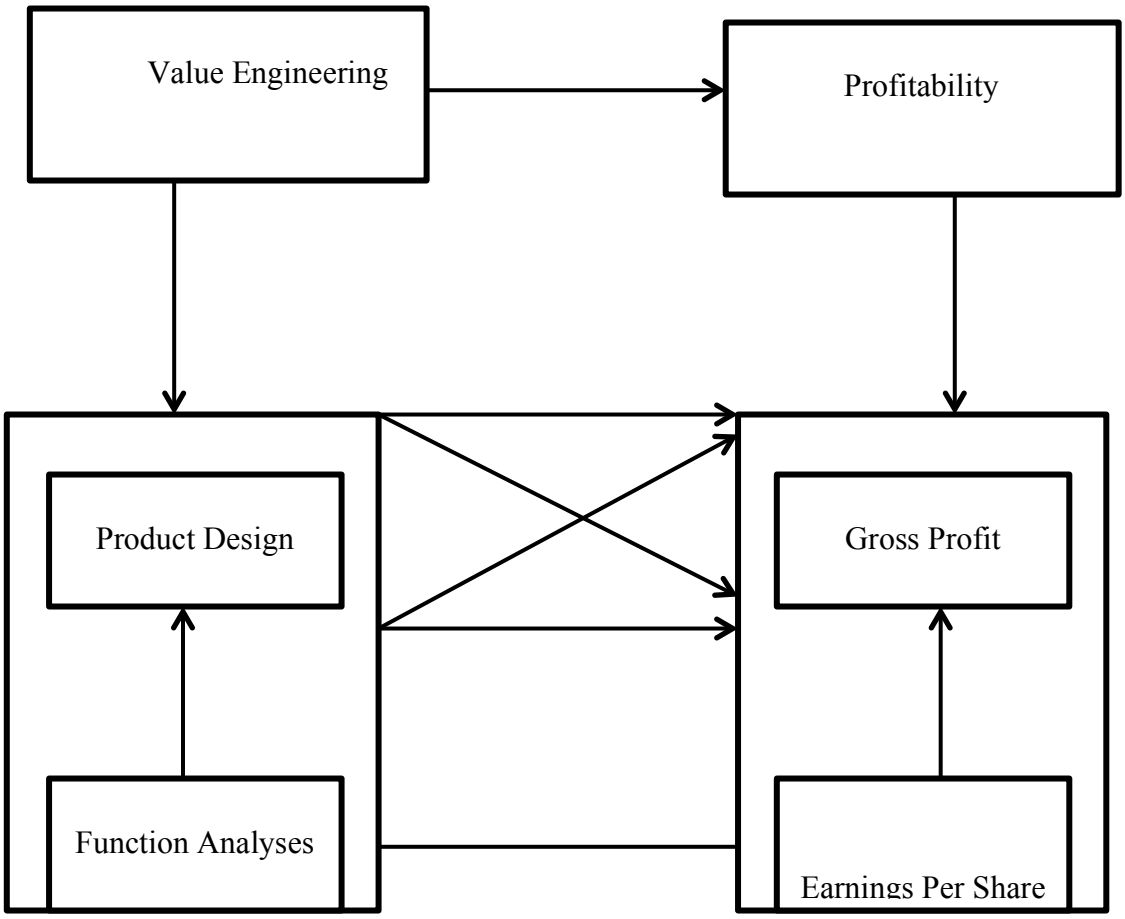

Figure 2.1: A Structured Technique of VE/VM

The framework above shows the variables involved with the concept of value engineering which literarily translate into: value engineering as the independent variable and profitability as the dependent variable, the proxies for the independent variable (value engineering) are products designs and functional approach while that of the dependent variable (profitability) includes return on investment and Earnings per share.

2.1.1 Evolution of Value Engineering (VE)

In the VE literature, there appears to be an agreement with regard to the origin of Value Engineering (Green and Moss, 1998; Finnegan, 2001; Karunasena et al., 2016). Value engineering was first introduced and adopted in the US in 1940s and its development has been credited to Lawrence Miles of the General Electric (GE) who worked as a Purchasing Engineer in the company at the time. Thus, VE was first adopted in the manufacturing sector during the World War II for lack of basic resources. At that time, Lawrence Miles thought of a way to look for alternative materials, components or resources that can achieve the result of those basic materials and resources that are not within reach at the least cost.

Miles' idea of functional analysis metamorphosed into value engineering (value methodology, value analysis, value management) because Miles believed that products are acquired for a given purpose – what the product can primarily be used for (Abdulaziz, 2006). As the concept became more globally acceptable and realizable some individual practitioners developed a learning society where the idea can be learned and improved over time. To continue its elaboration and application the Society of American Value Engineers (SAVE) was inaugurated in 1959 to facilitate VE development (Younker, 2003).

Some of the US government departments that have implemented VE include Department of Defense (DoD) and Naval Sea Systems Command (NAVSEA). The name value engineering instead of value methodology is widely embraced since the inception of SAVE in 1959, though DoD implemented the program in 1961.

Value engineering methodology was largely embraced in the United State due to its numerous benefits such as cost saving in project management. The methodology was introduced to other federal departments in 1988, which led to the declaration of VE Week by the Governor of Minnesota and Indiana in 1988 (Younker, 2003). SAVE grew within the USA and then expanded to other countries to enable the global communities' benefits from value methodology (Abdulaziz, 2006). This culminated in the adoption of value method by the British government and Alberta Ministry of Infrastructure in 2010. SAVE International currently partner with several global agencies to promote VE knowledge development and training to facilitate and improve VE methodology globally. From the outset of value engineering, several projects have employed and gained from the VE methodology including projects that were regarded as costly, repetitive, difficult in construction and those that implement design modifications in material or component (Annappa & Panditrao, 2012). VE methodology has been applied on costly projects with expensive materials and complex design that require comprehensive analysis of appropriate alternatives (Annappa & Panditrao, 2012).

2.1.2 Function Analysis System Technique - FAST

Analyzing the functions of a system, product or service is the centerpiece of value engineering activity that provides an understanding of what the system, product or ser-

vice is, which will result in the analytical discovery of a better functional value. This is the feature that made value engineering approach and process so unique from other problems solving techniques often employed by organizations (SAVE, 1998). FAST examines the specific project requirements and determines the value of the projects by identifying necessary functional approach and potential cost. As such, it is resourceful to deploy significant amount of time on FAST given its usefulness since oftentimes functions are not immediately clear, while in-appropriate choice from varying alternatives can result in cost overrun and poor performance. Charles By the way developed the concept of FAST in 1964 and identified both the primary and secondary functions in a system (Charles, 2007; Borza, 2011). The primary function includes those functions that must be in place for the efficiency of the system or the product while the secondary functions are those supporting the primary functions in the system.

FAST is a major technique used since the beginning of value analysis. The word "analysis" in this case means the separation of a function into its components. The procedure of function analysis must be clear to all participants so that they can easily focus on the fundamental functions under consideration. Facilitators use a verb/noun method to describe/define functions. These verbs/nouns, most of the times are simplified making it easier to locate the correct rank of a function in the hierarchy.

Gough (2000) considers four factors for a successful Functional System:

1. Know the systems and the reasons for existence.

2. Make adequate preparations before any participant is involved.

3. Establish other functional approaches via the key outputs, arrange the function based on necessities and discard useless ones.

4. Know what level to stop the analysis.

Save (2007) collaborating with the assertion of Gosh (2000) noted that the key to achieve a high level function analysis is by means of FAST which is a functional diagram that allocates the primary functions to the left hand side and, a progressive detailed advance functions to the right till the methods of realizing all the functions identified. It is also stated in CUP (1996), that the same diagram addresses the question of "why" a certain part of the components exist. This can be achieved by studying the diagram from right to left since there is no possibility to find meaningful alternative to a technical issue without identifying first the functional requirement. On the other hand, if the said diagram stems from left through the right, one can assign cost to the various approaches of achieving such function. Words is basically used to describe the function, where FAST is assumed to link the word developed by the function in the form of sentences using graphical diagram to present the argument as presented in figure 2.1.

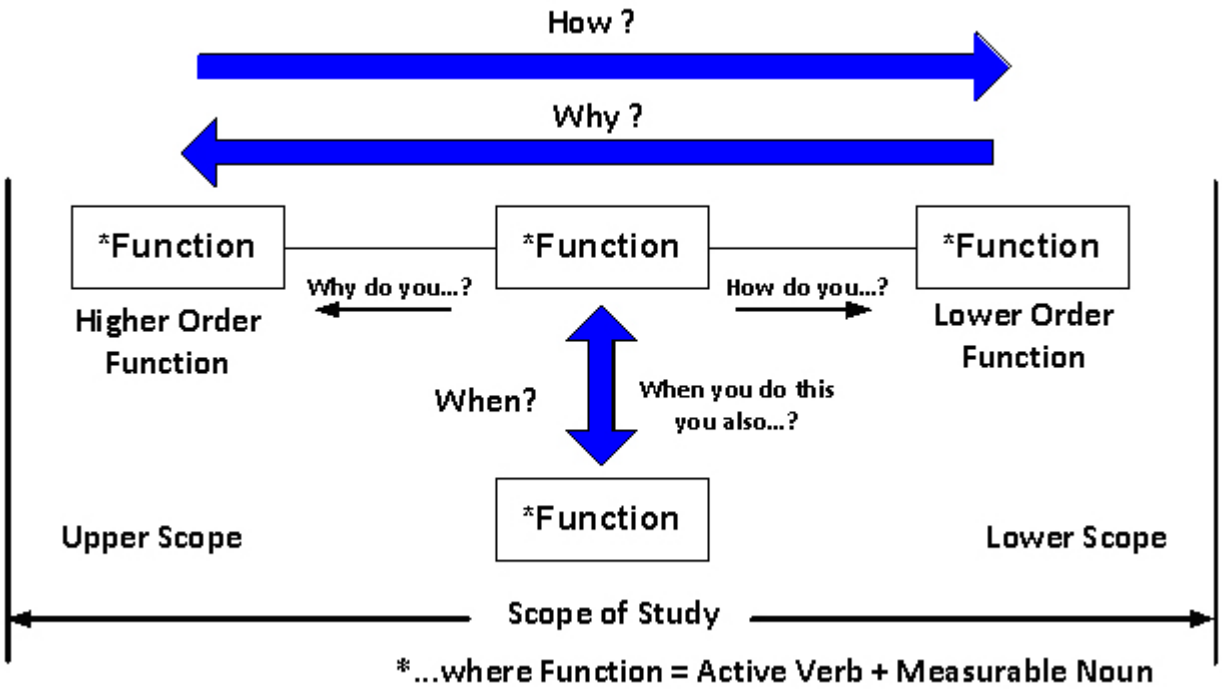

Figure 2.2: Technical FAST or function logic diagram. Source: Wikipedia, 2017

The essence of FAST is building consensus on the part of the value engineering team with regard to where and the way the systems are analyzed to fit within the components (Kmetty, 2013). The approach to functional analysis is through the selection of the building components, defining the need and desire (function), classify the functions, allocate costs to all the functions, and provide an analysis of the essential and expected performance levels of the function (Kmetty, 2013). The process involves the description of the functional analysis using verbs accompanied by a noun.

An example is illustrated in Table 1 below.

Table 2.1: Function Analysis Noun-Verb Connection

Subject Under Study	Verb	Noun
Paint	Prevents	Corrosion
Lamp	Illuminates	Space

The FAST diagrams help system users to calculate the ratio of cost of the critical paths functional costs such as the value engineering index – which is a measure of change in the value engineering methods year-on-year in relation to the reason the project is in the higher order functional relationship. The nexus between a higher order function and a lower order can be achieved through asking 'Why' the functions perform the way they do. As noted earlier the primary function moves towards the right of the left hand while the secondary function are to the right hand of the primary functions and will continue along the lower order functions by asking the 'how' questions (Kasi, 2009).

2.1.3 Value Engineering Study Management Job Plan

According to SAVE (2008), it was in May 1997 that 'Value Standard' was officially drafted and has been updated periodically to incorporate changes in technology and dynamics of the business environment. The update was also meant to enable the integration of value standard to meet the international standards organisations. SAVE (2008) further maintained that value standard is meant to serve as a guide to the managers, organizations and policy makers on the VE principle and presiding standard.

The idea of customer value optimization in value engineering is clear and understood but there is the need for a process or plan to be in place to ensure that such value will be realized from the project. The process cannot be approached inconsistently but

from an orderly and sequential manner where all the necessary actions must be taken to achieve the required results. As noted earlier, the GE employee Lawrence Miles formulated the VE process capable of crystalizing explicit client expectations while ensuring right decisions with the intent to meet clients' objectives (SAVE, 2007; Kelly et al, 2004). The approach is an orderly sequence developed to handle clients' needs efficiently via thorough understanding of the VE process by the project team to achieve the desired results or outcome of the clients (Kelly et al, 2004).

Various professionals selected by the value manager or project manager undertake the value management plan. The value engineering team is made up of professionals with skills, knowledge and abilities required to deliver the functional value of the project outcome. The VE resource person is responsible to guide the value team to create a well-defined structural plan that will result in the achievement of the goals (SAVE, 2007).

VE process is made up of three major successive stages: the Orientation Phase (Pre-Workshop), the Workshop Phase and the Implementation Phase (Post Workshop phase).

A. The Orientation Phase (Pre-workshop phase)

This phase of the value study plan involves "planning" and "organizing the value management study. It involves securing commitments from members of the organization (preferably the senior managers from different units of the organization involved in the process) and other stakeholders involved in the study. Many decisions are made and agreed upon by the selected members of the organization and other stakeholders involved. The decisions involve methods which will be adopted to ensure that stakeholders

have a vivid idea of the process and benefits of the process (this may include orientation meeting, training and lectures); the amount of time each member will have to commit in order to have a successful process; the information collection and distribution process; responsibilities shared among stakeholders in the process and the definition and clarification of customer needs and expectations (Kelly et al, 2004). The scope of the study is then produced together with the schedules, objectives, roles and responsibilities of the stakeholders drafted on the projects (SAVE, 2007).

B. The Workshop Phase

However, with regards to the value engineering approach adopted by the project manager with the team, the value engineering processes may be performed together in some ways. For instance, the information stage of the project may be combined with the orientation phase of the project while the feedback phase may be merged with the implementation phase, etc. The workshop phase consists of seven independent phases combined to achieve the overall goals of the value system. The phases are as explained below:

a) Information stage

This stage involves the analysis of the information with the intent to understand the project requirement and the client objectives. The stage entails the collection of data based on the existing model in the orientation phase. Such information or data like the project cost, scope, market, timeline, objectives, project stakeholders and the overall objectives are collected at this stage. In summary, the stage involves the collection of all the re-

quired and necessary data that will help to understand the overall customer needs and the objective of the project.

b) Functional Analysis Stage

The stage comprises of the explicit identification and classification of the overall objectives or outcome expected from the project. This is important as the stage enables the project team to identify the functional values of the project outcome and provide feedback on the overall success of the project. The identified functions are analyzed and compared with the clients' specification and needs. The application of FAST and the critical evaluation is essential in this phase where holistic team method is employed towards identifying and analyzing the project functions.

c) Creative Stage

The phase requires the application of creativity and innovation to discover alternatives to the functional values discovered earlier in the process (Kelly, et al, 2004). The instrument that are often utilized here include brainstorming with the group or the Gordon technique – like brainstorming, is used to generate ideas among stakeholders to solve difficult problems on the project through systemic structuring of different ideas for creative valuation within the groups. It helps the group look at problems from unconventional approach.

d) Evaluation Stage

The phase entails the evaluation of the ideas developed or the successful imports from the creative phase of the project. The various ideas are evaluated and appropriated based on

their identified contributions towards the success of the project or project the outcome. Beyond its ability to contribute to the effectiveness of the project, there are other factors considered including risks, cost and feasibility of the alternatives. Instruments employed in the approach include T-charts – which involve a typical t-table where the pros and cons associated with the projects are listed. Another instrument is the value metrics – which is an established standard to measure the value attached to an organization products and services. And, the life cycle costing - involves making a well thought out selection of effective least cost approach among competing lifecycle cost alternatives in purchasing, operating, maintaining and disposing of the project outcome (SAVE, 2007).

e) Development Phase

In this stage, the various ideas that were developed in the previous phase are further assessed and functionally developed into various options that can be adopted and implemented by the project team. The phase also involves the development and analysis of the merit, demerits, risks and limitations of the various options in comparison with the alternatives to determine their level of efficiency towards the achievement of the project outcome (SAVE, 2007).

f) Presentation Phase

This phase is the presentation of the value alternatives developed and agreed-upon by the project team to the organization leadership and other major stakeholders with interest in the project. This will ensure that all stakeholders have full understanding of the rationale for selecting the alternative options as well as provide assurance to the manage-

ment, thereby increasing the confidence the clients have on project implementation and the outcome (SAVE, 2007).

g) Implementations and Feedbacks

The phase engages the project team to make a decision with regards to the implementation of the value engineering alternatives including feedback to the organization leadership, the project stakeholders and the clients. This phase also involves the creation of models and parameters for systemic monitoring and evaluation of the value improvement process. The improvement made in the implementation phase will then be compared and evaluated based on the expected outcome.

2.1.4 VE Relevance in Organizational Management

The greatest benefit of value engineering in organizations is when it is directed toward obtaining maximum value from resources expended toward the achievement of corporate strategic objectives. While the analysis of functional approach remains fundamental organization-wide, it is the systemic analysis of those functions that sets value engineering apart from other management approaches in improving value to help organizations realize the business objective (Value Management Guideline, 2004). For instance, taking a cue from the construction industry, Latham (1994) and Egan (1998) illuminated on some challenges facing the construction industry in the UK that are common to other construction industries worldwide. The challenges include but not limited to issues of projects not executed on "time, within budget and to the required quality" which often lead to unsatisfied clients (Aibunu, 2008; Olatunji, 2006).

Research conducted on these challenges culminated in the development of innovative methodology that will improve the effective performance of the construction sector over time. Such methodologies include the collaborative procurements method, enhanced value engineering method, pre-qualification, quality assurance statement, technical education, whole lifecycle costing, lean thinking, partnering. Gough (2008) acknowledged that, although these methodologies improve the effectiveness of the construction sector, a few challenges still persist which includes poor communication, unrealistic project objectives and wrong estimates among others.

Kumaraswamy and Chung (2008) shared the view that VE has the capabilities of increasing the customers' values when appropriately integrated as long as the collaborative procurements route is involved. This can be achieved by applying team based approach in the value management system that results in improved confidence to understand and communicate effectively among the project stakeholders. Value engineering creates an environment that facilitates collaborative effort and integrative procurements route with the opportunity to analyze and make the right decisions on the project. Collaborative procurements routes make the projects teams more integrated while value engineering provides for better alignments of the strategy, value and organization goals.

The research conducted by SAVE (2008) on value methodology confirmed that VE has the ability to enhance customer satisfaction as well as improve the organization level of investment decisions. Practitioners apply value engineering methods to product and services in various industries including the construction, manufacturing, government, education, transportation and health care. The research study also discovered that the de-

ployment of value engineering often results in at least 30 percent reduction in the cost of the manufactured products, the construction of a project and services. Arguably, the return on investment from the implementation of value engineering programs is on average between ratio 1:10. This means that every naira invested in the value engineering decision results in 10 naira net savings in cost and time (SAVE, 2008).

VE facilitates the procedure that allows the capturing and understanding of the customer needs and making such explicit through the project charter – a document describing the summary of the project idea, how it will work and what need to be in place for it to work (Blyth & Worthington, 2001). Project charter entails explicit analysis of the client's expectation and requirements from the projects (Othman et al, 2005). This is a process that is yet to be embraced by most organization leadership, which often lead to inaccurate project goals and designs by failing to properly capture clients' needs and expectations, which inevitably results in failure in achieving project outcome. Value engineering emphasizes that projects charter is vital to ensure clients' satisfaction (Abdulrahman et al, 2007).

In an attempt to contribute to the method of value management system, Green (1994) developed the Simple Multi Attribute Rating Technique (SMART) that extensively analyzes clients' needs and goals based on a linear addictive model, by taking the overall value of a given alternative as a sum of the performance value multiplied by its weighted criterion. Kumaraswamy and Chung (2008), further employed another approach in the value system analysis in the quest to enhance the project outcome. Other methods

often employ includes Function Analysis System Technique (FAST), functional tree, brainstorming, tree mapping, etc. (see Green, 1994; Hamilton, 2002).

In Summary, VE helps organization management and leadership to increase profitability, mitigate risk, improve problem solving capability, efficient use of resources, minimize cost, saves time, improve market share, achieve competitive advantage, improve quality, and effective management of clients' specifications and project objectives.

2.2 The Project Management Office (PMO)

According to Verzuh, (2008), the project management office (PMO) establishes a "methodological framework" that facilitates project planning and controlling through effective integration of the project management knowledge areas in portfolio management. The PMO is an integral part of the organization that provides managerial, advisory support, conducts training, consulting and technical services for project driven organization (Miranda, 2003; Verzuh, 2008; Gerald, 2008; Gonçalves, 2006). PMO can also be defined as an entity assigned with the obligation to coordinate, manage and oversee projects' activities under its supervision (PMI, 2008).

A different stance was shared by Desouza & Evaristo (2006), when they argued that organizations differ and as such it would be problematic to implement the same project management office in every organization. Dai and Wells (2004) view the PMO as the organization units assigned with the responsibility of assisting the manager and the management on strategic project portfolio management especially as it involves project formulation, implementation, evaluation and monitoring. A distinction has been made be-

tween the project management office and the program office. The PMO is seen from a broader project management perspective while program office is a unit established to manage and control a specific project or series of related projects.

Dai and Wells (2004) also differentiate between multi project PMO and single project PMO. While they recognized that both project management approaches are essential in the organization however, they focus on organizations operating multi-projects PMO. Desouza & Evaristo (2006: 415) concluded that there is no universal definition of a PMO due to the re-customization of the PMO to fit the organizational context within which they operate.

The reviewed literature revealed five common features of the PMO:

1. Assigned with the responsibility of ensuring the successful execution of the project within the organization.

2. Most PMOs are assigned with the task of ensuring that the project management process is aligned with the organization goals, objectives and vision.

3. The PMOs in several organizations operate independently with their own resources.

4. The PMOs are often made up of executives, professionals and technocrats.

5. The PMOs assumed the responsibility of developing project management standards and processes to improve the capacity of the organization.

PMO terminologies differ among organizations especially with respect to the size of the organization, the visions and the maturity. For instance, the PMO is called PO (project office) in small-scale organizations while it is referred to as project management office in large and standard organizations and, Program/Portfolio Management Office is a relatively higher level organizations (PMI, 2013). PMI (2013) is of the view that the project management office was unknown in the 20th Century but the growth in management strategy in the 21st Century helped to popularize the PMO as a management strategy deployed to achieve efficient project results and organization goals (Dai & Wells, 2004).

PMS (2011) share the view that the PMO in some organizations is viewed as a change agent that gradually assume increasing responsibility from a divisional project management office to an enterprise project management office. In summary, PMO may be structured for a project, a program, a department, a business unit or the whole organization. There can even be more than one PMO in some large firms with several subsidiaries across the globe (Duggal 2007). However, organizations with multiple PMOs usually have a central PMO where informational data of the portfolio activities of other supporting PMOs are reported. This PMO model is depicted below:

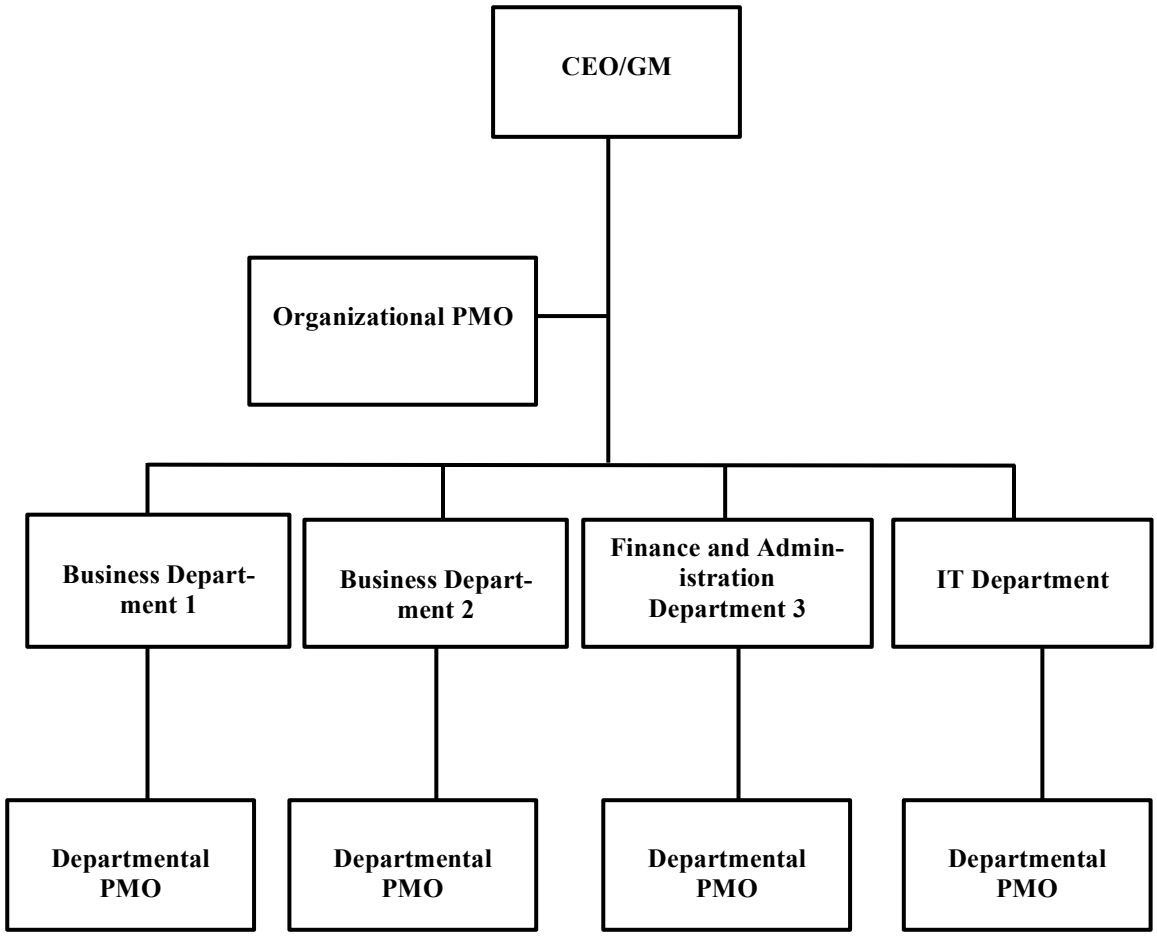

Figure 2.3: A multiple level of PMO

2.2.1 Evolution of the PMO

The PMO is arguably a new concept that was largely unknown and accepted by management practitioner (Dai & Wells, 2004:526) until relatively recently. The growth in popularity of the project management office has been identified as a recognition by organizations' leadership that their business strategies, long-term growth and visions are better achieved through the establishment of the PMO and expertise in project portfolio management with a consensus that project management is a powerful management strategy and competitive tool (Hurt & Thomas, 2009).

PMI has been a leading promoter of the value of the project management office across the globe (PMI, 2004). However, in spite of the traction the PMO has gained in the corporate world, there is still a growing debate in the academic world with regard to the benefit and value of the PMO in the organization and, if there is value-added, how is the value delivered and what are the factors influencing the delivery process in the organization. Several researchers like Hurt & Wells (2009), Hobbs & Aubry (2007), and Martin et al (2007) have examined the role of the PMO in the execution of project portfolio and business strategy and how the PMO can help deliver value in the organization.

It is important to note that there is no clear overriding structure the PMO should follow. Hobbs & Aubry (2007) pointed out three major factors that have made it difficult for researchers to have a consensus on the project management office:

1. PMO is a new concept.
2. PMO functions, methodologies and structures are multifaceted.
3. Investigating the value of the PMO has been largely uncoordinated

These caveats are the reasons why researchers, like the researcher of this dissertation have embarked on a research mission to unravel the importance of the PMO in the organization and how to facilitate the adoption of the PMO as a business strategy.

2.3 PMO Maturity Models

This section focuses on the extent to which the Project Management Office (PMO) is capable of meeting the needs of the clients and generating value for the organization. The maturity of the PMO is often seen from the tactical and operational perspectives but fur-

ther analysis revealed that there are different opinions on this viewpoint (Pinto, 2012). There are two peculiar questions: can one opine that there is ample evidence to conclude that the strategic PMO is certainly mature? And can we boldly say that the operational and the tactical PMO are automatically immature? Of course, available data revealed that the above conclusions are not correct. For instance, Pinto (2012) maintained that if the goals of the strategic PMO are strategic in nature, the positioning in the organization helps to perform maturely or immaturely. The same goes to the operational and the tactical PMO.

The implication here is that, there is a possibility to have mature or immature PMO that is strategic, operational or tactical depending on the operating goals and the organizational context of each of these PMOs. The PMO invariably generates value to the clients in form of quality services, so the maturity of the PMO can therefore be assessed based on its ability to provide quality services the PMO was established to deliver. Basically, there are several ways the PMO provides services to the clients or the organization ranging from the most important to the most trivia value addition (Pinto, Cota, & Levin, 2010).

To expand the concept of the PMO maturity, Hill (2008) developed a five level PMO maturity model from level 1 Project Office (PO) to level 5 PMO Center of Excellence. Here, the PMO maturity level is measured based on the increasing roles in the organization.

Hill (2008) identified certain roles common to the various levels of the PMO such as:

1. Project Oversight,
2. Process Control,
3. Process Support,

4. Business Maturity,
5. Strategic Alignment.

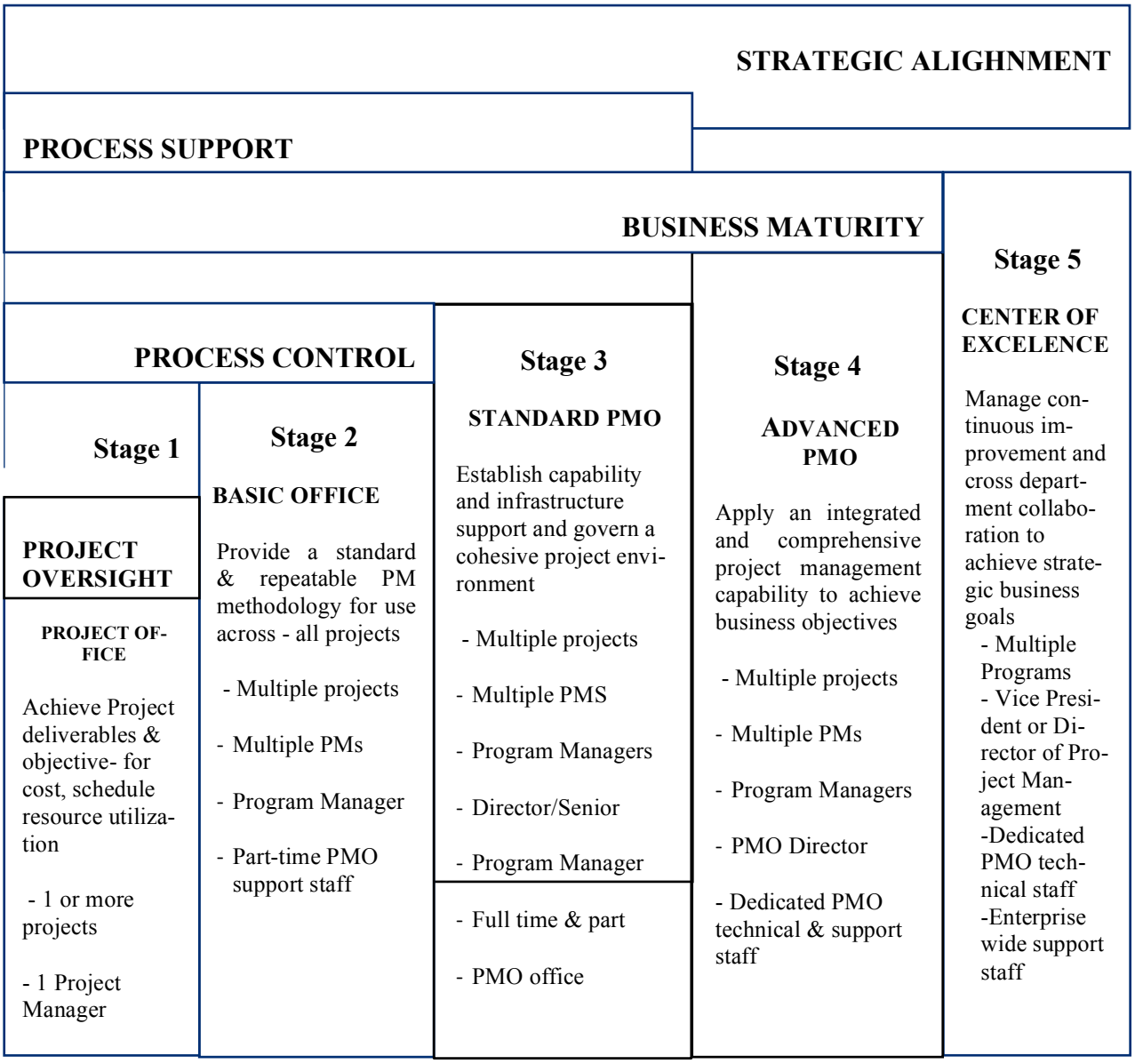

Table 2.2: PMO capabilities across PMO competency

Source: Author Schematization based on the work (Hill, 2008)

2.4 PMO Functional Analysis

The multi-dimensional organization structures, the politics and the cultural factors dominance in the organization all combined to impact the extent to which the PMO can deliver multiple activities and manage project and portfolio resources. As such, to achieve the operating mandates of the PMO, then the PMO establishment must be aligned with the organization business culture, the strategic mission and the vision (Salameh, 2014). Salameh, (2014) Gave the functional analysis of the Project management Office as follows;

Standard, Methodology and Process: The PMO focuses on providing methodology definition, metrics, processes development, execution strategy, framework for strategic project and portfolio delivery, resources management, scope management, risk management and project integration.

Knowledge and Talent Management: This comprises of training and development, capacity and capabilities building, certification and qualification. Also included knowledge management, intellectual collateral and property management, content management and strategic collaboration or alignment.

Organizational Change Management: The PMO addresses the repositioning of the organization and the strategic projects geared toward exceeding clients and stakeholders expectations, assessing readiness for organization change, resistance management, managing stakeholders, and effective communications.

Administration and Supports: The administrative and support functions of the PMO provide methodical tools to implement project portfolio, evaluate completion pro-

gress and other organization support services geared toward excellence in project portfolio management. Similarly, the PMO often provides consulting and information management support system while deploying leadership expertise in portfolio management to help unit or department PMOs achieves their project outcomes.

Strategic Planning: The PMO helps guide the organization to re-align the strategic priorities, business goals, corporate initiatives and opportunity analysis with the overall PMO mandates in portfolio investment decisions and implementation plan.

Harmonizing the functions of the PMO with the organization will not only help organizations to excel in project portfolio management but also help to deliver project portfolio successfully on budget. The planned cost and actual cost as well as planned schedule and actual schedule including other key performance indicators (KPIs) as well as any deviations are consistently monitored and controlled by the PMO to optimize projects resources and deliver project portfolio on agreed schedule.

2.4.1 PMO Decision Making Framework - Heuristics and Biases

The definition of the PMO differs in terms of the nomenclature, model and functions, but it is defined as an integral part of the organization that coordinates and oversees the management of project (PMI, 2011). Two central frameworks of the PMO decision-making process have been prevalent in the literature. One framework posits that the PMO can be viewed as a repository and not a dynamic establishment that merely collects executable projects from different business units without having the organizational influence on business decision making process and corporate performance. Other researchers are of

the view that infact, the PMO is a dynamic entry point to the organization especially those institutions with previous form of project management internal controls i.e. methodologies for portfolio management. With this, the PMO is seen as a centerpiece in decision making process in the organization with regard to investment alternative, governance process and a major influence on corporate strategies and performance.

Based on the PMO specific functions as suggested by Letvec (2006), the following models are platforms for decision-making in the PMO.

1. **Repository PMO Model:** This is the central project and portfolio management unit in the organization that influences and controls the standard of project governance with low to medium decision-making influence. It acts as a knowledge base positioned to develop and maintain best practices in the organization.

2. **Consulting PMO Model:** This model emphasizes that the role of the PMO is to provide training and mentoring to the project teams as well as provide expert guide to help organizations deliver project portfolio outcomes successfully. This model has medium to high level of influence in organization decision-making.

3. **Blended PMO Model** – This is the hybrid of the repository and the consulting PMO models. It plays an active role in the management and execution of some major project portfolio in the organization with medium level of influence on organization decision-making. The model advocates that the PMO should provide consulting and training services to the project managers.

According to Duggal (2007), organizations embrace the PMO decision-making framework based on their objectives and environmental suitability. In a management structure where the decisions are made top-down, the PMO decision making process may be referred to as a control tower. However, if the PMO mandate is merely basic information gathering, the framework for decision-making would be more like an information Bureau. Basically, there is absolutely no one PMO framework that fits all organizations and the framework that an organization selects often depend on the business culture and the business objectives.

The PMO is considered one of the dynamic management initiatives that enhances the potential repositioning of organizations for better corporate performance as well as open up new business opportunities by introducing and adopting innovative ways to manage project portfolio and operating initiatives which increase the capabilities and competitiveness of the organizations (Aubry et al., 2008).

Pennypacker (2005) concludes that the capability maturity model largely drives the PMO decision-making rules-of-thumb. West (2010) concluded that oftentimes, these heuristics are irrational and biased particularly with regard to informal projects such as Nike (just do it projects), Rogue (bully projects), Zombie (killed projects that refused to die), Vampire (resources sucking projects), and Phoenix (dead but reincarnated projects).

Despite the above facts, the Project management office often considers certain standard metrics to evaluate and make investment decision in the organization. Numerical factors such average rate of returns, net present value, internal rate of return and payback

period, while non-numerical factors like the operating necessities, market trends and competitive benchmarks, etc., guide the PMO investment decision-making process.

2.4.2 PMO Governance Structure

Project governance in the PMO is the process of ensuring that the processes, policies and procedures and practices associated with developing, selecting, prioritizing, communicating, implementing, monitoring and closing a given project is well adhered (PMI, 2008). Management plays a significant role to ensure the clients get optimal value for their projects, maximum value for the organization by making sure that the PMO mandate is aligned with the organization overall strategy (Krasner, 2003). The survey carried out by KPMG global projects management in 2007, revealed that the PMO plays a significant role in the efficient management of the organization project portfolio across board with increasing numbers of organization adopting the PMO with special emphasis on the PMO governance structure reflecting the strategic business objective and the vision of the organization as depicted below in figure 2.4.

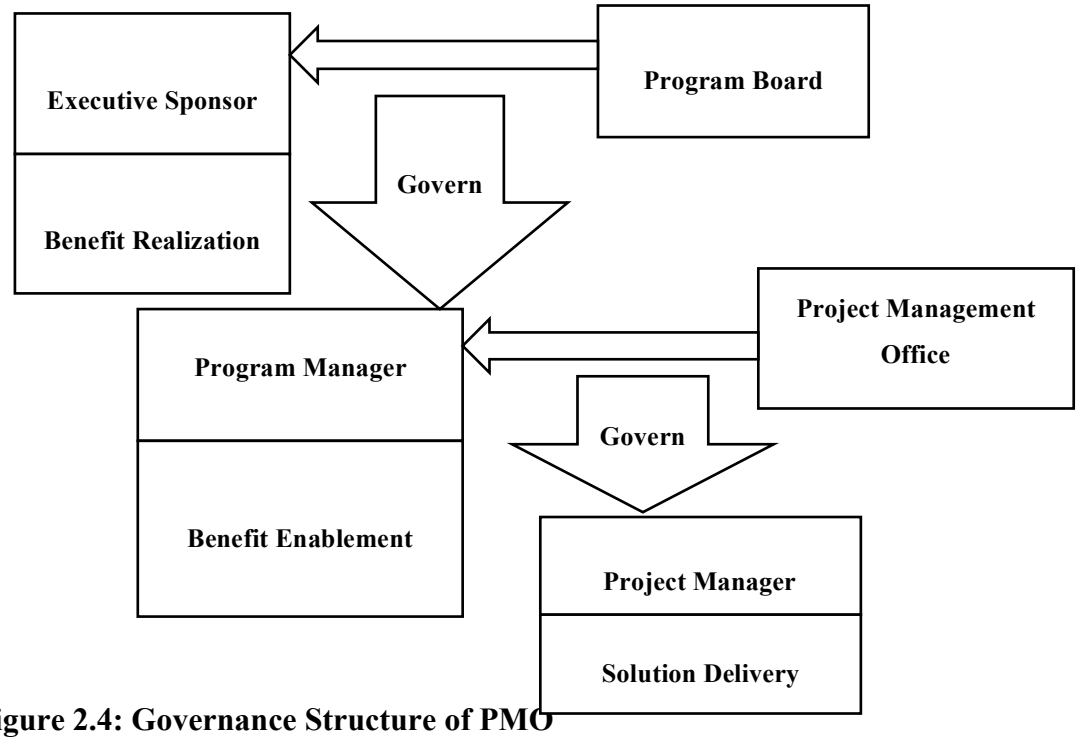

Figure 2.4: Governance Structure of PMO
Source: Author Schematization based on PM Standards, PMI 2006

In expounding the role of the PMO in the organization, Hill (2007) shares the view that the PMO often plays a dual function of both the examiner and the examinee. From the examiner perspective, the PMO provides the project teams with standards and operating principles of project management and, at the same time as the examinee, the PMO provides an evaluation to understand whether or not the principles and standard guidelines were adhered to. The PMO further ensures that the principles of project portfolio management are properly applied organization-wide. The implication is that organization leadership should plan to develop and incorporate value engineering and the PMO competencies as strategies for cost-effectiveness and risk-free management.

However, the ability to choose the right PMO decision-making framework depends on the availability of project data and whether or not the data can be easily accessed, collected and assessed to generate reports on project portfolio progress to the senior management to ensure well-informed decisions (Dai and wells, 2004). However, Simon (2006) warns that the PMO accountability sometimes reduces the business unit control over projects that are important to the specific business unit given that some projects are executed to improve the business units or functions and not the organization as a whole. The author is of the opinion that, business unit should be able to prioritize its projects and manage the project without undue interference by the enterprise PMO.

In spite of its numerous advantages, one of the biggest challenges against the PMO in its capacity to influence decision-making process is to demonstrate to the organization leadership the intrinsic value of the PMO (Duggal, 2007). Hence, Cappels (2004) argues that if the PMO cannot be expected and trusted to save resources more than its own cost, it should not be given the opportunity to make organization-wide decisions with strategic impacts on corporate performance. In line with that, Duggal (2007) suggested that the tangible value of the PMO needs to be measured based on its contributions toward increasing revenue, reducing costs, increasing customer satisfaction, increasing team morale, improving project quality and enhancing organizational effectiveness.

Unfortunately, most PMOs are not successful. According to Tennant (2001), one of the major problems the PMO faces is the wrong perception of senior executives about the reason the PMO exists. The PMO is not a solution for “saving projects that are failing or destined to fail i.e. irrationally conceived projects like Nike and Rogue” (Meredith &

Mandel, 2006: 209), but it is a medium to improve project management in the long term. Kendall and Rollins (2003) identified reasons that often lead to the PMO failure and recommend that the PMO should not only focus on portfolio management, but also help organizations go beyond its service and/or products delivery obligations.

The PMOs that merely give information to executives and are responsible for the project management processes have a declining value curve as presented in the below figure. The PMO faces resistance from both the project managers and the organization and when the resistance exceeds the perceived value, it reduces the significance of the PMO with no tangible value to prove its worth (Kendall& Rollins, 2003: 33).

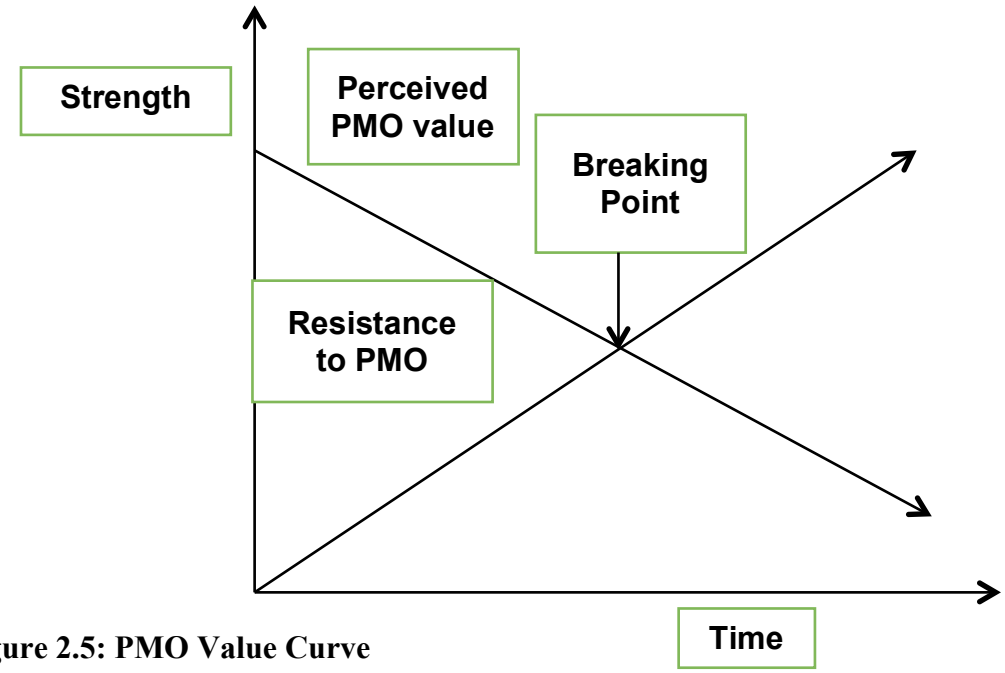

Figure 2.5: PMO Value Curve

2.5 PMO Performance in Organizations – A Review

The PMO activities is organizational context-driven and vary according to their objectives. The PMO plays a vital role in change management and in promoting organizational transformation in terms of facilitating changes in innovative ways organizations deploy to accomplish their business goals and objectives. Aubry (2015) stresses increasing corporate performance as the ultimate outcome of the PMO, which he referred to as a three-fold component: "project management performance", "business performance", and "project management maturity". Aubry (2015) isolates four main variables to capture the context of organizational transformation:

1) The size of the organization is important due to its impact on operations.

2) Project management maturity at the organizational level may have a significant influence on project management in general and on the PMOs in particular given the relationship between the existence of change-oriented environment and the effect of change on performance and, the PMO maturity.

3) The socio-cultural environment also contributes to the overall transformational context. The overriding organizational culture has been shown to have an important variable on the PMO implementation.

4) The effectiveness of any organizational change can be influenced by management practices where a change in management can effect a change in the PMO.

The PMO performance has a direct impact on organizational performance. The Center for Business Practices Research Report conducted a survey about "the State of the PMO, 2007-2008", the findings revealed the PMOs in "High- Performing Organizations" and in "Low-Performing Organizations". The identified "high-performing organizations" are in the top 25% in overall industry indices such as strategy execution, shareholder and customers' satisfaction, budget and financial performance, resources allocation, strategic alignment and portfolio performance, portfolio risk management, benefits realization analysis, contract preparation, outsourcing, project opportunity, process development, resource assignment process, staff management, relationship management and resource identification and optimization" while the "Low-Performing Organizations" are in the bottom 25% in overall industry indices mentioned above (Center for Business Practices Research Report, 2007:5).

According to the findings, the PMOs of high-performing organizations are enterprise PMOs that are significantly bigger and older with higher level of project management maturity than the PMOs in low-performing organizations. The PMOs in high-performing organizations usually painstakingly conduct the evaluation of both the project manager and the project team more frequently for continuous improvement and performance. Based on the above survey, it is apparent that the PMO effect and/or affect organization performance although the extent of the effects differs, depending largely on the type and the roles and responsibilities of the PMO.

Chapter 3: Research Methodology

The validity of any research work depends on the adoption of appropriate research methodology, which in turn depends on the research question and the objectives of the research. This research employed descriptive survey method of data collection and analysis through the use of structured questionnaires.

3.1 Research Design

This research studies the Kano Electricity Distribution Company and the Abuja Electricity Distribution Company and how they can integrate value engineering in the PMO as a risk management tool in executing their project portfolios. The business goal of these electricity distribution companies is to provide electricity as a source of power in Nigeria. The population of the study is made up of the top management and members of the PMOs in both Kano Electricity Distribution Company and Abuja Electricity Distribution Company. The total workforce in Kano Electricity Distribution Company is 240 while that of Abuja electricity Distribution Company is 280 as at the time of this research.

The choice of Kano and Abuja out of the eleven distribution companies in Nigeria is due to the fact that they are only the two institutions among the eleven electricity distribution companies (DisCos) that have adopted and established the project management office in their operating structure as at the time of this research. Secondly, the researcher is well versed in the nature and structure of the two organizations as the researcher previously worked with Kano Electric Distribution Company as the Chief Strategy Officer and

worked as Regional General Manager and Pioneer Manager of the Project Management Office at Abuja Electricity Distribution Companies. The researcher helped set up the PMO in both companies that are still running today.

The researcher randomly sampled eighty (80) respondents from both companies: 45 respondents were sampled from Abuja Discos and 35 respondents were sampled from Kano Discos. The sample represents 15 percent of the total population. Regarding an ideal sample size from the population of the study, Ichoku (2015) opined that the more the sample the better. The author noted that, 20 percent is ideal for population size less than 250, and 15-10 percent is ideal for population size within the range of 250-500. That the more the population size the lower the percentage sampled, similarly, the lower the sample size the higher the percentage sampled. The Finite Population Correction (FPC) for this sample is Sqrt (N-n) / (N-1) = 0.83, where *N* is the population size and *n* is the sample size (Cochran 1977).[1] The principal importance of the FPC is to reduce the margin of error of a sample by reducing the estimate of the population standard deviation.

Most empirical studies do not consider fraction sampled but are more interested in the total number sampled. As noted earlier, the data was collected through the administration of structured questionnaires that were mailed to selected top management and some were distributed by hand to the respondents and collected them back by hand after the agreed days with the respondents. Data gathered from the questionnaire were analyzed

[1] Cochran, W. G. (1977). Sampling techniques. Wiley, New York.

using basic descriptive statistics using mean, standard deviation, simple percentages and frequencies with the application of Statistical Package for the Social Sciences (SPSS).

3.2 Questionnaire Reliability

The results were analysed using Cronbach's Reliability Alpha Test, which is a test considered a reliable technique that can determine a unique estimate of the reliability from a single test (Gliem and Gliem, 2003, p.84). Cronbach's-α is the expected correlation of two tests that measure the same construct. The test is a function of the number of items in a test, the average covariance between item-pairs, and the variance of the total score. It should be noted that a Cronbach's alpha reliability coefficient of at least 0.7 is needed before an instrument is adjudged reliable (Gliem and Gliem, 2003; p.87).

To test the reliability of the study a pilot study was made of five respondents randomly chosen and the questionnaire administered to them. The data obtained from the pilot study was analysed using the Cronbach Reliability Alpha Test. The Cronbach Reliability estimate was used to reveal internal consistency, which is a measure of how different items in a construct (in the questionnaire) align in achieving the overall goal. Specifically, internal consistency is mainly concerned about how different versions of the questions individually aid the achievement of the objective or how they align with the overall research question. The average results of Cronbach Alpha coefficient were 0.786, which is considered acceptable. Thus, the instrument is considered reliable for data collection.

3.3 Research Ethics

Research ethics entails making sure the design of a research is methodologically sound and morally justifiable to all those involved (Saunders et. al., 2009). It is clear and important that ethics in research of this nature must be taken seriously. The ethical principles observed during the course of this research survey were:

1. **Voluntary Participation:** Respondents were given the opportunity to participate in the survey voluntarily at their discretion without any form of compulsion.

2. **Disclosure:** The researcher made the objectives and the purpose of the study clearly known to the respondents before they participated. This is to enable the respondents decide whether or not they wanted to participate in the study.

3. **Confidentiality:** The researcher made it crystal clear to the respondents that the study data is relevant only for academic purpose beyond which the data is useless.

4. **Anonymity:** Given the fact that the case study companies are organizations where the researcher introduced the project management office and value engineering brings to limelight the likelihood of the study being biased. The argument is that the respondents are likely to be bias in their responses by trying to answer the research questions based on their familiarity with the researcher or just answering what they felt the researcher wanted to hear instead of being objectives.

Statistically speaking, this empirical research was not only considered a huge success but also a pacesetter, given the research mentality in Nigeria and in fact, many African countries, which perennially keep Nigeria and the continent behind. Realistically, the two Electricity Distribution Companies were the only organizations among the 11 Electricity Distribution Companies in Nigeria that offered the researcher an employment opportunity upon his arrival in Nigeria as a Doctoral Candidate from the United States.

Therefore, it became inevitable for the researcher to carryout the study in those organizations if the study must be carried out in Nigeria in the Electricity Distribution subsector within the designated timeframe to complete the research.

However, consciously strategizing on how to deal or mitigate the confidentiality issues and risks that might arise as a result of respondents being biased became the immediate concern of the researcher. To deal with the situation, the researcher employed several measures.

The first conscious method employed by the research was the deployment of a strong emotional intelligence strategy. Having spent the last 13 years in the US, the researcher copied and deployed across board, the United States social capital mentality: “Freedom of Speech” within the rank and file away from the traditional dogmatic, “command and obey” communication style. Thus even beyond the research study population, the employees at Kano Electricity Distribution Companies and Abuja Electricity Distribution Companies had embraced a new organizational scholarship mindset that promoted

American individuality which tremendously reduced the chances of being unconsciously influenced by the research or other senior executive that participated in the research study.

The second measure employed by the researcher beyond giving the respondent an option to decide whether or not to participate was giving the respondents the full details of the research objectives and why the data is necessary. This openness repositioned the respondents to decided whether or not to participate in the research singlehandedly and also anonymously.

The third strategy was that the leadership style of the researcher obliterates the chances of the respondent being biased. The laissez faire professional attitude of the researcher greatly impacted on the workforce and hence, limited the interference of the researcher not only in the way and manner the respondents responded to the research questions but also in the way employees (the base of the research study population) in the two electricity distribution companies make decision in general.

The fourth strategy the researcher deployed to alienate the bias mentality was to succinctly inform the respondents through the introductory letter that the respondents are free to express their view with regards to the subject under discussion without any form of considerations in favor of the researcher.

Fifthly, the researcher ensured that respondents responded to the research questions without indicating their identities, which made it difficult for the researcher or anyone for that matter to potentially ascribe any response to any responder. The aim is to ensure that the respondents feel free to express their view without any form of consideration whatsoever.

Lastly, the various trainings on Value Engineering and Project Management Office conducted by the researcher to the employees of the two electricity distribution companies case studied (which also include the respondents) were not only deployed across the board well beyond the research study population but also, based on principle of objectivity targeted at transferring knowledge to a knowledge deficit workforce post-privatization. Therefore, the trainings were not in any way instructed or targeted on how to answer the research study questions. The research questions were not sub-projects in the training class as a guide or preparation or the need to answer the research questions in a particular way that suit the whims and caprices of the researcher.

5. **Withdrawal:** To further ensure that the right of the respondents are respected, the respondents were told that they are free to withdraw from the survey.

Chapter 4: Power and Energy Sector in Nigeria – Case Study

4.1 Power Sector in Nigeria

This section presents an overview of the power sector in Nigeria, the generation, transmission and distribution, the reforms, challenges and prospects of the sector over time. Nigeria is blessed with abundant energy resources capable of not only meeting the electricity needs of her teeming population but also serving as a major source of revenue to the country and even West Africa (ECN, 2015). Energy plays an important role in the process of production, industrialization, urbanization, transportation and sustainable economic growth (Olajide 2014). No nation can realize sustainable economic development without developing its energy sector. Almost all activities whether commercial, domestic and industrial depend largely on the proper functioning of the energy sector.

Among the leading energy sources available in Nigeria are hydroelectricity, crude oil, natural gas, coal, solar, biomass, wind and geo-thermal among others. Electricity supply in Nigeria used to be generated mostly from hydroelectricity, which accounted for 84 percent of the total electricity generated in the country in 1984 but declined gradually to as low as 23 percent in 2015 and below 20 percent in 2018 because of institutional neglect and lack of investment. Natural gas accounted for about 77 percent of total electricity generated in Nigeria in 2015 and over 80 percent in 2018 because of increase in investment, as presented in figure 4.1 below (Okeke, 2016).

Figure 4.1 Share of Hydroelectricity in Total Electricity Distributed in Nigeria.

Like crude oil, Nigeria is the fourth largest exporter of liquefied natural gas in the world, though natural gas still accounts for the largest bulk of electricity generation in Nigeria, the power sector is still experiencing high volatility or constant erratic power outage making it difficult to trigger and sustain economic development in Nigeria (IMF, 2015). Among the leading factors responsible for power outage that became a concern to policy observers and policy makers are poor infrastructural development, poor gas supply, insecurity in the country and inconsistent government policies in the sector.

The Nigeria power sector is not only known for its infrastructural decay but also for epileptic power supply that has caused damages to home electronic appliances, industrial machines and perpetual increase in the operating cost of many institutions, businesses and establishments through increased overhead cost. Despite the abundance of energy resources in Nigeria, majority of Nigerians still do not have access to electricity. About 60% of the Nigerian population does not have access to electricity. Also, only 10% of rural households have access to electricity (Adebayo, 2014; Abubakar et al, 2015). Okeke (2016) revealed that 51.2% of rural households in Northcentral, 70.4% in Northeast,

57.7% in Northwest, 33.6% Southeast, 31.3% in Southsouth and18.8% in Southwest geopolitical zones do not have access to electricity.

The poor nature of power supply in Nigeria has prompted the perennial need to rely more on fuel generating machines and diesel generating machine for the rich families and industries who rely more on diesel generators to power their home or industries raising the demand for crude oil products like fuel and diesel in the country. Based on the report of International Energy Agency (IEA, 2015), Nigerian electricity consumption per capita as at 2018 was 12-watts/person or 144.48kWh from 140kWh in 2015. This is relatively poor when compared with developing countries like Brazil with 268-watt/person, South Korea with 1,038 watt/person or Spain of 645 watts/person as of 2012.

Historical Trends in Electricity Production and Distribution

Electricity Production and distribution could be traced back to the Nineteenth century when electricity was first generated in Lagos in 1896, barely fifteen years after it was generated in England; the home country of the colonial masters (Niger Power Review, 1985; Zubaru & Serkan, 2014; Arinze, 2014; KPMG, 2016). At this period the total electricity generated was 60kW, which was below the demand for electricity at that time due to rise in the demand for electricity over time. Nigerian Government Electricity Undertaking (NGEU) was established in 1946, under the 'Public Works Department' (PWD) to oversee the production and distribution of electricity in Lagos Nigeria. To ensure greater efficiency and production, the then colonial government enacted a degree in 1950 establishing the 'Electricity Corporation of Nigeria' (ECN) to oversee the production of elec-

tricity and take the overall responsibility for all the various outlets of electricity production in Nigeria.

Nigerian Electricity Supply Company' (NESCO) was given a license to generate electricity in some selected geographical areas in Nigeria. Also, Niger Dams Authority (NDA) was licensed to generate electricity from renewable source; hydroelectricity. According to Cladius (2014), NESCO was saddled with the responsibility to construct and maintain the dams while the Niger Dams Authority was responsible for power generation and ECN was responsible for the distribution and sales of electricity at utility voltages (Manafa, 1995). On April 1st 1972, the 'Electricity Corporation of Nigeria' (ECN) was merged with the Niger Dam Authority (NDA) resulting in the formation of the 'National Electric Power Authority' (NEPA) to facilitate a better coordination of power generation, transmission and distribution in Nigeria. Nigeria Power Review (1989) pointed certain factors that necessitated the merging of ECN with NDA to form NEPA. The factors are:

1. **Ease of Management:** Merging had the country's energy generation, transmission and distribution in one institutional body and management with responsibility for its financial obligations vested with the Federal Government of Nigeria.

2. **Better Resources Utilization:** Human, natural and financial resources will be more effectively coordinated and managed under one institutional body with improved communication and better decision making and problem solving.

However, the sector continued to perform below its capacity and the expectation of the stakeholders, which led to further reform and regulation for better performance. Even-

tually, the government commenced the privatization process in 1988 and the sector was partially commercialized by the 'Commercialization and Privatization Decree' No. 25 with the intent to redress the epileptic power supply in Nigeria. Nkiru (2011) is of the view that commercialization of the power sector in 1988 did not yield any meaningful results because Nigeria continued to experience constant power outage with total installed capacity below 6000MW.

Policy analysts argued that poor implementation of government policies has been the major cause of failure of the power sector in achieving the mandate, which prompted the Nigerian government to establish the 'Electric Power Implementation Committee' (EPIC) in 2000 to prepare the National Electric Power Policy (NEPP) in 2001 and the National Energy Policy in 2003 with the main objective of ensuring an optimal utilization of non-renewable energy resources: crude oil, coal, natural gas and renewable energy sources; solar, wind, geo-thermal and biomass to aid sustainable development in Nigeria through active participation of the private sector.

The policy aimed at achieving the following:

a) Extensive investment in the mining and exploration of crude oil and natural gas

b) Extensive investment in the development of electric power generation, to ensure that more than 75 percent of Nigerians have access to electricity by 2020

c) Explore other sources of electricity generation.

4.2 Power Generation Sub-Sector

4.2.1 Successor Generation Companies (Gencos)

Available statistics revealed that there are six major electricity generating companies in the Nigeria Electricity Supply Industry (NESI 2017) with about 23 generating plants connected to the national grid. The total installed capacity is 12,522MW while the available capacity is 7,139.6-MW1 (KPMG, 2018; Nkiru, 2011). KPMG (2018) found out that power generation is mostly thermal based with total installed capacity of 10,401MW representing 81 percent of the total installed and available capacity stands at 6,079-MW, representing 83 percent of the total installed capacity. While total installed capacity from hydropower is about 1.9384 GW with available capacity of 1,060 MW.

The existing generation companies and installed capacities is presented Table 4.1

S/N	Generation Company	Plant Type	Generating Capacity
1.	Afam Power Plc (I-V)	Thermal	987.2
2.	Egbin Power Plc	Thermal	1,320
3.	Kainji/Jebba Hydro Electric Plc	Hydro	1,330
4.	Sapele Power Plc	Thermal	1,020
5.	Shiroro Hydro Electric Plc	Hydro	600
6.	Ughelli Power Plc	Thermal	942

Table 4.1: Six Power Generating companies with installed capacity.

Independent Power Producers (IPPs): Unlike the Gencos, the IPPs are power plants owned and managed by private firms. Since inception, the Nigerian Electricity Regulatory Commission (NERC), being the regulatory agency in charge of the power sector, issued more than 70 licenses to Independent Power Producers (IPPs) between 2012 and 2013 in addition to the already existing IPPs in the country prior to 2012 (KPMG, 2016; Arinze, 2014). Available statistics revealed that some of the major exist-

ing IPPs include Shell–Afam VI (642MW), Agip–Okpai (480MW) and AES Barges (270MW).

National Integrated Power Projects: The National Integrated Power Project (NIPP) is an offshoot of the government's effort to reduce the incidence of erratic power supply in the country. NIPP was established in 2004 as a federal government scheme to fast-track government funded initiatives in the power sector to stabilize the sector by adding significant new generation capacities to augment electricity supply for distribution. Available statistics revealed that Nigeria currently has about ten (NIPPs) with total combined installed capacity of 5,455- MW.

Some of the NIPP power plant and date commissioned are presented in table 4.2

S/N	National Integrated Power Projects	Generating Capacity	Date Commissioned
1.	Alaoji generation company Nigeria limited	1,131	August 2013
2.	Benin generation company limited	503	June 2014
3.	Calabar generation company limited	634	June 2014
4.	Egbema generation company limited	381	June 2014
5.	Gbaran generation company limited	254	June 2014
6.	Geregu generation company limited	506	May 2013
7.	Ogorode generation company limited	503	August 2015
8.	Olorunsogo Generation Company limited	754	June 2014
9.	Omoku generation company limited	265	June 2014
10	Omotosho generation company limited	513	October 2014

Table 4.2: Ten Power Generating Companies with installed capacity
Source: Author Schematization based on data from NERC

According to NERC (2016), the Federal Government set aside the sum of N50b naira in escrow accounts in three Nigerian banks as a buffer for losses that may accrue to any of the Gencos and, the Nigerian Bulk Electricity Trading Plc (NBET) manages the account.

Various power generating plants in Nigeria is presented in Table 4.3 below.

Name	License Type	Site Location	Capacity
Afam Power Plc	Generation on-grid	Afam, Rivers State	987.2MW
African Oxygen & Industrial Gases Limited	Generation off-grid	Ikorodu, Lagos State	19MW
Agbara Shoreline Power Limited	Generation on-grid	Agbara, Ogun State	100MW
Akute Power Limited	Generation off-Grid	Lagos Water Corporation	13MW
Alaoji Generation Co. Ltd (NIPP)	Generation on-grid	Alaoji, Abia State	1074MW
Anita Energy Limited	Generation on-grid	Agbara, Lagos State	90MW
Azura Power West Africa Limited	Generation on-grid	Ihovbor Benin, Edo State	450MW
Benin Generation Company Limited	Generation on-grid	Ihonvbor, Edo State	450MW
Calabar Generation Company Limited	Generation on-grid	Calabar, Cross Rivers State	561MW
Century Power Generation Ltd	Generation on-grid	Okija, Anambra State	495MW
CET Power Projects Ewekoro	Generation off-grid	Wapco Ewekoro, Ogun State	6MW
CET Power Projects Ltd.	Generation off-grid	Tinapa, Cross River State	20MW
Contour Global Solutions (Nig) Ltd	Generation off-grid	NBC Bottling Plant, Ikeja	10MW

Contour Global Solutions (Nig) Ltd	Generation off-grid	NBC Bottling Plant, Apapa	4MW

Table 4.3: Generating Plants and their generating capacities (Source: NERC)

4.2.2 Power Transmission Sub-Sector

The transmission company of Nigeria (TCN) was part of the reformation of the Power Holding Company of Nigeria (PHCN-NEPA Successor) which was reformed into six (6) generating companies, one transmission company (TCN) and eleven (11) distribution companies (ECN, 2015). However, unlike other sub-sectors of the power sector, the Nigerian government controls the TCN, though outsourced and managed by a Canadian company, Manitoba Hydro International (Canada), which is a vertically integrated, government-owned Canadian Provincial Crown Corporation. The firm is charged with the responsibility of revamping the corporation in order to achieve financial and technical sustainability. The aim is to ensure stable and reliable power transmission to meet electricity demand.

According to Arinze (2014), the transmission capacity of TCN is currently about 5,523.8km of 330KV lines and 6,801.49km of 132kv lines. TCN has two main departments; market operator and system operator. The market operator is obligated to administer the wholesale electricity market, promote efficiency and where possible, competition, the system operator focuses on system planning, administration and grid discipline.

The system operators and market operators' responsibility in the TNC are presented in Table 4.4 for compatibility overview

S/N	System Operator	Market Operator
1.	Undertake dispatch and generation scheduling	Electricity market administration
2.	Schedule energy allocated to each load participant in the event that available generation is not sufficient for all loads	Guarantee an efficient, transparent and non-discriminatory market service to all participants
3.	Ensure reliability and availability of ancillary services	Facilitate the development of a sustainable market
4.	Undertake real time operation and SCADA/ EMS system.	Implement market rules, draft and implement all requisite procedures
5.	Administer system constraints (congestion), emergencies and system partial	Review the efficiency and adequacy of market rules and market procedures and propose such amendments.
6.	Coordinate regional Interconnectors	Admit and register participants
7.	Forecast demand for electricity	Organize and maintain a participants' register
8.	Implement and enforce grid code, draft and implement the operating procedures as may be required for proper functioning of the system operator controlled grid and system planning.	Centralize the information required for market administration, organize and maintain relevant databases.
9.	Implement and supervise the open access to system operator controlled grid	Calculate and recover ancillary service and must-run generation costs, when necessary.
10.	Plan the operation and control the power outage.	Administer the market settlement process and market payment system.

Table 4.4: Responsibility of the Market and System operators of the TCN

4.2.3 Electricity Distribution Companies Sub-Power Sector

There are eleven electricity distribution companies (Discos) in Nigeria that emerged from the privatization process in 2013 and the reformation of the PHCN, the Figure 4.2 clearly illustrates the various geographical coverage of the electricity distribution companies in Nigeria while table 4.5 reveals the various percentage allocations to each of the Discos.

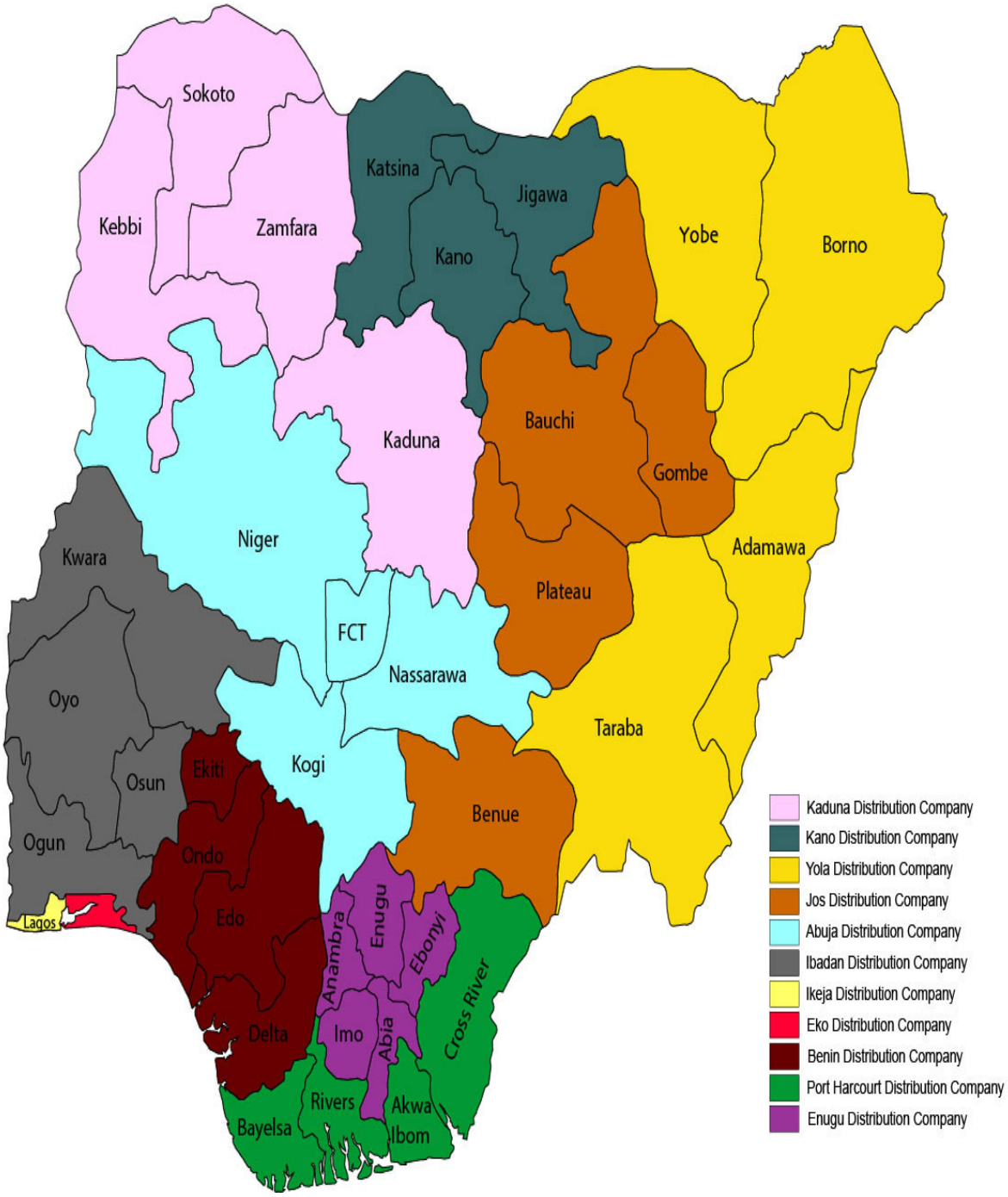

Figure 4.2: Map of the Geographical Market Areas of DISCOs (source: NERC).

S/N	Disco	% Load Allocation
1	Abuja Electricity Distribution Company	11.5%
2.	Benin Electricity Distribution Company	9%
3.	Eko Electricity Distribution Company	11%
4.	Enugu Electricity Distribution Company	9%
5.	Ibadan Electricity Distribution Company	13%
6.	Ikeja Electricity Distribution Company	15%
7.	Jos Electricity Distribution Company	5.5%
8.	Kaduna Electricity Distribution Company	8%
9.	Kano Electricity Distribution Company	8%
10.	Port Electricity Distribution Company	11.5%
11.	Yola Electricity Distribution Company	11.5%

Table 4.5: Percentage Load Allocation of 11 DISCOS

Similarly, Table 4.6 shows the various classes of the electricity customers in Nigeria classified into 5 major sub-groups

S/N	Plant Type		
1.	Residential	Capacity (MW)	A consumer who uses his premises exclusively as a residence - house, flat or Multi-storey house where people reside.
	R1 R2 R3 R4	Life-Line (50kWh) Single & 3-phase LV Maximum DD & HV Maximum Demand	
		(11/33 KV)	A consumer who uses his premises for any purpose other than exclusively as a residence or as a factory for manufacturing goods.
2.	**Commercial**		
	C1	Single & 3-phase	
	C2	LV Maximum DD	
	C3	HV Maximum DD	
3.		(11/33 KV)	A consumer who uses his premises for manufacturing goods including welding and ironmongery.
	Industrial		
	D1	Single & 3-phase	
	D2	LV Maximum DD	
	D3	HV Maximum DD	
4.	**Special**		
	A1	Single & 3-phase	
	A2	LV Maximum DD	
	A3	HV Maximum DD (11/33KV)	
5.	**Street Lightning**		
	S1	Single & 3-phase	

Table 4.6: Classes of electricity customers in Nigeria

The power sector of Nigeria evolved over time and has undergone several structural reforms to ensure efficient functioning of the sector. In spite of the reforms, the power sector still experiences constant power outage or erratic supplies that seem to defy any meaningful solutions to date. It is therefore pertinent to review some of the major constraints facing the power sectors in Nigeria. The major challenges are:

Insufficient Funding

The energy sector of Nigeria, especially the electricity power has been grossly underfunded. The power sector often lacks adequate access to long-term loans to finance major infrastructure necessary for efficient production and distribution of electricity, pre and post privatization. The Discos in Nigeria are currently unbankable. The poor funding of the power sector is reflected in its poor resource allocation toward research and development, which in turn, affected the ability to increase electricity production and supply, innovate and implement profitable and sustainable project portfolio.

Inadequate Skilled Manpower

The poor funding of the power sector reflects also in the level of available skilled manpower in the power sector. Majority of the project managers, technician and engineers are outdated and aged with no real succession plan to improve the performance of the sector, whereas Nigerian engineers are doing well in their professions abroad and are regarded among the best engineers in the world. Sadly, politicizing employment, promotion and remuneration in the power sector also resulted in the ongoing brain drain in the power sector. Ebewel (2011) is of the view that continuous politicizing of employment

in the power sector will lead to reduction in the hiring of committed employees dedicated not only to the success of the power sector but also, Nigeria. Unfortunately and realistically speaking, most of the current employees (recycled NEPA/PHCN workforce) really do not embrace the privatization and do not care about the electricity industry performance mandate of the Federal Government of Nigeria.

Corruption

Corruption generally hinders progress and development of any nation. Nigeria is globally known and legendary for high level of corruption. Transparency International ranked Nigeria 148th most corrupt country out of 188 countries profiled in 2017. For Discos to thrive, there is a need to ensure fair playing ground for all stakeholders otherwise the objectives and goals of the power sector privatization will be defeated overtime. For instance, Arinze (2014) argued that it is tribalism and corruption that prompted the government to establish refinery in Kaduna State located thousands of mile away from the source of raw materials - crude oil.

Obsolete Equipment

The infrastructural development required to drive the power sector is lacking because of outdated equipment. Arinze (2014) noted that poor funding culture invariably means that vital and efficient machineries are not procured, the machines develop constant faults while efficiency is compromised which accounts for constant power failure in Nigeria. To effectively generate electricity that meets the need of all Nigerians there is an urgent need to increase the investment in the power sector by procuring long lasting ma-

chineries and equipment. The private sector investors in the power sector are largely underfunded, which makes them depend on the government for financial assistance i.e. Stabilization Fund, even after the privatization of the power sector.

Poor Transmission Infrastructure

The poor state of the transmission network is one of the challenges facing the Nigeria power sector, as it hinders efficient transmission of electricity to various locations in Nigeria. The Transmission Company of Nigeria (TCN) remains a government corporation despite that TNC is outsourced and managed by a Canadian firm for the government of Nigeria. The transmission company operates with obsolete infrastructure and, the bureaucratic processes mostly hinder project development and execution. TNC operations currently generate debates among policy analyst on the need to privatize the transmission sub-sector given the apparent underperformance.

Lack of Gas supply

Inadequate gas supply significantly hinders power generation despite daily gas flaring. Nigeria has the ninth largest gas reserves in the world but domestic gas supply in Nigeria is hindered by poor gas infrastructure in the country. Majority of the energy companies prefer to sell their products outside the country for better profit and also, to reduce the incidence of bad debt since quite a large number of the Nigerian government agencies and customers do not pay tariff. According to (NERC, 2019) Nigeria discos indebtedness to the Nigeria Bulk Electricity Traders (NBET) is well above N778B naira (about $2.2B) since the subsector was privatized in 2013.

Environmental Challenges

The power sector is faced with a lot of environmental issues because apart from the vandalization of the pipelines, the power plants are mostly not only located far from the major gas plants but also, not located in cities where other major industries and manufacturers like cement factories, breweries, etc. are located to facilitate electricity transmission as well as reduce the emission of carbon monoxide (CO).

Historical Analysis of Electricity Distribution Companies in Nigeria

As earlier noted, electricity distribution in Nigeria can be traced back to 1896 with the installation of the first generating power plant in Marina, Lagos Nigeria, with initial generating capacity of 60kW (Arinze, 2014; KPMG, 2016). However, with the amalgamation of the Southern and Northern Protectorate in 1914, other major cities in the country started developing and generating electricity in their regions (Arinze, 2014). The cities which had electricity at this period include; Port Harcourt 1928, Kaduna 1929, Enugu 1933, Maiduguri 1934, Yola 1937, Zaria 1938, Warri 1939, Calabar 1939.

The status quo of electricity distribution remained regionally independent until the Nigerian government established the Public Works Department to take control over the generation and distribution of electricity throughout Nigeria because of operating efficiency, operating challenges and the need for better management of the nation electricity. The then colonial government established the Electricity Corporation of Nigeria (ECN) in 1950 by the ordinance No.15 to oversee the various electricity supply outlets in Nigeria, but ECN did not commence full operation until 1951 when it took over the management

of all electricity generation, transmission and distribution. Claudius (2014) argued that the merger under ECN led to a marginal improvement in electric power supply in the country.

As manufacturing and commercial activities increased in Nigeria, the demand for electricity also increased over time and the need to increase the supply of electricity became imminent which prompted the government through the ECN to embark on several projects to increase the supply of electricity. For instance, the Ijora, Oji-River, Kano and Ibadan power stations were established to boost the availability and quality of power supply and delivery in the country. The Ijora power station was commissioned in February 1956 to distribute electricity to some satellite towns like Ikorodu, Shagamu, Ijebu-ode as well as other major towns in Ibadan, which was then the seat of the Western Regional Government (Claudius, 2014).

A significant reformation was made in the power sector in 1972 with the merging of the ECN and the Niger Delta Authority leading to a unified body known as National Electric Power Authority (NEPA) though the institution did not commence operation immediately until January 6th 1973. Recall, that before the formation of NEPA, NDA was established and saddled with power generation in the country while the ECN was in charge of power distribution. The poor performance of the NEPA characterized by poor electricity supply throughout the country, prompted policy makers to agitate for independent and autonomous institution free from government bureaucratic control for better performance.

However, with the advent of the democratic regime in Nigeria in 1999, reforms were made in the power sector to make it more responsive to the increasing economic activities in Nigeria. This prompted the government to establish Power Holding Company of Nigeria (PHCN) with the intention of privatizing the power sector to make it more responsive to the need of Nigerians. It was officially commissioned in May 2005 and charged with the responsibility to generate and distribute electricity throughout Nigeria. PHCN superintended the generation and distribution of electricity in the country, but was characterized by excessive corruption. Most government parastatals, agencies and Nigerians do not pay electricity bills and the supply of electricity throughout Nigeria was so epileptic that most Nigerians resorted to the use of generators as an alternative source of energy in their homes, firms and industries. Agitation among the Nigerian citizens and call among policy analysts compelled the government to consider the privatization of PHCN for better performance.

4.2.4 Reformation of the Power Holding Company of Nigeria (PHCN)

In 2013, the Federal Government of Nigeria decided to carry out a massive reformation of the power sector by fully privatizing the entire sector. This led to the unbundling of PHCN into three sub-sectors namely, six generation companies, one transmission Company and eleven distribution companies. The eleven distribution companies are privately owned and operated by private investors with 60% interest while the Nigerian government own 40%. The 11 electricity distribution companies that emerged from the privatization process are:

1. Abuja Electricity Distribution Company (AEDC),

2. Benin Electricity Distribution Company (BEDC),
3. Eko Electricity Distribution Company (EKEDC),
4. Enugu Electricity Distribution Company (ENEDC),
5. Ibadan Electricity Distribution Company (IBEDC),
6. Ikeja Electricity Distribution Company (IKEDC),
7. Jos Electricity Distribution Company (JEDC),
8. Kaduna Electricity Distribution Company (KdEDC),
9. Kano Electricity Distribution Company (KEDOC),
10. Port-Harcourt Electricity Distribution Company (PHEDC),
11. Yola Electricity Distribution Company (YEDC)**.**

The privatization exercise was effected by the presentation of certificate of ownership to the prospective owners' on 30th September 2013 when each of the new distribution companies (except Kaduna Disco which came a year later) was charged with the responsibilities of distributing clean and efficient electricity in their territorial markets or areas of coverage. However, power sector reformation through the privatization exercise has yielded little or no results in the efficient distribution of electricity throughout Nigeria.

4.2.5 Anticipated Advantages of the Privatization of Power Sector in Nigeria

Improved Power Supply

The reformation of the electricity distribution slightly increased the efficiency of resources utilization; human capital and raw materials to develop the power sector and the economy. The state of the power supply in the country before now was so epileptic

that electricity outage has crippled many industries in Nigeria with increased overhead cost and making their products less competitive compared to their competitors from other countries (Noko, 2017). Claudius (2014) noted that when lights go out, computer screens darken, machinery stops and productivity screeches to a halt as you immediately worry about lives, injury, safety and damage. However, with the reformation of the electricity distribution in the country, electricity distribution has improved a little bit and some Nigerians now enjoy power supply for more than 4-6hours daily, which is still a complete failure when compared with the global standard of almost 24hrs of electricity availability everyday. Although, Okeke (2016) argued that the privatization of the electricity sector has not really yielded any positive result as the power supply pattern characterized by constant outage remains the same and the electricity tariff is skyrocketing.

Improved Infrastructural Development

The electricity distribution companies have over time slightly increased their investment in infrastructure i.e. mainly in tariff collection technology but not in capital projects. Since the reformation of the sector, it has not been business as usual because some government parastatals and MDAs were forced to pay for the electricity they consumed while the maintenance culture of the distribution companies still lags. Most of the electricity distribution companies are yet to understand that in today's world, profitability is driven among other factors, by technology measured in terms of innovation, investment in research and development (R&D), excellent customer service and acquisition of skilled manpower.

Improved Maintenance Culture

Over the years the government often earmarked huge amount of money to maintain and replace the power sector equipment, but the funds usually ended up in the pockets of self-interested stakeholders. The privatization of the electricity distribution subsector of the power sector, brought with it some improvements. KPMG (2016) in their report argued that the major challenge of the power sector post-privatization is mainly poor maintenance culture that continues to hinder the sector regardless of the new players. With the privatization exercise, the electricity distribution companies understand the importance of maintenance culture as it will lead to higher productivity, higher profit, lesser Health Safety and Environment (HSE) issues, cleaner electricity and accelerated growth and development in Nigeria, but really do not have enough resources to execute.

Generate More Employment Opportunities

The privatization triggered an increase in the number of employment in the power sector. Prior to the privatization exercise of the power sector, NEPA had many ghost workers who were blindly paid by the Federal Government of Nigeria. The salary either ended up in the pockets of the politicians or top management of NEPA, which increased the financial burden of the Nigerian government. But with the privatization exercise, the sector increased the employment of fresh graduates and skilled workers but the ability to retain these new crop of global-minded employees given the overriding business culture of NEPA, remains a challenge. Olajide (2014) argued that with the privatization exercise over 50,000 new employees were employed in the electricity distribution companies in Nigeria.

4.3 Kano Electricity Distribution Company – Organizational Overview

Following the privatization of the power sector in 2013, Kano Electricity Distribution Plc, popularly referred to as KEDCO or Kano Disco emerged as one of the electricity distribution companies. The company successfully commenced operation on November 1st 2013 after a rigorous evaluation by the Bureau of Public Enterprises (BPE) to ensure that all the requirements by NERC were met. KEDCO was inaugurated afterward as one of the 11 electricity distribution companies (DisCos) as contained in Section 67 of the Electricity Power Sector Reform Act 2005. From inception, Alhaji Tajuddeen Aminu Dantata Chairs the KEDCO's Board while the MD/CEO, Dr. Jamil Gwamna heads the executive management team.

Kano Disco is owned and managed by Sahelian Power SPV Ltd with 60 percent equity in Kano Disco. Sahelian Power SPV Ltd comprises of five independent energy companies that merged together for the purpose of acquiring KEDCO. The companies include: Sahelian Energy and Integrated Services Ltd (SEIS), the Kayseri ve Civari Electric T.A.S (KCETAS) Turkey, Dantata Investment and Securities Company Ltd, INCAR Power Ltd and the Highland Electricity Ltd. Kano Disco is franchised to distribute and market electricity in Northwestern part of Nigeria which include three states; Kano, Kastina and Jigawa states.

The core business activities of Kano electricity distribution company as contained in section 67 of the Electricity Power Sector Reform Act stipulates that: a distribution license shall authorize the licensee to construct, operate and maintain a distribution sys-

tem and facilities including but not limited to the following activities as may be specified in the license:

(a) Connect all eligible customers in the territorial market to receive electricity supply

(b) Enumerate, install, maintain and fund customer meters, billings and tariff collections

(c) Other distribution services as may be prescribed.

KEDCO is responsible for the management of meters' installation (except for the recent introduction of third party Meter Assets Providers by NERC in 2018 (MAP), servicing, billing, consumer services and the collection of revenue including the management of the distribution network within its franchise zone of about 67,128 Km^2.

The main strategic thrusts are:

- Reconfigure power distribution from radial to a ring network to improve efficiency
- Close the metering gap via innovative meter deployment initiatives
- Invest in capacitor banks to improve power efficiency and stability
- Install additional lines to de-load the feeders and new transformers at load points
- Increase payment channels to cater for diverse customers and improve collections
- Improve work environment via initiatives on people development and HSE
- Deploy an enterprise platform–ERP systems to integrate functional business areas.

4.4 Abuja Electricity Distribution Company – Organizational Overview

Following the privatization of the power sector in 2013, the Abuja Electricity Distribution Plc, or Abuja Disco or AEDC was licensed to serve the Northcentral Nigeria

States; Kogi, Nasarawa and Niger from its headquarters in Abuja, Nigeria's capital city in the Federal Capital Territory (FCT). KANN Utility Limited (KANN) of Zambia owns 60 per cent of Abuja Disco and the Federal Government of Nigeria owns the remaining 40 per cent. Former Ambassador Shehu Malami is the Chairman of the AEDC Board while the current CEO Engr. Ernest Mupwaya supported by the executive management team, manages AEDC overall business operations. Abuja Disco is responsible for the management of meters' installation (except for the recent introduction of third party Meter Assets Providers by NERC in 2018 (MAP), servicing, billing, consumer services and the collection of revenue as well as the management of the distribution network within its franchise areas, a territorial coverage of an area of 133,000 km^2.

The Transmission Company of Nigeria (TCN) Plc manages the Abuja transmission grid from the national control center in Oshogbo, Osun State with a supplementary center at Shiroro, Niger State. According to AEDC (2017), Abuja Disco distributes an average of 204,150MW of electricity annually. Abuja Disco has successfully been transmitting electricity in its territorial markets and was commended by the BPE in 2016 for abiding by the corporate ethics.

AEDC (2015) was deemed to have the best state of the art infrastructure among the eleven distribution companies in Nigeria. The report argued that, Abuja Disco infrastructure is among the most modern and best maintained in Nigeria. In FCT, Abuja Disco has installed $215M worth of distribution network equipment and underground cables to enhance the landscapes of the Federal Capital Territory as a rapidly growing contempo-

rary megacity. Abuja Disco planned to install the same infrastructure in all it territorial markets having invested over $25M in Minna, Lokoja and Lafia business districts.

Chapter 5: PMO Framework, Evaluation & Risk Management Practices

5.1 PMO Hypothetical Framework

Organizations operate in an ever dynamic and competitive environment that requires organizations to constantly innovate to implement more projects portfolio successfully, improve business processes and reduce costs. The quest to remain competitive and boost performance has prompted organizations to continue to innovate tactically to implement strategic initiatives. This has led many organizations to establish the project management office, following best practice to coordinate the implementation of projects and operating initiatives in alignment with the organization strategy (Trans, 2016).

According to Monteiro (2016) several frameworks of the PMO have been proposed and developed. Regardless of the numerous PMO models and functions in the literature, a typical PMO framework generally supports organization strategy and business objectives. Hubbard & Bollies (2015) argued that the PMO is an organizational structure designed to bridge the gap between project management and business management, hence the PMO creates, initiates and delivers value on executed project portfolio, invariably to achieve the overall business objectives.

Different PMO framework extracted from PMI (2013): Presented in Table 5.1 below

Business-Level Role	Operational Responsibility	Organizational Accountability	Requisite Authority
Enterprise PMO One for enterprise. *Permanent function*	Strategic master planning. Tactical master planning. Project selection & prioritization.	Enterprise – reports directly to the MD/CEO	Review and approve master project portfolio and budget plans. Oversee portfolios and programs.
Division PMO One for each division, region, or portfolio *Permanent function*	Tactical master planning. Project-portfolio management.	Division, region, or portfolio – reports directly to Division manager or Enterprise PMO.	Establish project-portfolio operational and budget plans and authorize adjustments. Manage portfolios and oversee programs
Business Unit PMO	Operations master	Functional business unit	Develop project-program
One per business unit *Permanent function*	Planning. Project-program management.	Reports Directly to Division PMO.	Operational and budget plans and authorize adjustments. Manage programs and oversee projects.
Project PMO One for each major or mission critical project *Temporary function*	Project initiation, planning, execution, monitoring, control, and closing. Manage project.	Specific major project – reports directly to Business Unit PMO	Develop project operational plans and budgets and authorize adjustments. Manage, control, and report project progress.

Project Office One per project *Temporary function*	Project initiation, planning, execution, monitoring, control, & closing. May include manage project.	Specific project – reports to the project manager.	Prepares and maintains project documentation as directed by the project manager.
Project Support **Organization (PSO)** *Normally Temporary but may be* *Permanent function*	Support administratively, project initiation, control, planning, execution, monitoring, and closing. Project controls function.	One or more Specific projects – reports to various project managers or a business unit manager.	Report project progress and status
Project Management Center of Excellence (PMCoE) *Normally Permanent function*	Establish, document, and promulgate project business management standards, methodology, practices, tools, training, templates, education, and PM competency.	No projects – Administrative function reports to management at the enterprise, division, or business unit level as applicable.	Maintain, update, and disseminate the project business management methodology, practices, tools, and project management communications such as status reports, intranet website, and dashboards.

Table 5.1: Different PMO Framework (Source: Bolles & Hubbard, 2015))

Table 5.1 illustrates different PMO framework within different organizational structure, Roles, Responsibility, Accountability and Authority (RRAA) Matrix. The framework of the PMO can be explained further under different topologies.

5.1.1 First Topology of the PMO

Englund, Graham and Dinsmore (2003) propose three PMO frameworks:

- **Project Support Office (PSO) -** involves in providing internal consulting for project management activities, including planning, scheduling, management tools and documents that facilitate speedy execution of projects in the organization.

- **Project Management Center of Excellence** - ensures adoption of up-to-date methodologies and skills in project management such as the standardization of processes, identification of best practices and training, etc.

- **Program Management Office -** advocates for total authority over assigned portfolio with extended responsibilities over recruiting, training and developing the project managers, and align the executable projects to the corporate strategy.

5.1.2 The Second Topology of the PMO

Kendall & Rollins (2003) propose four PMO frameworks in project development and implementation.

- **Project Repository** where the emphasis is for the organization to adopt appropriate tools and data in project design, reporting and managing projects.

- **Project Coaching** which provides the project managers with trainings, mentoring and other professional development assistance to enhance the project managers' ability to implement projects successfully.

- **The Enterprise PMO** oversees all projects in the organization regardless of the size and ensures all projects are executed in line with the business culture.

- **The Deliver Value Now PMO** provides support services to the enterprise portfolio management process.

5.1.3 The Third PMO Topology

This topology was developed by Letavec (2006), he proposes three models of PMO.

- **The Consulting PMO** directly monitors organization projects by getting involved in an advisory capacity to manage the organization's projects.

- **The Knowledge (Strong) PMO** serves as the organization knowledge base that build the organization project management best practice while coordinating the central body that supervise all project and program in the organization.

- **The Standard (Blended) PMO** provides organization with trainings, mentoring and development on the best project implementation process and standards, often referred to as center of project expertise.

5.1.4 Fourth PMO Topology

This topology was developed by Desouza & Evaristo (2006) who developed four PMO models in project implementation.

- **The Supporter PMO** provides support to the project managers by providing information regarding the project risk, project prospects, challenges, and maintain-

ing project archives. The supporter PMO takes no responsibility for the success or failure of the project because it has no direct control over the project.

- **The Information Manager PMO** furnishes up-to-date information regarding the resources required to ensure effective project implementation and report the progress of the project.

- **The knowledge-intensive PMO** plays more of administrative responsibility but lacks control over the project or has minimal control over the project.

- **The Knowledge Manager PMO** like the Standard Blended PMO, provides mentorship, trainings and coaching of the project managers on best practice in project management.

5.1.5 Fifth Topology of the PMO Framework

Developed by Hill (2008) who proposes five models of the PMO that represents progression in project management.

- **The Project Office** provides information and capabilities to ensure competence and professionalism in the implementation of project.

- **The Basic PMO** deals with multiple projects oversight and controls the aggregate oversight of multiple projects relative to the performance of project managers.

- **The Standard PMO** provides centralized oversight and controls multiple projects that involve multiple project managers. Here the PMO has control over the project managers and urge them to conform to best practice.

- **The Advance PMO** is a better version of the standard PMO as it is more interested in ensuring the project management conforms to the organization strategy, objectives and the overall business goals.

- **Project Management Centre of Excellence** focuses on the overall strategic business interests of the organization. As such it has access to the CEO of the organization and influences organization decisions.

5.1.6 The Sixth Topology of the PMO

Crawford (2011) developed three frameworks of the PMO.

- **The Project Control Office** emphasizes that PMO should generally handle complex projects but usually just focus on a single project at any point in time and does not engage in multiple projects at a time.

- **The Business Unit PMO** handles multiple projects of different sizes and scales or short-term initiatives that require a few resources.

- **The Strategic Enterprise PMO** coordinates ongoing project portfolio among multiple departments. This PMO is mostly associated with large organization with multiple business units and portfolio where the need to constantly prioritize projects cannot be overemphasized.

5.1.7 The Seventh Topology of the PMO models

Project Management Institute (2013) developed five PMO frameworks.

- **The Project Specific PMO** provides project related services as an entity established to provide support for specific projects and programs.

- **The Business Unit PMO** specializes in providing project related services to various business units in the organization, which include the portfolio management, the operational project support and human resources utilization.

- **The Project Support Office** employs the tools and practices established by the organization to provide administrative support to the project manager.

- **The Enterprise PMO** ensures the alignment of project management with the corporate strategy in the execution of projects as well as provides real time information on project management best practice.

- **The Project Management Centre of Excellence** provides the organization with tools and techniques that employ the best methodologies and standards to enable the project managers deliver projects seamlessly.

5.1.8 The Eight Topology of the PMO

The most recent topologies in the PMO model are those provided by Bolles & Hubbard (2015) who developed five models of the PMO.

- **Project Office PMO** (single project) and Project PMO (major project).

- **The Project Support Office** provides administrative support services to the project managers involve in project execution.

- **The Division PMO or Business Unit PMO** provides business managers across the division and the business unit with information on best practices.

- **The Enterprise PMO** provides information to the project managers and business managers on enterprise wide basis to facilitate project execution.

- **The Project Management Centre of Excellence** provides the project managers with established project management standards, methodology, practices, education, training, development coaching of project management best practice enterprise-wide.

From the various topologies of the PMO framework by different authors discussed in this section, the most common model of the PMO the world over are; Enterprise PMO, Project Management Center of Excellence, Project Office and Project Support Office.

The summary of the topologies and various models of the PMO are summarized in Table 5.2 below.

Authors	PMO Model	PMO Model	PMO Model	PMO Model	PMO Model
Englund, Graham & PC Dinsmore (2003)	Project Support Office	Project Management Center of Excellence	Program Management Office		

Kendall & Rollins (2003)	Project Repository	Project Coaching	Enterprise PMO	Deliver Value Now	
Craig Letavec (2006)	Consulting PMO	Knowledge (Strong PMO)	Standards (Blended PMO)		
Kevin Desouza & Roberto Evaristo (2006)	Supporter	Information Manager PMO	Knowledge Manager PMO	Coach PMO	
Gerard M. Hill (2008)	Project Office	Basic PMO	Standard PMO	Advanced PMO	Project Management Center of Excellence
J K Crawford (2011)	Project Office	Business Unit PMO	Enterprise PMO		
PMI (2013)	Project Office	Departmental /Business Unit PMO	Project Support Office	Enterprise PMO	Project Management Center of Excellence
Dennis L. Bolles & Darrel G. Hubbard (2015)	Project Office /PMO	Project Support Office	Departmental /Division /Business Unit PMO	Enterprise PMO	Project Management Center of Excellence

Table 5.2: Topologies of PMO Framework (Author schematization)

5.2 Risk Management Methodologies in Practice

Global business environment is dominated by incessant quests for innovation in product, production process, IT development, financial management, project implementation, human resources optimization, etc. The perennial search for advanced methods has created ever-increasing opportunities for business owners and investors alike as they make considerable efforts to create value. As corporate leaders navigate the changing socio-economic, political, informational and technological business landscape, they face severe uncertainties which create potential risk portfolios such that if poorly handled can cripple the organization.

Corporate leaders are beginning to appreciate the urge to focus on the emerging needs of the organization with regard to business risk management through efficient portfolio management (Beasley, Branson & Hancock, 2017). Beasley et al (2017) argued that several organizations are recognizing the value that a structured focus on managing the emerging business risks can bring to the organization. Most corporate leaders are strengthening the organization processes that enable the identification, assessment, management, monitoring and evaluation of risks that are likely to impact the organization strategic plans negatively or otherwise. Some corporate leaders have adopted the concept of "enterprise risk management" (ERM) to help them strengthen their enterprise wide risk oversight.

Corporate leaders have been managing business risks for decades, but ongoing developments, most especially advancement in information technology brought about a new set of business risk that require enterprise risk management approach to mitigate the

risk using top-down approach so that risk can be managed in a holistic manner with an enterprise-wide management lens for the organization to achieve its strategic objectives. While business risk and the concept of risk management have been topical issues over the years, several authors have made considerable efforts to justify their definition of risk and risk management, making it difficult to adopt and embrace an all-encompassing definition.

Different authors on risk management not only justify their definition but also provide different optional processes in managing the risk. Samson (2009) argued that risk management is wide and difficult to apply in all organizations in the same format and procedure. It is important to give an insight into the meaning of risk in itself before trying to understand the concept of risk management and the various risk management models in practice. Of course, risk and uncertainty are twin words that are commonly confused in the corporate environment.

Samson (2009) argued that even risk management practitioners often find it difficult to differentiate risk and uncertainty. Risk is measured in terms of the probability of occurrence of an event multiplied by the associated consequence. For instance, if we can calculate the potential damage exposure can do to a new organization, then we should be able to estimate the amount of resources required to control it. Risk represents a situation where probability information about an event occurring is available, which makes risk more objective. Though risk can be subjective as well, in a situation where an individual subjectively assigns probability to an event occurring or not occurring. Different people define risk in different ways. Some people would say that the probability of occurrence of

an event reflects uncertainty, and that in contrast risk also has to do with the severity of the consequence of the uncertain event.

However, uncertainty in the sense of Knight (1921)[2] is an extreme case of risk and it is a situation where the probability of an event occurring is not available. It involves making decision for events that we do not have any experience or enough information as well as event that have never occurred before in the past. In attempt to differentiate risk and uncertainty, Cleden (2009) argued that uncertainty is unpredictable and unforeseeable event while risk is foreseeable and predictable events before they occur.

Risk can be classified in several ways and forms, few of the classes of risk include:

Business Risk

This is the type of risk associated with fluctuation in products, business process, and innovation in product design among others. This type of risk often affect business performance due to occurrence of an event that could be in the form of competitor's product development, brand re-design among other related factors.

Credit Risk

This is among the oldest form of risk known and likely the most common risk predominant in the world today (Broll, et al., 2002). It is the risk associated with possibility of default by funds borrower based on the agreed terms with the lenders. Banks and other financial institutions often face this type of risk. The greater the risk the higher the

[2] Knight, F. H. (1921). Risk, uncertainty and profit. Houghton Mifflin Company, Boston, New York,.

premium or interest charge on the loan by the financial institution, thereby leading to an improvement in the net-interest margin (Hanweck and Ryu, 2004).

Equity Risk

This kind of risk is often associated with equities held by banks. The risk occurs due to adverse changes in equities in the market, the higher the risk the higher the returns on the equity otherwise organization will not invest in it.

Operational Risk

This risk is associated with the possibility of a break down in the machine used in the operational process. The risk is associated with equipment and management failures, competitors' actions and natural disasters (King, 1998). Technological error that may occur in the production process is also considered and classified under operational risk.

Market Risk

This risk is common to every quoted company in the stock market. According to Hanweck and Ryu (2004), this kind of risk occurs as a result of adverse movement and fluctuation in the financial market interest rates and exchange rate, bond, equity and commodity prices.

Money Laundering

Corporate organizations often face this type of risk on a daily basis and constantly work toward minimizing the risk. This risk is associated with obtaining money illegally, such as accounting fraud, drug dealing, corruption, tax evasion and others.

Information Technology Risk

As much as the IT has solved several complex problems, it has equally created some risk contents the corporate leaders try to contend with. The most common IT risk includes network failure, skills-gap, hacking, virus attack and poor systems integration.

Human Resource Risk

This risk is associated with not employing the right human capital, which is prevalent not only in the power sector but also in Nigeria. Other common risk associated with human capital includes inappropriate means of recruitment, failure to provide feedback to the employees on performance, over-reliance on key personnel, inappropriate training and development, etc".

5.3 Concept of Risk management

Several authors have provided insights into risk management as a concept and how it can be applied in managing organization resources and project portfolio. Smith et al. (2006) argued that risk cannot be used as tool to predict the future occurrence, but should be perceived as a tool that improves project decision making based on the available information on the investment thereby improving the ability of project managers to make complex decision. Like every other management concept, risk management has been defined in terms of its scope but the import remains the same.

For instance, Cooper et al. (2005) argued that risk management process involves systemic application of management policies, processes and procedures to the tasks of establishing the context, identifying, analyzing, assessing, treating, monitoring and communicating risks potential and status to the stakeholders. Cooper argued that risk management could better be understood from the risk management process in project implementation. (Smith et al., 2006) cautions that all steps in risk management process should be completed sequentially when dealing with risk mitigation so as to efficiently implement the process in the project. There are several models of risk management practice, but the common models are those described in the framework presented in Figure 5.1 below. The principles described in the risk management process presented below illustrate the dynamism of risk management in the PMO.

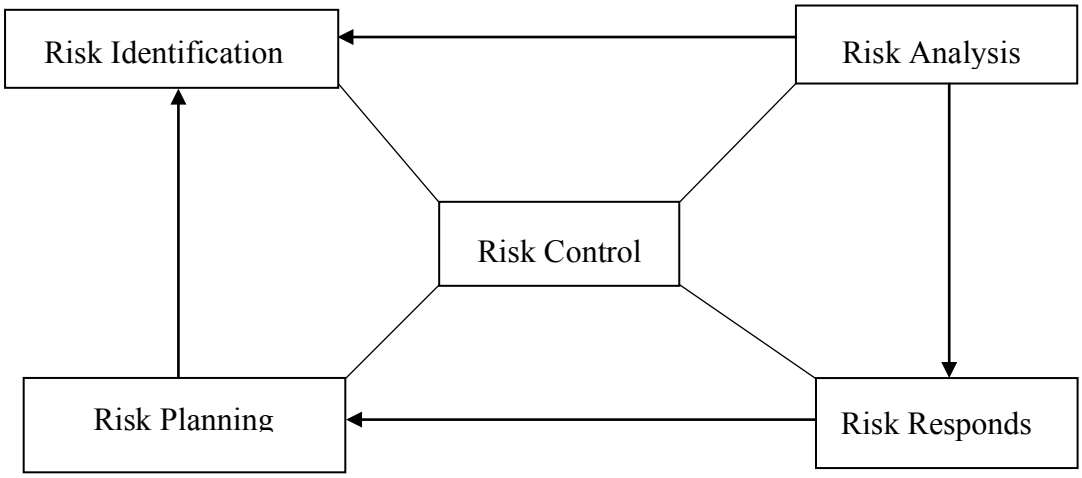

Figure 5.1 Structure of a Risk Management Process
Source: Author Schematization based on PMBOK and Smith et al. (2006) work.

Benefits of Risk Management

Risk management is really not resource wasting for the organization given the associated benefits derivable from its effective management over time. Risk management is

not only beneficial to the project itself but also to the stakeholders involved in managing the project. One distinguishing benefit of risk management is a clear understanding of the potential completion risk inherent in a typical project. Thomas (2009) on the benefit of risk management argued that, risk management is the increased level of control over the whole project and more efficient problem solving processes, which can be supported on a more genuine basis.

Different organizations attitude toward risk can be explained as cultural differences where the approach depends on the company policy and their internal procedures (Webb, 2003). Three organization's approaches can be distinguished to explain the attitudinal differences among organization toward risk.

- The first is the risk-neutral firm that does not invest much in risk management but is still aware of the most important risks.

- The second approach is the risk-averse, where no investments are made to reduce the probability of occurrence.

- The last one is the risk-seeker where the organization is prepared to face all risks and is often called a gambler. In the long term, the risk-seeking companies may be more profitable than risk-neutral firms because of the large investment opportunities, which also come with huge losses if risk management process is neglected.

5.4 PMO Critical Success Factors (CSF)

It is essential for project managers and the PMO facilitators to identify their Critical Success Factors (CSFs) that serve as bases of measuring performance in project execution. CSFs are required key fundamentals and processes that must be performed if the project implementation goal must be achieved. It helps the PMO and the team to have a common reference point and identify with the most important factors to enable them work together to achieve a common goal. The following are the basic CSFs every PMO should put into consideration:

1. **Standards**: The PMO acts as either a support or control on the project managers but in either case, the aim is to provide the project managers with standard, methodologies, model and principles that are consistent with best practice in alignment with the organization strategy. As such, the PMO acts as a watchdog, adviser and instructor in project management within the organization. Thus the PMO ensures consistency in project management and implementation practice, since the more the deviation from the established standards, the more difficult it is for the organization to measure the success of each project.
2. **Policies**: There should be a set down rule governing the project managers and the PMO. The PMO monitors how projects are executed within the organization and the deviation that occurs. It should be noted that PMO should not act as a source of excess rigidity in the organization, certain level of flexibility should be encouraged within the organization based on the set down organization principles. The

PMO facilitates the adjustment of policies relative to the organization in the process of project development and execution.

3. **Training**: one of the cardinal functions of the PMO is to provide trainings, coaching and mentoring to the project managers and the organization staff on best practice in project management. As with any other entity, the PMO facilitates constant learning process that aids the efficient management of the organization resources over time. Thus, the PMO should have a platform where the project managers, stakeholders and team member can access information.
4. **Resources**: This depends on organizations management structure. The PMO can actually be directly involved in providing resources for the project managers especially in the Project Management Center of Excellence. Depending on the nature of the organization and how it is structured, the concept of managing and providing resources to projects could be part of the PMOs overall remit. The extent the PMO directly involve in the management of the project resources however depends on the organizations structure.
5. **Processes**: The process and how a project implementation is controlled is arguably the most important role of the PMO. While standards and policies provide essential baselines for the project managers in the PMO, a well-designed process in the project delivery is highly essential for the success of the projects in achieving the organization strategic goals the projects were designed to achieve. The PMO should often aim at providing project management process that is scalable and flexible enough to accommodate project manager initiatives and contingencies

that allow the teams to work semi-autonomously in the quest to achieve the organization goals and objectives.

5.5 Evaluation of PMO Impact on Corporate Performance

The importance of bridging the gap between organization strategic planning and implementation brings about the concept and relevance of the project management office. Rohm et al. (2013) emphasized that organization project portfolio should be properly aligned with the corporate strategy. Crowford, Hobbs & Turner (2006) stressed that organizations have realized the importance of the PMO in actualizing and aligning organization strategy with projects portfolio, which indicates the potential role the PMO plays in efficient delivery of strategic plan in the organization. Schmidt (2009) noted that most of the time corporate strategy seems to be fairly abstract leaving project and program managers in the PMO to wallow in darkness.

Organizations have long recognized the role of strategic planning in realizing the organization goals and objectives. Nevertheless, the exercise is futile except these plans can be successfully implemented since not executing the right strategy right is not any different from executing the wrong strategy. This propelled Charan & Colvin (1999) to argue that most organizations do have strategic plan but the problem is the effective execution of the strategies. Statistics on failure of strategic plan are illuminating:

- Fortune Magazine, noted that less than 10 per cent of business strategic plans are effectively achieved.

- Australian Institute of Company Directors argued that 70 percent of failed CEOs is not because of wrong strategy but because of poor execution of the right strategy.
- McKinsey noted that 28 per cent of CEOs surveyed argued that their organizations formulate strategic plans that reflect organizations objectives but not effective.
- PwC argued that about 2.5 percent of organizations have 100 percent strategic project on time, within budget and scope estimated to deliver the project benefits.

Abeni (2017) therefore argued that the PMO is strategically positioned to facilitate the achievement of the organization strategic plan by coordinating, facilitating and disseminating information on best practice in portfolio management required to execute the strategic plan. The PMO leaders often develop some core set of best practices that deliver consistent results to enable the organization achieve the business objectives.

Schmidt (2009) identified some core role of the PMO in implementing organization strategic plans:

- **Develop a Clear Strategic Vision:** Organizations are created to solve particular problems by adding value and once they do, they succeed. Through project, programs and portfolio evaluation, the PMO assists the management to visualize the feasibility of their ideas.

- **Consistent Business Practice:** Successful PMO leaders understand and build a consistent model and well-designed approaches that are easily understood, useful and adaptable to any project, which ultimately allow the executive to effectively execute, communicate progress, make business projections and sound decisions.

- **Facilitate Organization Change:** The PMO leaders are aware that change is difficult even in the best circumstances but can be mitigated through proper corporate evangelism, education and model.

- **Managing the Brand:** The PMO leaders understand that getting the job done does not differentiate the organization from others, rather what differentiates is the brand and innovative ability in product, project, process, production, etc.

Similarly, Desouza & Evaristo (2006) identified the role of the PMO managers in ensuring the projects comply with the organization three strategic targets which includes:

1. **Organization Strategic Goals:** The PMO leaders ensure that the projects being executed by the organization are aligned with the organization strategic goals and objectives. The PMO leaders should equally ensure that the PMO staffs are fully aware of the organization goals and objectives that guide the PMO leaders to prioritize resources in project implementation.

2. **Organization Strategic Growth:** The PMO leader ensures that the approved projects facilitate the strategic direction of the company.

3. **Development of Effective Knowledge Management:** The PMO leaders facilitate the development of procedures, tools, templates and techniques of project management by developing means of effective professional knowledge transfer among the PMO team and the organization staff.

Abeni (2017) explains the role of the PMO in meeting and implementing the organization strategic plans, noted that various steps are involved in aligning the organization projects portfolio with its strategy. It is important for the PMO leaders to be well guided by following best practices in portfolio management to implement the organization strategy.

The emergence of a new order in business and organizational management and leadership sprouted the importance of the PMO on a global scale. The ongoing innovative thought leadership in organizations in the last decade created an unprecedented and an enabling environment for the institutionalization of the PMO. The PMO is now being established in many organizations while several others are planning to follow suit. The Project Management Institute (2000) confirms that project management helps organizations meet their customers' needs by standardizing routine tasks.

The PMO ensures available scarce resources are used in the most effective and efficient manner to improve corporate performance by being methodical in prioritizing portfolio investment. Van der Linde and Steyn (2016) opined that the establishment of the PMO gave rise to the tools and methodologies to support project portfolio management to deliver the strategic business goals. The implementation led to the emergence of the project management office specialists where engineers are functional multi-taskers combine both project management and engineering responsibilities.

The PMO ideally help the organizations to identify some inherent challenges and structural imbalances in organizations' strategic direction, business culture and corporate values, thereby helping organizations to re-adjust its objectives, strategy, structure, process and ideologies that may hinders organizational success (Hurt & Thomas, 2009).

Zhai, Xin, & Cheng (2009) developed a mega project management value framework built on value addition to four key project stakeholders; enterprises, customers/clients, subcontractors/suppliers, and the community. They developed basic framework that incorporates value addition to the above four stakeholders in PM process:

1. Develop factors that improve the performance of the project; minimize cost, reduce project duration and improved quality.

2. Improve enterprise competencies through the deployment of enhanced project management capability in project portfolio management, knowledge managements, improved technology innovations, and organization transformation.

3. Increase organization revenues inflow through broadened global business opportunities.

4. Strives to improve customer relations via better customer communications, growing satisfied customer, and strong customer loyalties to attract new customer.

Hurt & Thomas (2008) concluded that the PMO value to the organization is measured by:

1. Project manager satisfied with its application - the organization key stakeholders believe that the PMO provides value.

2. Adhered to project management practices - project management implementation resulted in the desired processes and outcome. Can be ascertained through measurement of PM adherence to policies, principles, procedures and practices.

3. Perceived to improve the PM process - management sees the opportunity for the PMO to improve project management (PM) process through a number of initiatives geared toward organization change, budget performance and organizational learning.

4. Improved business outcomes – the PMO delivers project portfolio effectively to satisfy customers, retain customers and attract new customers.

5. Improved returns on investment – the PMO improves portfolio management process and achieve cost minimization, which add up over time in addition to maximize revenue from well executed project portfolio.

Trans (2016) pointed out several areas where the contributions of the PMO in organizations are noteworthy:

- Consistency in project portfolio delivery strategy

- Clarity on the progress of project portfolio helps top management to have a basic information on the portfolio to make spot decisions

- Ensure quality via constant review of project deliverables and outputs to ascertain that outputs are complete and delivered based on accepted methodology

- Predictable delivery timeline and costs forecast and estimated resource requirement enable agility and foresight for long-term planning

- Accountability is reinforced based on clearly defined functions and responsibilities. Teams are held accountable for delivery and realization of project outcome

- Efficient investment management where efforts and resources are directed toward the right prioritize initiatives to ensure that only projects that contribute to the organization's strategic objectives are executed

- Resilience by running 'what-if" analytical scenarios to ensure that mitigation or exploitation strategies are well leveraged to manage risks and opportunities.

The PMO acts as a communication and strategic execution bridge between organization management and project portfolio leaders and also, between strategy planners and strategy executors. The PMO is a vision-driven strategic business partner, an integrator and a catalyst for organizational change and drivers of business success.

Chapter 6: Data Analysis and Interpretation

6.1 *Overview of Methodology, Objectives & Questions*

The specific objectives of the study are:

1. To examine the drivers and facilitators of initiating value engineering in the PMO.
2. To understand the theme surrounding value engineering adoption in the PMO.
3. To ascertain factors constraining the successful adoption of VE in the PMO.
4. To examine the prerequisites for the adoption of VE in the PMO.
5. To examine the role of value engineering as a risk management tool in the PMO.

The objectives above helped the researcher to pose the question: To what extent can value engineering decision making process be applied as a risk management tool in the project management office to make efficient investment decision? The overall question that guides the research is decomposed into the following specific questions.

1. What are the drivers and facilitators of initiating value engineering in the PMO?
2. What are the themes surrounding value engineering adoption in the PMO?
3. What are the factors constraining the successful adoption of VE in the PMO?
4. What are the prerequisite for the adoption and implementation of VE in the PMO?
5. To what extent is value engineering a risk management tool in the PMO?

The method of data collection has been discussed in chapter three. Of the 80 questionnaires administered 64 were correctly filled and returned which represent 80 percent of the total questionnaires administered.

With regard to the ideal response rate that can be accepted as sufficient for analysis in engineering management and social sciences, Richard (2005) maintained that the response rate is dependent on several factors including but not limited to the kind of instrument used in the data collection whether it is through electronic or a face-to-face. The author noted that a 60 percent response rate is acceptable in a face-to-face questionnaire distribution.

However, Moser and Kalton (1971) are also of the opinion that a survey response rate is considered significant if it is not lower than 30-40%. Going by the foregoing arguments this research is perceived to have achieved an acceptable response rate that is sufficient to make analysis. The collected questionnaires were coded to ensure efficiency and efficacy.

This chapter presents the data collected and describes the quantitative techniques of descriptive statistics applied to the data.

Overview of the Respondents.

This section presents an overview of the characteristics of the respondents for better understanding of their background in education and experience. Figure 6.1 sets out the gender distribution.

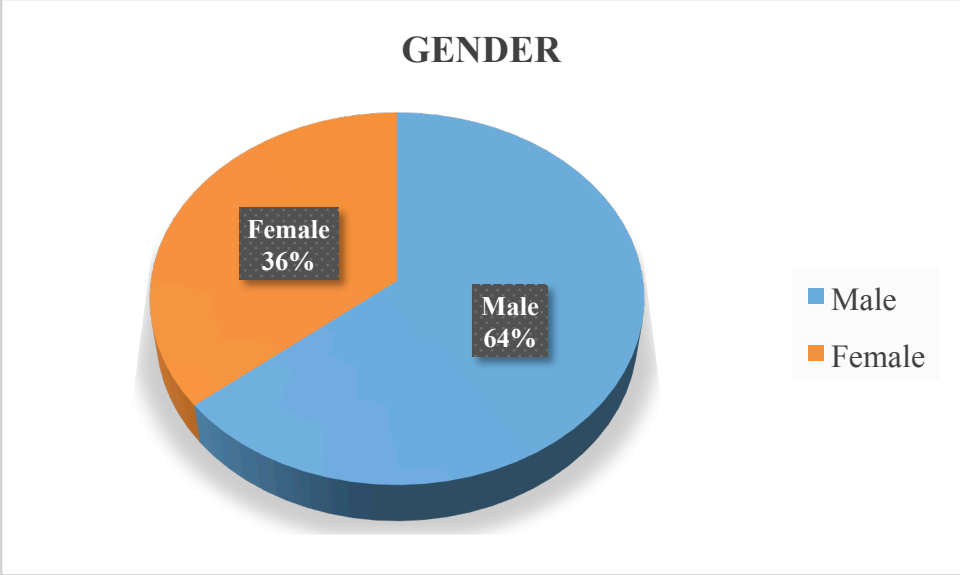

Figure 6.1: Gender Distribution of Respondents

41 (64%) of the respondents were male while 23 (36%) were female. This male majority in the sample reflects the broader numerical dominance of male employees in the electricity distribution subsector. Our findings collaborate with the findings of other researchers who have investigated gender roles in project management (Mulenburg, 2002; Rudman & Phelan, 2008; PMI, 2010).

For instance, Mulenburg (2002) argued that there is male dominance in project management with about 68% to 32% male-female project managers. Smith (2002) argued that the possible reason for male dominance includes differences in investment on education, trainings, and hours worked and work experience. Similarly, Rudman & Phelan (2008) argued that women project managers face the negative perception of over-ambition and self-promotion.

Project Management Institute (PMI) has conducted surveys to affirm the dominating gender ratio of males to females in project management. According to PMI member-

ship survey in 2008, the gender breakdown of membership is 70 percent male and 30 per cent female. PMI 2008 professional pulse survey revealed that 32 percent of professional project managers are female and 68 percent are males. Although, male professional has been taking the lead in project management over the decades, however more women are assuming greater responsibility relatively recently (Mulenburg, 2002; Neuhauser, 2007).

The PMI (2010) survey of top five project management industries as presented in Table 6.1 below revealed male dominance in all the industries. The study indicates that in each of the industries, the male counterpart dominates the female in project management and execution, which also corroborate with our findings in the research.

S/N	Industries	Percentage of Male	Percentage of female	Total
1	Construction	93.5%	6.5 %	100%
2	Power Sector	71%	29%	100%
3	Financial Industry	52%	48%	100%
4	Information Technology	68.6%	31.4%	100%
5	Telecommunication	72.3%	23.7%	100%

Table 6.1: PMI Study of Project Managers Genders in Five Industries

Respondents' ages are shown in Figure 6.2.

Figure 6.2 sets out the age distribution of the respondents.

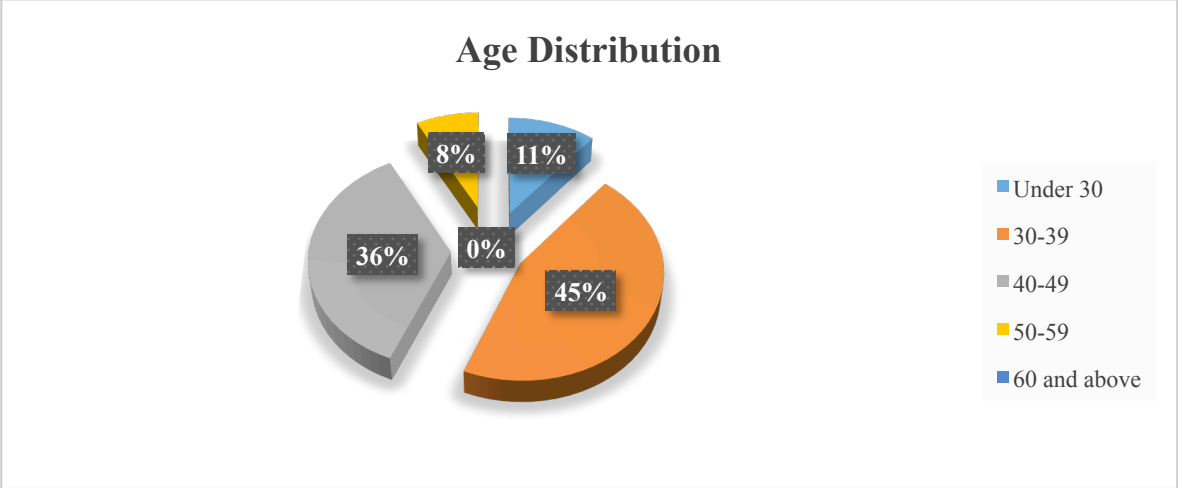

Figure 6.2: Respondents Age Distribution

The results indicated 7(11%) of the respondents' ages are below 30 years. 29(45%) are between 30-39 which represents the majority of age distribution of the respondents. About 23 of the respondents representing 36% are of age between 40-49. The finding revealed that 5(8%) of the respondents' ages were between 50-59 while none of the respondents' age was 60 years or above. Given that majority of the project managers sampled are age between 30-39, one might argued that most of the respondents are young project managers who are still grasping with the concept of value engineering in managing risk in the PMO. Data from the two electricity distribution companies (Kano Electric and Abuja Electric) revealed that the PMO was introduced in 2014 and 2017 respectively.

Most literature on project management and execution see age as a passive factor in project management, that is, age does not matter. For instance, Kaufman (2014) argued

that an organization could employ any staff regardless of age bracket to ensure a good talent is not pass over or missed out and should consider integrity and ability rather than age. The present findings seem to differ from the findings of Kaufman (2014) as the data revealed that project managers are of variety of ages and dominated by age range 30-39 years. The fact that none of the age respondent is above 60 years indicates further that project management and the PMO are still dominated by young employees.

The next question sought information on respondents' years of experience and the result of the finding is as presented in figure 6.3.

Figure 6.3 shows respondents' years of experience distribution.

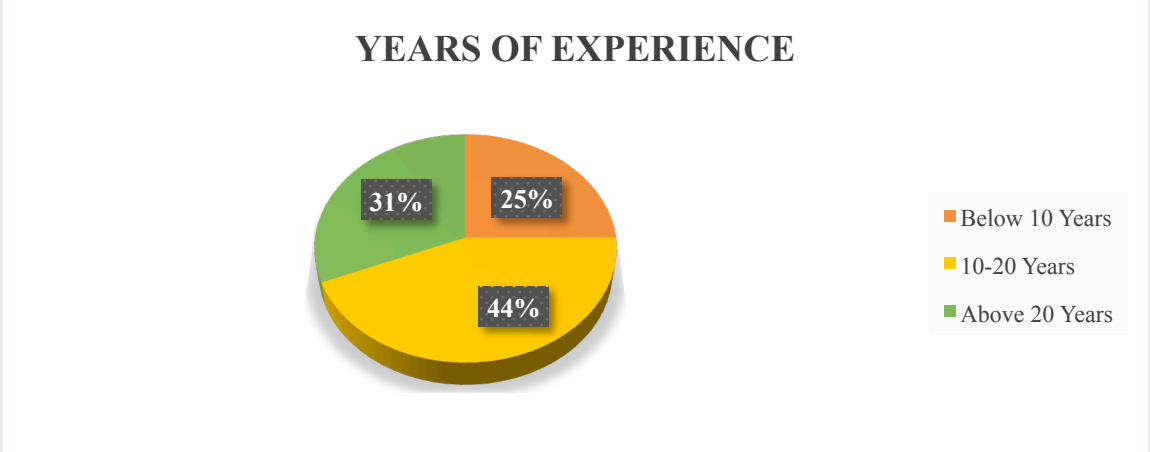

Figure 6.3: Respondents Years of Experience with Electricity Distribution Company

Figure 6.3 presented the years of experience of respondents in project management. The finding revealed that 16(25%) of the respondents have below 10 years of experience in project management; 28(44%) of the respondents being the majority have between 10-20 years' experience and 20(31%) have above 20 years of experience in project management. Spontaneously, one can conclude that young employees with fair experience dominate the project management office in both organizations. However, consider-

ing the fact that age has a strong correlation with years of experience, the research concludes that more experienced employees made themselves readily available to respond to the research questionnaire.

The findings revealed clear evidence of the role years of experience plays in project management given the fact that most of the respondents have 10-20 years of experience in project management. Earlier researchers like Huckman, Staats & Upton (2008) argued that "repetition breeds competence", meaning that experience plays important role in adopting the PMO. The authors noted that repetition in work plays a significant role in organization learning curve and individual routine learning in general. Zollo & winter (2002) argued that the key facilitator in project managers' performance is cumulative experience. The research argued that the more projects the project manager has executed holding other factors like cognitive ability, enthusiasm, education, interpersonal traits etc. constant, the better his performance in planning and executing a project going forward.

Han-Ping (2015) is of the view that most project managers understand there are more than one way to perform a task and argued that project managers know how to apply the accumulated project management knowledge, skills and processes to achieve a particular outcome.

The next question sought information on respondents' education highest qualification and the result of the finding is as presented in Figure 6.4.

Figure 6.4 sets out this education qualification distribution.

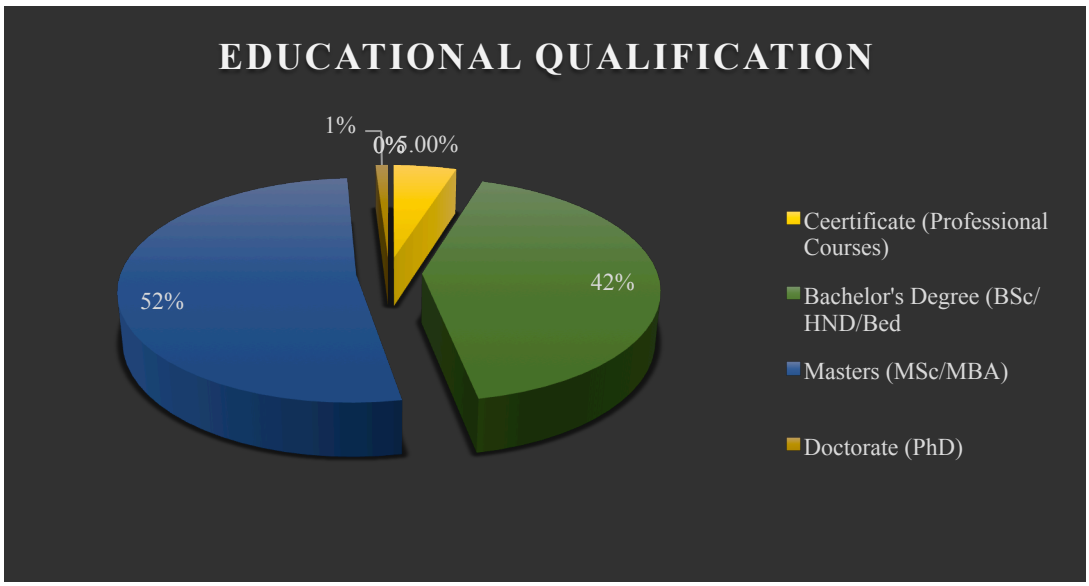

Figure 6.4: Respondents Highest Educational Qualification

Figure 6.4 shows the educational qualification of respondents to ensure that the respondents are able to provide the study with well-informed responses. About 27(42%) of the respondents are degree i.e. Higher National Diploma (HND) and BSc holders; the finding reveals the majority of the respondents highest educational qualifications are MSc/MBA holders 33(52%); none of the respondents is a high school certificate holder or OND/NCE (Ordinary National Diploma/National Certificate of Education) holder, and another 3(5%) are professional certificate holders such PMP or Prince2 while 1(1%) of the respondent is a PhD holder.

One can conclude that MSc/MBA certificate holders dominate the PMO of the two electricity distribution companies where this study was carried out, given that the group has the largest project managers that participated in the survey. From the distribution here, it could be deduced that based on the educational qualification, the respondents have the tendency to provide the research with well-informed answers because the majority of the respondents have MBA/MSc with 10-20 years of experience.

Although, literature is limited regarding educational qualifications of project managers, the PMO team and their performance on projects. However, a survey by PMI (2008) revealed that a PMO team with more highly educated members (advanced degrees) performs better than a team with more average educated individuals. This study has sufficient evidence to conclude that educational qualification plays a significant role in the adoption of the PMO or successful integration of value engineering in the project management office.

6.2 *Analytical Framework for Introducing Value Engineering in the PMO*

This section evaluates the factors that facilitate the introduction of value engineering as risk management tool in the PMO. The data from section B of the questionnaire were employed in the analysis. The questionnaire is provided in Appendix I.

As stated in chapter three, the research employed a Likert scale of five points with a benchmark mean set at 4 on a scale of 1 to 5 to ensure consistency with the research instruments. i.e. 1= strongly disagree, 2= disagree, 3 = neutral, 4= agree, and 5 = strongly agree. As such, every item with a mean above 4.0 is regarded as important or otherwise not important as shown in table 6.2 below.

Thus strongly agree is 5, while strongly disagree is 1.

S/N	Category	Point	Cumm. Point
1	Strongly Agree	5	5
2	**Agree**	**4**	**9**
3	Undecided	3	12
4	Disagree	2	14
5	Strongly disagree	1	15

Table 6.2: Likert Scale

An item whose mean-point is well above average, benchmarked at 4.00 was regarded as important in driving the introduction of value engineering (indicating positive) while any response whose mean-point is below the benchmark was regarded as unimportant for the introduction of value engineering (indicating negative) as a risk management tool in the PMO.

Table 6.3 revealed the respondent responses on the factors driving the introduction of value engineering as a risk management tools in the PMO at both Kano Electric and Abuja Electric. From Table 6.3, it was clear that all the variables measured in the data collection instrument revealed positive influence in the introduction of value engineering in the organization except for the question that sought to know whether there are available well-trained personnel as facilitators in the VE workshop, which was rejected by the respondents. The responses of the respondents revealed that lack of qualified personnel is a major hindrance. This was ascertained from the mean score that is below 4.0 showing that more of the respondents did not believed that there are available qualified personnel to facilitate the introduction of VE in the PMO. Similarly, the open-ended question responses revealed that lack of qualified personnel with sound knowledge of VE limits its introduction in the PMO.

This means that value engineering as a risk management tool in the PMO still lacks well-trained personnel because of lack of resources for knowledge management in Africa. This conforms with the earlier findings of Ibrahim (2010) who pointed out among other factors such as lack of well trained personnel, social and habitual resistance to change, legal and contractual constraints, high cost of integrated software for professionals, lack of enabling environment in the form of government policies and legislations are the rationale for the lack of acceptance of value engineering as a risk tool in the PMO. Meera (2013) concluded that VE has suffered from lack of available personnel to adopt the model in the process of managing risks in project management particularly in the engineering organizations.

It was revealed from the data in table 6.3 that the PMO team often embrace value engineering as risk management tools largely due to a common interest in the deployment of VE in the PMO. This was confirmed by the responses of the respondents, which is above 4.0 mean points with a low standard deviation. It was equally observed from the responses that management embraces and support VE as a tool in risk management and will provide a conducive environment for the concept to thrive over time, given that the mean of the question is above 4.0.

Kolo and Ibrahim (2010) argued that stakeholders and decision makers have started to appreciate the importance of introducing value engineering as a risk management tools in project planning and execution, the authors argued that the concept has gained wider acceptance with about 48 per cent increase in the last couple years. The author further argued that organizations understand that value engineering is about designing a sys-

temic way of implementing project that add value to the clients at a minimized cost. Although, Jagun (2006) noted that organizations or project managers that are risk averse often do not fully embrace the VE concept for fear that it might lead to disruption of the organization methodology and the strategic plans.

Items	Code	Mean	SD	Remarks
PMO clients are interested in the use of the value engineering	B1	4.23	0.52	Important
There is the availability of well-trained individuals to act as facilitators in the workshop	B2	2.57	1.29	Unimportant
There is general awareness by the stakeholders on the benefits of the VE in the PMO	B3	3.66	0.91	Unimportant
There is excellent and collaborative working relationship among PMO stakeholders	B4	3.84	0.99	Unimportant
There is commitment and cooperation of professional bodies to implement value engineering	B5	3.11	1.29	Unimportant
Other stakeholders have interest/support in the use of value engineering	B6	3.89	0.76	Unimportant
There is conducive project environment to facilitate the introduction of value engineering	B7	4.19	0.64	Important
Management supports the introduction of VE	B8	4.08	0.86	Important
There is appropriate and flexible procurement system	B9	4.23	0.75	Important
Cluster		**3.76**	**0.89**	

Table 6.3: Drivers/Facilitators for introducing Value Engineering

The standard deviation of the responses is infinitesimal, it was observed that the mean of the sample is not far from the mean of the population and hence, minimal error is committed in the data collection process.

The above analysis revealed that PMO clients' interest in VE, the general awareness of the benefit of VE in the PMO by major stakeholders, professional bodies like PMI

growing interest to see VE deployed in the PMO, management support for the introduction of VE in the PMO by providing a conducive environment to launch VE and the flexible application of VE, all play a significant role in the introduction of value engineering in the PMO. While the lack of skilled and well trained personnel or professional is the major factor identified to hinder the introduction of value engineering as a risk management tool in the PMO.

From the discussion so far, we may safely conclude that value engineering is still at its early adopter stage particularly in countries like Nigeria and this is due to lack of qualified personnel to adopt the model in the project management office. Also, the lack of innovative ability of most corporate leaders and project managers equally hinder its adoption as a new strategic tool in managing project portfolio to realize organizational goals. Figure 6.5 captures the framework describing the drivers and facilitators of employing VE as risk management tool in the project management office, as revealed in the data collected by the researcher.

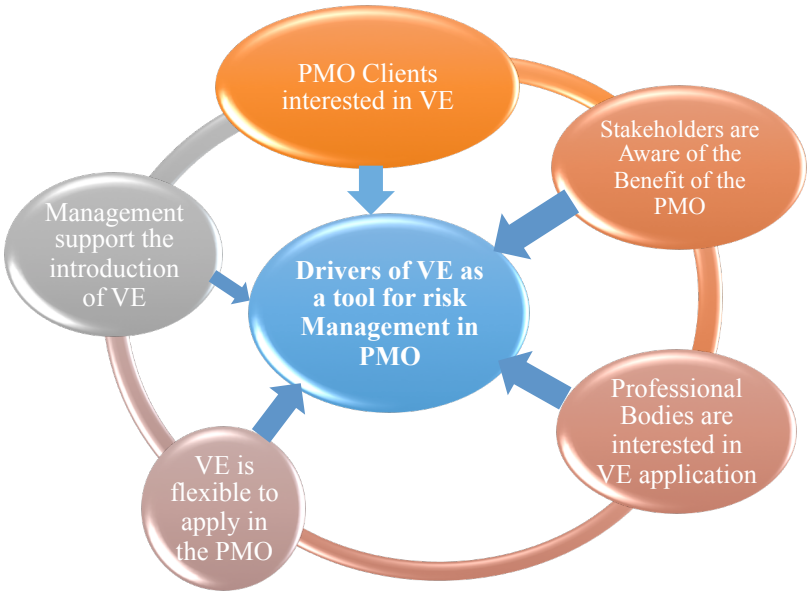

Figure 6.5: Facilitators for introducing VE as Risk Management tool in PMO. (Author Schematization)

6.3 Value Engineering in the PMO - Analytical Theme

In this section, an attempt was made to unravel and discuss the unique features and themes that facilitate the adoption of VE as a risk management tool in the PMO. To enable the discussion of the theme, responses to section C of the questionnaire were employed to facilitate the analysis and discussion. The summary statistics of the unique themes of VE that enable its adoption in the PMO is presented in table 6.4 below. As pointed out earlier, the benchmark mean of the responses is set at 4.0. As such, any response whose mean is above 4.0 is regarded as important (positive) theme that facilitates the adoption of VE in the PMO. While an item or response category whose mean value is less than the benchmark value is regarded unimportant (negative) feature of VE facilitat-

ing its adoption in the PMO. Table 6.4 revealed those unique themes of VE that facilitates its adoption in the PMO at both Kano Electric and Abuja Electric.

From Table 6.4, it was clear that all the variables measured in the data collection instrument revealed positive influence on the adoption of value engineering in the project management office. It could be seen from the table that all the variable means are above 4.0 indicating a strong correlation with the adoption of value engineering in the PMO.

Items	Code	Mean	SD	Remarks
It is function based	C1	4.31	1.01	Important
It involves structured multi-disciplinary team-based workshops	C2	4.36	0.98	Important
It employs a range of analytical tools	C3	4.39	0.88	Important
It involves creative brainstorming	C4	4.53	0.85	Important
It follows a structured Job Plan	C5	4.31	0.83	Important
It is led by a qualified value practitioner	C6	4.34	0.84	Important
It involves customers/end users	C7	4.47	0.50	Important
It causes study team to achieve sustained improvements	C8	4.30	0.81	Important
It uses cost effective techniques	C9	4.53	0.69	Important
Its main aim is to improve function at reduced cost	C10	4.44	0.92	Important
Cluster		4.40	0.83	

Table 6.4: Unique Theme of Value Engineering Facilitating its Adoption in PMO

Table 6.4 presents the mean of the respondent responses regarding whether the fact that VE is functional based, structured multi-disciplinary team-based workshops, making use of wide range of analytical tool, often follow structured job plan, aimed at providing the customer with more satisfaction, improve team performance and goal achievement, aimed at minimizing cost, support team discussion and achievement and ultimately improves function. This unique feature of value engineering has spurred its

adoption in several organizations as a risk management tool in the project management office.

It could be seen further from the mean responses in Table 6.4 that majority of the respondents agreed with the fact that value engineering facilitates the implementation of project in a cost effective manner and allows for brainstorming among the project team on the best approach to execute the project to ensure it never deviated from the organization overall strategic goals and objectives. The research corroborates with the findings of Bones & Law (2000) that identified the theme of value engineering that facilitates its adoption in project management to include; VE involves structured team-based workshop, involves team brainstorming, involves skilled and qualified professionals, its cost effective, integrates customer/supplier needs and involves clear program work.

The authors argued that organizations in the US and Europe have adopted project management methodology that facilitated the implementation of project at a least cost but that will also aid the organization to provide customers with more value for their money. Therefore, value engineering unique features and themes facilitate the achievement of 100 percent success in project portfolio management and its adoption in the PMO.

In a similar faction, the Value Management Guideline, (2004) argued that VE enables creative problem solving, involves key stakeholders in project execution, aims at achieving value addition, emphasizes functional analysis, involves project learning as the major features of value engineering. Our findings upheld the assertion of both Value Management Guideline (2004) and that of Bones and Law (2000) on the unique features of VE that facilitates its adoption as a risk management tool in the PMO.

We may conclude from our analysis that such features of VE like the fact that it aids creative problem solving, involves key stakeholders in project execution, aims at achieving value addition, emphasizes on functional analysis, involves project learning, it is a multi-disciplinary function, implements projects at a minimal cost, among others are the major driving features of value engineering in the PMO. PMI (2013) argued that the PMO facilitates the adoption of best practice principle, process, methodology and policy in project implementation and enables the alignment of the organization strategy with project portfolio implementation in the PMO.

If the PMO facilitates the management systems for the organization then value engineering adoption in the PMO will enhance the realization of identified corporate goals at a minimized cost and well-improved value.

6.4 *Constraints to Implementing Value Engineering in the PMO*

The previous section discussed the factors that facilitate the introduction of value engineering as a risk management tool in the project management office as well as the unique features of VE that aid its adoption in the PMO. In this section, we discuss the constraints hindering the adoption and implementation of VE as a risk management tool in the PMO. Following the assertion of Kelly et al (2004) that value engineering, despite its unique advantages in functional analysis and project implementation still suffers from low acceptance especially in emerging economies. Some of the possible impediments of VE application as a risk management tool in the PMO that militate against its capability in shaping the organization strategy will be reviewed.

The summary statistics of the constraints to the adoption of VE in the PMO is as given in Table 6.5. The benchmark mean response is set as usual, as such, any response whose mean is above 4.0 is regarded as important impediment hindering the adoption of VE as a risk management tool in the PMO. While an item or response category whose mean value is less than the benchmark value is regarded unmportant impediments hindering VE adopting in PMO.

Measured Variables	Code	Mean	SD	Remarks
There exist a lack of awareness or knowledge of Value Engineering.	D1	4.34	0.48	Important
There is organizational resistance to change	D2	4.38	0.83	Important
There is a lack of qualified value engineering practitioners.	D3	4.13	0.88	Important
Wrong belief that value engineering impedes and/or delays projects.	D4	4.02	0.81	Important
There is fear of incurring additional cost due to value engineering.	D5	3.67	0.86	Unimportant
There is a lack of commitment to implement value engineering by the Management.	D6	3.48	0.91	Unimportant
Over-emphasis on cost at the expense of performance and quality.	D7	2.75	0.90	Unimportant
There exist wrong notion that value engineering reduces the project scope.	D8	2.94	1.13	Unimportant
There are difficulties in establishing mutual objectives by all participants	D9	3.38	1.22	Unimportant
There are difficulties in involving all key stakeholders in project processes.	D10	4.30	0.63	Important
Cluster		**3.74**	**0.87**	

Table 6.5: Constraints Hindering the Adoption of VE as Risk Management tool in PMO

The inhibiting factors mean response and standard deviation from the questionnaire is as revealed in Table 6.5. It was revealed from the mean response rate in Table 6.5 that most of the items and/or variables measured were important factors hindering the

successful adoption of VE as a risk management tool except for items D7 and D8 whose mean value are less than the benchmark 4.0. It therefore implies that over-emphasis on cost, sometimes at the expense of performance and quality and the fact that there exist a wrong notion that value engineering reduces the project scope were identified by the respondents as major constraints facing the adoption of value engineering as a risk management tool in the PMO.

Secondly, such factors as lack of awareness of the value engineering in the PMO, lack or minimal amount of qualified value engineering professionals, wrong notion that VE might delay project execution and implementation, fear of incurring additional cost employing value engineering are major factors hindering the adoption of VE in both Kano Disco and Abuja Disco. Other major constraints as discovered from the research include lack of strong commitment toward the implementation of VE in the organization, difficulties in reaching mutual understanding by all the participants and difficulties involving all stakeholders in project implementation are impediments toward successful adoption of VE as a risk management tool in the PMO at both Abuja Disco and Kano Disco.

Kolo and Ibrahim (2010) on the impediments hindering the successful adoption of value engineering in project management argued that lack of qualified professional to facilitate its adoption is the major hindrance to the implementation of value engineering in most construction firms. The researchers noted further that other factors such as fear that value engineering might breed lots of difficulties in its application thereby hindering the project duration, general organizational resistance to change and difficulties in bringing

all the stakeholders to terms are mostly the challenges hindering the successful adoption of value engineering in the project management office.

Sabiu & Agarwal (2016) enumerate several variables that seem to hinder the successful adoption of value engineering in project management. Among the top factors they identified to impede VE adoption as a risk management tool include, poor knowledge of the benefit of VE in management, lack of technical knowhow of VE, not involving specialists and professionals from the outset, poor knowledge of project management and poor technology development. Other impediments are poor information integration, conflict of interest by different stakeholders, government policies in the industry, among other factors do not support the VE adoption in the PMO.

Olanrewaju and Khairuddin (2007) argued that although value engineering and the project management office are gaining the attention of most project management professionals in Nigeria and beyond, its application is still at its infantry stage because of the fact that majority of the stakeholders in project implementation are skeptical of its adoption. They argued that most stakeholders do not see the need for the introduction of value engineering as a risk management tool and prefer to defer to the earlier status quo. From the analysis above, we could see that the identified factors by the researcher and supported by the respondents confirmed that over-emphasis on cost sometimes at the expense of performance and quality, the fact that there exist a wrong notion that value engineering reduces the project scope, minimal amount of qualified value engineering professionals, wrong notion that VE might delay project execution, fear of incurring additional cost em-

ploying value engineers to deploy value engineering, are the major factors hindering the adoption of VE at both Kano Electric and Abuja Electric.

This conclusion corroborates with the findings of Kolo and Ibrahim (2010) that lack of qualified personnel, fear of VE adoption creating several difficulties hinder its adoption. Similarly, Sabiu & Agarwal (2016) found that lack of technical knowhow of VE, lack of involving specialists and professionals from the outset, poor knowledge of project management and poor technology development hinder the development of VE. This research found enough evidence to uphold the factors identified by Sabiu & Agarwal that hinder the adoption of VE in the PMO.

6.5 *Prerequisites for adopting and Implementing VE in the PMO*

To successfully adopt value engineering as a risk management tools in the project management office there are some essential requirements that need to be in place for its successful implementation. Kolo and Ibrahim (2010) opined that for value engineering to be successfully adopted, there are certain factors that must be met for its successful adoption. The factors the author identified as well as the information from the data set will be analyzed in this section of the research. Kelly et al (2004) further argued that some authors refer to value engineering as a "premier league" project implementation strategy that ensures the achievement of project success. Since it enables the achievement of optimal balance between time, cost and quality in project management thereby giving more value to the client or customer money.

The summary statistics of the environmental prerequisites for the adoption of VE in the PMO is as given in Table 6.6. The benchmark mean response is set as usual and any response whose mean is above 4.0 is regarded as important prerequisite for successful adoption of VE as a risk management tool in the PMO. While a response category whose mean value is less than the benchmark value is regarded unimportant success factors in the adoption of VE in the PMO.

The essential requirements are grouped into environmental factor, human capital factor, business process factor and information sharing factor. The environmental factor stresses on those elements that permit a sound working relationship among the major stakeholders in project implementation.

Kelly et al (2004) noted that a well-coordinated, integrated and collaborative team is highly essential for project implementation to be successful. This will not only increase the value of the innovative hub, but also increase the ability of the team as well as ensure the success of the project management office over time.

Thus, the environmental factors required for successful adoption of VE are discussed in Table 6.6. The respondents mean response revealed that such environmental preconditions as procurement Acts in practice in the states where the project is proposed to be executed supports value engineering adoption and implementation, where organization members embrace changes and are innovative, where organization tolerates and embraces the culture and ideology of all stakeholders plays essential role in promoting the adoption and implementation of value engineering as a risk management tool in the PMO.

Other environmental requirements for the successful adoption and implementation of VE as a risk management tool include where organization improves its business to business (B2B) relationship and, where organization provides suitable environment for the adoption of value engineering as a risk management strategy.

Variable/Items	Code	Mean	SD	Remarks
The Procurement Acts practiced in the states the organization is located supports value engineering implementation	E1	3.81	0.75	Unimportant
Organization staff members embrace changes and the opportunities.	E2	4.06	0.79	Important
Organization recognizes the cultures of all stakeholders.	E3	4.08	0.74	Important
Collaborative working environment between our organization and others.	E4	3.83	0.85	Unimportant
Current organizational structure provides an environment that suits the adoption of value engineering.	E5	3.95	0.81	Unimportant
Recognition and involvement of end-user's contribution to processes.	E6	3.58	0.89	Unimportant
Cluster		**3.89**	**0.81**	

Table 6.6: Environmental Factors that are essential for the adoption of VE in PMO

It could be seen literarily from the literature that most organization staff are averse to changes especially in the developing countries and this is reflected in their expenditure on research & development (Meera, 2013). The findings are based on the environmental factors necessary for successful adoption of VE in organizations similar to the findings of Kumaraswamy & Chung (2008) who argued that, before value engineering is implemented in project management especially in the construction industry, there is a need to ensure that the management provides an enabling environment for it to thrive.

Organizations need to improve its relationship with all its suppliers and customers to ensure that both interests are integrated and management should inculcate the habit of embracing innovative and strategic change management process in all the employees. These factors will facilitate the implementation of value engineering in the project management office.

Variable/Items	Code	Mean	SD	Remarks
Organization is capable of adopting value engineering.	E7	3.69	0.85	Unimportant
Organization is aware of the success achieved by using value engineering in projects elsewhere and its contribution in achieving value for money.	E8	3.58	1.08	Unimportant
We have within our organization people who can conduct value Engineering workshop as "facilitators".	E9	3.39	1.23	Unimportant
There is clear definition of roles and responsibilities of each staff working within the organization.	E10	3.42	1.02	Unimportant
We do have staff with the ability to implement newly introduced concept quickly and accurately.	E11	3.75	0.89	Unimportant
We have confidence in the expertise and competence of other project stakeholders.	E12	3.56	1.11	Unimportant
Cluster		**3.57**	**1.03**	

Table 6.7: Human Capital Factors that are essential for the adoption of VE in PMO

Table 6.7 revealed the necessary human capital essential factors that should be in place before the introduction of value engineering in the project management office. It was revealed that factors such as whether the organization has the required personnel and professional is the most important human capital factor considered before the introduction of value engineering in an organization. Secondly, organization considers the PM

ability of the project managers domicile in the PMO, their ability to handle projects using VE as a methodology and whether the project management office team has a clear understanding of his or her role in project implementation. Factors such as if organization has the staff and employees who can easily adapt and pull resources together accurately and efficiently to implement any concept introduced.

Of course, according to Wang & Zang (2014), it depends on the organization innovative ability and organizational structure since no organization can successfully introduce a new management concept and achieve successful project implementation in a faulty organizational structure. They argued that organizations need to reevaluate its workforce capability alongside its competitors before introducing a new methodology. Han-Ping (2015) is of the view that successful corporate leaders know the importance of project management and the PMO and also understand that adopting the right methodology does not only aid the achievement of the strategic objectives and the goals but also increase the legitimacy, prestige and popularity of the managers among stakeholders.

Table 6.7 presents the business process prerequisites that enable the successful adoption of value engineering as a risk management tool in the PMO. The business process that is essential relates to the series of internal controls that must be in existence to achieve successful project implementation. Here the business process as described by Emmett (2005) includes but not limited to, the workplace rules, ethics, and procedures within and between organizations. He argued that there is a need for a sound change and process management strategy to be in place to facilitate smooth and hitch-free introduction and implementation of VE in the PMO.

Table 6.7 below presents an overview of the descriptive statistics (mean and standard deviation) in both tabulated format and graphical format. From the table it was revealed that the organization procurement and contract strategy does not support value engineering with a mean of 3.75 below the benchmark mean of 4.0. This is dissimilar to what Ruikar et al. (2006) argued that organizations should develop their strategy and internal controls in a way that support the introduction of new concepts and methodology of achieving business objectives without necessarily deviating from its strategic plans.

Variable/Items	Code	Mean	SD	Remarks
Our procurement and contract strategy is appropriate for value engineering implementation.	E13	3.75	0.94	Unimportant
We acknowledge and appreciate the benefits of embracing new concepts for improved service delivery.	E14	3.92	0.91	Unimportant
We participate in an open and effective communication among project stakeholders.	E15	3.56	1.02	Unimportant
We attend regular project workshops to discuss progress and concerns about ongoing project.	E16	3.55	0.92	Unimportant
We have change management strategy that will ensure smooth introduction of new techniques.	E17	3.94	0.75	Unimportant
Cluster		**3.74**	**0.91**	

Table 6.8: Business Process Factors that are essential for the adoption of VE in PMO

The mean of the variable E14 revealed that Kano Disco and Abuja Disco are somewhat open and receptive of new concepts or innovation with the capability to improve the operating results overtime via efficient service delivery and competitive prod-

ucts. The mean value at almost 4.0 with a minimal standard deviation indicating that the researcher, in gathering the information or the question and getting the required responses committed no error. In a similar study, Ruikar et al. (2006) earlier noted that organizations that are open to new ideology tend to innovate faster than their competitors and this often give them a competitive edge in the market. Organizations that are culturally open to new management systems easily adapt to new technology and easily reduce cost of doing business and position itself as the market leader overtime.

The last business process variable in Table 6.7 revealed a significant influence of the prerequisite for the adoption of value engineering as a risk management tool in the project management office. The mean response of 3.94 and a standard deviation of 0.75 indicate the availability of some internal controls on change management strategy to facilitate the introduction of new concepts, ideology and methodology as necessary prerequisite for the successful introduction of value engineering in any organization as evidence crystalizes that caveat from the findings at Kano Disco and Abuja Disco in Nigeria.

Table 6.7 clearly illustrates the mean value of the respondents' responses to each of the variables measuring the business process in the organization and how they facilitate the introduction of VE as a risk management tool in the PMO. We see from the table that availability of contract strategy, change management strategy are major management operating policies that are required as a business process for a hitch-free introduction of VE at Kano Disco and Abuja Disco.

Ahadzie (2008) noted that value engineering is a new concept and model that can be employed in the construction industry and the power sector to improve their project

delivery and implementation over time. The author argued that business process can facilitate the introduction of value engineering and value engineering can in-turn further improve the business process. This presupposes the need to develop more VE professionals to ensure the successful introduction and adoption of value engineering as a means of improving the business process and service delivery to add value to their customers.

The last major prerequisite for the introduction and implementation of value engineering as a risk management tool in the PMO borders on the integration and sharing of information among the stakeholders. The importance of effective communication among the project management office team, the project manager, the organization management, the clients and customers, regulatory institutions, professional bodies among others, cannot be over emphasized.

When information regarding a project are well documented and disseminated among the stakeholders there are less chances of mistakes, delay, rework and project failure since all the stakeholders on the project are abreast of adequate project information and can easily discover when things are not going well (Emmett, 2005).

Table 6.8 revealed the summary statistics describing the informational needs for the introduction of value engineering in the project management office. From the table, we discover that all the variables judging by the mean value are important. For instance, the first variable measuring whether the PMO clients clearly communicate the requirements and needs, revealed a mean value of 3.59 which means that for a successful project implementation using VE as a methodology, the PMO manager needs to clearly under-

stand the project outcome, client needs and the requirements, which boosts the necessity of information sharing.

It was also revealed that there is a need to clearly spell out the value for money and be understood by the PMO team why the contract duration need to be clear and definite so as to enable the project leaders measure its success overtime.

Variable/Items	Code	Mean	SD	Remarks
PMO clients excellently communicate the requirements and needs.	E18	3.59	1.11	Unimportant
Value for money is clearly spelt out and understood in carrying out individual projects.	E19	4.28	0.63	Important
Contract durations are definite and well defined.	E20	4.02	0.77	Important
Cluster		**3.96**	**0.84**	

Table 6.9: Information integration prerequisite for the introduction of VE in PMO.

Information integration and sharing among project leaders/managers, the PMO and the project clients is as important as providing the right environment with the required personnel, to enable the success of the project portfolio.

Emmett (2005) noted that when there is a lack of effective bridge of information in project execution and decision making process, the project duration will be delayed and more resources will be spent which will further escalate the issues of inefficiency in project delivery. He argued that information integration and implementation ensure that issues like cost of project, contract duration, value for money, project efficiency etc. to be clearly defined and well discussed ab-initio.

The results from the mean response on the importance of information integration and sharing among major partners in the PMO was clearly discussed above, revealing that the PMO project managers at both Kano Disco and Abuja Disco clearly understood the importance of defining the role money will play in the project management office.

Following the findings of Emmett (2005), Ruikar et al. (2006), Ahadzie (2008), Kumaraswamy & Chung (2008), Kolo and Ibrahim (2010) and Han-Ping (2015), the researcher argued that there are certain things that organization must put in place to facilitate the adoption and implementation of value engineering in the project management office without which the concept and methodology will likely not achieve the intended objectives of adding value and minimizing cost.

Therefore, organizations need to be ready for the introduction of value engineering by providing the right environment where innovation can seamlessly thrive, the teams freely interact while the management operates an open door policy to drill down innovative culture. The organization will also need to assess itself and ensure it has the required experts in the workforce to drive the new methodology in project implementation or to take the step required to employ such experts. Similarly, organization business processes like the application of change management is of paramount importance including the level of trainings the organization provides for its project management office team and the organization staff.

The information integration and sharing pattern in the organization determines also whether an organization is ready for the adoption and implementation of value engineering as a risk management tool in the PMO. The customers and clients of the organization

want their needs to be met in a timely and efficient manner. This can only be possible if the organization provides a platform where clients of the PMO give details and accurate information about their requirements and needs before the commencement of the project development and execution process (Mounir, 2015).

6.6 *Analysis of VE Model as a Risk Tool Management in the PMO*

The dynamic business environment where organizations currently operate, most especially with regard to new business risks emanating from advancement in IT and increase in global resources mobility, implies that organizations need to constantly evolve with new strategies, models and methodologies to achieve strategic business goals. Organizations who invest in research and development to improve the business process, management systems, product quality, service delivery and customer satisfaction will remain competitive in the global market. Every organization aims to grow, expand and develop, hence the need to plan strategically to ensure the accomplishment of desired goals through the adoption of innovative methodologies of achieving project development and execution (Melnyk et al., 2014).

Trans (2016) noted that the quest to remain competitive and boost performance has prompted organizations to continue to innovate and implement innovative strategy such as the establishment of the project management office in their organizations to facilitate the efficient and methodical implementation of project portfolio that align with the organization strategy. According to Monteiro (2016) several models and functions of the PMO have been proposed and developed among the leading authors with the aim of reporting

project execution. PMO models generally support organization strategy and business process as premises to justify methodical project portfolio management.

Quadri (2012) concluded that given that the organization found itself in a world where economic agents can 'plug-n-play' from any part of the world, it becomes imperatives for any organization competing in the 21st century to adopt unconventional corporate strategy such as value engineering in their PMO as a risk management tool.

The summary statistics of the analysis of VE model as a risk management tool employed in the PMO is presented in table 6.9 below.

As pointed out earlier, the benchmark mean of the responses is set at 4.0. As such, any response whose mean is above 4.0 is regarded as important (positive) to facilitate the adoption of VE model as a risk management tool in the PMO. While an item or response category whose mean value is less than the benchmark value is regarded unimportant (negative) facilitator of VE model as a risk management tool in the PMO.

From Table 6.9, it was clear that all the variables measured in the data collection instrument revealed positive influence on the adoption of value engineering as a methodology of risk management in the project management office except one of the variables with a mean value less than 4.0 benchmark. We could see from the table that the mean of 4 of the variables are above 4.0 indicating strong preference for the adoption of value engineering as a risk management tool in the project management office.

This implies that based on the mean of the responses, value engineering as risk management tool is not adopted in the PMO to aid the identification and planning of risk, ra-

ther, VE facilitates the mitigation of risk in project management through employing appropriate methodology while also aligning the project portfolio management with the organization strategy.

Code	Code	Mean	SD	Remarks
Value Engineering helps to create awareness about importance of risk management in your organization.	F1	4.30	0.46	Important
VE ensures that risk management is performed formally in your organization.	F2	4.25	0.76	Important
Efforts are in place to identify and document risks encountered in your organization.	F3	4.09	0.50	Important
Value engineering is used in the identification and planning for risk.	F4	2.86	1.17	Unimportant
VE in the PMO aids SWOT analysis.	F5	3.86	0.94	Unimportant
PMO using value engineering ensures that risks identified are analyzed to determine their potential impact.	F6	4.03	0.80	Important
Risks so identified and estimated have little chance of occurrence.	F7	3.83	0.83	Unimportant
Organization examines and documents the effectiveness of the risk response strategy, and management process.	F8	3.64	0.84	Unimportant
PMO using value engineering ensures a quantitative risk analysis is conducted.	F9	3.73	0.96	Unimportant
Detailed risk response plan is prepared for risks that warrant action/attention.	F10	4.19	0.59	Important
Cluster		**3.88**	**0.78**	

Table 6.10: VE Model for Risk Management in the PMO

The findings above revealed among others that value engineering as a risk management tool in the project management office helps in creating awareness about importance of risk management in the organization, encourages the application and efficient management of business risk, facilitates the documentation of various risks, aids the analysis of risk and, their potential impacts on the project portfolio and the organization.

Other benefits of employing value engineering as a risk management tool in the organization include but not limited to: enhanced SWOT analysis, documentation of risk strategy and policies, management process, and ultimately aid the preparation and drafting of risk response plan.

Behrang & Towhid (2016) noted that value engineering has become the most viable option in mitigating risk associated with the corporate strategic plan, financial and risk associated with project management development and implementation in the organization. They argue further that value engineering and risk management are valuable fusion with capabilities to manage risky project portfolio and the organization, to achieve better results. Dallas (2006) is of the view that value engineering as a risk management tool leads to efficiency in project delivery, cost optimization, value addition and improved management process and customer satisfaction. He noted that combining risk management practice and value engineering process will result in cost optimization by striking a balance among risk, value and the project outcome.

Chapter 7: Research Findings

7.1 Introduction

This chapter discusses the research findings and analytical justifications. The study evaluated the prudential implementation of value engineering decision-making process as a risk management tool in the Project Management Office. To achieve the overall aim of the study and develop a model that facilitates the achievement of the research main objective, the study breaks the task into five specific objectives to investigate different aspects of the rationale for value engineering integration into the project management offices of Kano Electricity Distribution Company and Abuja Electricity Distribution Company to facilitate efficient project portfolio implementation. The discussion in this chapter is based on the research data presented, analyzed and interpreted in chapter six of this research.

7.2 Analysis of Findings

7.2.1 Objective 1: To examine the drivers and facilitators of initiating value engineering as a risk management tool in the PMO.

Based on the data gathered from the questionnaire, it was learnt that all the variables measured were impactful in facilitating the introduction of value engineering as a risk management tool in the project management office except for lack of qualified personnel. Specifically, it was learnt that; 1) flexibility of value engineering as a tool in pro-

ject management, 2) ability of value engineering to deliver higher value at a minimized cost, 3) interest of the project clients and customers in the application of value engineering in the PMO, and 4) overwhelming support from the management, (when the organization leadership and major stakeholders are aware of the benefits of integrating value engineering into the project management office), 5) perceived improvement in organization project portfolio performance, 6) including the willingness of the various professional bodies to see to the successful adoption and implementation of value engineering in the project management office are strong factors driving the introduction of value engineering as a risk management tool in the project management office

The study further revealed that lack of professionals with sound knowledge of value engineering, project management and the PMO is the greatest threat to the adoption and implementation of value engineering in the PMO. Admittedly though, both value engineering and the project management office are still in their infantry or developing phase in most developing or emerging economies (Quadri, 2012). Value engineering, most especially in the construction industry in the advanced countries like USA, Europe, UK and Canada has been growing tremendously. Countries like China and Malaysia are fast catching up on the application of value engineering in project implementation and delivery (Kelly et al, 2004). This conclusions corroborate with earlier researchers like Jagun (2006), Kolo and Ibrahim (2010) who argued that factors like support from the management, general stakeholders' awareness of the role of value engineering in the PMO, are among the tools driving the introduction of value engineering in the PMO.

7.2.2 Objective 2: To understand the theme surrounding value engineering adoption as a risk management tool in the PMO.

Based on the analysis from chapter six, it was gathered that value engineering has features that make it expedient to adopt as a risk management tool in the project management office. Top among the features of VE methodology include the fact that;

1) It is function based and aimed at improving the functional outcome of a project, systems, etc., at a minimized cost over time

2) It is based on a structured multi-disciplinary team, employs a range of analytical tools in project decisioneering and execution, and decisions are made based on team effort resulting from hours of brainstorming

Other unique features of VE facilitating its adoption as a risk management tool include,

3) It is led by qualified professionals

4) Adopts a structured job plan

5) It involves both end of the organization supply chain and,

6) Ultimately leads to better project development and execution resulting in improved organizational competitiveness and performance over time.

As noted earlier, the fact that VE leverages the adoption of a structured job plan which involves both ends of the organization supply-chain, leads to a better development and execution of the organization project portfolio resulting in improved organization

competitiveness and better corporate performance over time. The features of VE discussed above helped to facilitate its adoption in many several developed countries like USA, China, Canada and Germany among others, with tremendous results.

Sabiu & Agawal (2016) noted that value engineering has been recognized globally as an emerging paradigm that focuses on "continuous increase in value provided to the clients and is widely accepted as an important risk management tool in recent studies". The importance of evaluating value engineering in the project management office stems from the fact that value engineering has been regarded in management literature as an unconventional 'premier league' management strategy with capability to realize project portfolio objective with minimal exposure to risk. As Sabiu & Agawal (2016) noted, VE employed multi-disciplinary team and wide variety of tools and its usefulness lies in its ability to break the sequence of work to a manageable level and apply appropriate managerial tools to improve project decisioneering and execution, where decisions are made based on team effort resulting from hours of brainstorming.

7.2.3 Objective 3: To ascertain factors constraining the successful adoption of VE in the PMO.

In discussing value engineering as a risk management tool that can facilitate better operating results in the PMO, there are still constraints hindering the adoption of VE in the PMO. In spite of the merit of value engineering as a risk management strategy over other conventional management strategies organizations employ to manage project portfolios, it beats the researcher's imagination why the adoption of VE has not gained any traction most especially in the developing countries.

The simple reason stems from the fact that value engineering adoption and application has some challenges constraining its adoption. From the empirical results analyzed in chapter six of this research, the identified constraining factors include but not limited to 1) lack of professionals to integrate VE into project management and the PMO. From the earlier objective that sought to discover factors driving the introduction of value engineering, we discovered that lack of professionals to integrate the concept into project portfolio management is the major challenge facing the adoption of VE in the PMO.

Other constraining factors are; 2) un-verified assumption that value engineering application in the PMO results in scope creep which delay the project schedule with impact on quality, 3) lack of stakeholders' awareness of the merit of VE application in project implementation process, 4) fear that employing VE as a risk management tool in project development and execution has negative effects on the organization strategic business plan, 5) the organizational structure and business culture further act as impediments to the adoption and implementation of value engineering in the project management office. Apparently, some organizational structures make it almost pragmatically impossible for easy adoption of a new strategy, model and technology capable of delivering the business objectives, customer value and improved intimacy with suppliers and partners.

Like the issue of lack of professionals to facilitate the adoption of VE which stands as the major challenge, the fear that employing VE as a risk management tool in project development and execution increases the project scope, further impede its adoption and implementation in the PMO. Matter of fact, from the responses, it stands as the biggest threat to the adoption of VE in project management and in the PMO.

Annapa & Panditrao (2014) argued that some organizational structures do not support flexible management systems and processes aimed at reengineering the organizational culture, ideology and operating procedures to ensure that every project is aligned with organization overall strategy. This is contrary to the evidence from this research that adopting VE methodology as a management system and risk management process in the PMO rather ensures that the organization overall business strategies are preserved by realigning project portfolio with the organization mission and vision. The authors in the literature concluded that organizational structure and fear factor often constrain the adoption of VE in the PMO, which validates the findings of this thesis.

7.2.4 Objective 4: To examine the prerequisite for the adoption and implementation of value engineering in the PMO.

Objective four investigated the necessary factors that must be in place for value engineering to be successfully adopted in the organization. The factors are sub-divided into four groups; environmental factor, human capital factor, business process factor and information integration and sharing factor. The objective here is to measure some inherent topmost factors the organization must have in place to ensure successful adoption and application of value engineering in the PMO. Many of these prerequisites were discussed and found important in driving the adoption of value engineering as a risk management tool employed in the PMO.

Factors such as the availability of conducive environment where project team can interact and share ideas is on top of the chart of the major facilitators of VE adoption in the PMO. Such factor like stakeholders should have a fair knowledge of the benefits of

the VE methodology is also a top prerequisite for the adoption and implementation of VE. Among the leading human capital factors necessary for successful adoption of VE is the buy-in from the project team including well-coordinated trainings and capacity development to improve the skills and innovative ability of the organization employees. These caveats play a crucial role in the adoption of VE in the PMO, as competent employees tend to appreciate the need for improved business approach to realize the business goals.

Factors such as availability of enforceable policies on contract management and change management as well as the existence of efficient information and communication management also facilitate VE adoption in the PMO. An organization that understands and embraces the importance of innovation makes it easier for the introduction of a new concept, methodology and strategy like value engineering. Such organization will not only dominate the market and the industry overtime but also, creates a platform for successful adoption of VE. Improved information management techniques that enable better information sharing and integration equally substantially influence the adoption of value engineering in the PMO. Freddy (2015) opined that since clients are more interested in how to minimize project cost with better quality regardless of the means, the adoption of unconventional business strategies like value engineering makes it seamless to achieve clients' strategic project outcome and business goals.

7.2.5 Objective 5: To examine the role of value engineering as a risk management tool in the PMO.

This is the hallmark of the research dissertation. It assessed the importance of adopting value engineering as a risk management tool in the project management office.

Like other objectives, comprehensive discussion of the importance of risk management in project portfolio delivery was attempted in chapter six. It was learnt from the discussion that organizations have started to embrace and adopt unconventional management systems and techniques like value engineering, as a risk management strategy and methodology to identify risk through a holistic process and develop action plan to mitigate the risk through a systemic procedure aimed at giving the organization additional value at a fraction of the cost.

As Freddy (2015) argued that the invalidated perception that value engineering tends to increase the scope and delivery duration of project, unfortunately militate against the adopting of VE methodology as a risk management tool in the project management office. However, this research finding concluded that if VE integration process in the PMO is well designed and coordinated, it shortens the project duration than increase the scope since project managers are well guided by a set of methodology in project portfolio execution.

7.3 Analytical Justification

This research contributes to the body knowledge in risk management and the project management office by proposing the adoption of value engineering in the PMO to engender a systematic design of project portfolio management process that resonates with the strategic plans and operating procedures of an organization in a bid to create additional value for the business and the clients at a minimized cost. This research has not only proposed the adoption of value engineering as a risk management tool in the project man-

agement office but has also provided a framework for its successful adoption and implementation. From the summary of the findings provided earlier, the research highlighted the drivers and facilitators of the adoption of value engineering in the PMO as a risk management tool.

The research equally highlighted and discussed the features of value engineering, which aimed at providing deeper insight into the applicability of the concept in the PMO. Embracing the concept and features of VE aids the understanding of the nature of VE, which will in-turn guide the business leaders and decision makers to recommend and support the methodology for ease of adoption in the organization and in the PMO.

In the course of developing the framework for the integration of value engineering as a risk management tool in the project management office, the researcher highlighted series of factors that might pose a threat to the successful adoption of value engineering application as a risk management tool in the PMO. It was identified that lack of qualified VE professionals with requisite skills and management acumen to adopt and integrate value engineering in the PMO, is a serious challenge inhibiting the implementation of VE as a risk management tool in the PMO.

This manifests in the form poor management and execution of project portfolio in the organization with its attendant effects such as re-work, delays and cost overrun, which negatively impact on the organizations' returns on investment. But realistically speaking, the companies case-studied are facing considerable operating risks both within their internal and external environments with regard to systemic execution of capital pro-

jects, which necessitates the adoption of VE in the PMO to streamline portfolio execution to trigger improvement in the organization bottomline.

The above mentioned factors coupled with organizational management and leadership lapses, inadequate funding, corrupt employees (from NEPA/PHCN) and poor project portfolio leadership contribute to the poor performance of the energy sector in Nigeria in terms of the profitability and sustainability of the sector since privatization in 2013.

Risk is inevitable in any organization. Though there are several conventional ways of managing risk – risk hedging and risk sharing among others, but these approaches have suffered different set back in their efficacies in organizational management especially when integrated in project management. This research has therefore proposed the framework required to ensure hitch-free adoption of value engineering as a risk management tool in the project management office by identifying factors that can facilitate its adoption in the organization, the constraining factors as well as the unique features of value engineering driving its applicability in project management and in the PMO.

It is noted that VE if well designed and coordinated, shortens the project duration instead of increasing the scope since project managers are guided by a set of methodology in project portfolio execution. This research therefore argued that organization business risks can better be managed by adopting unconventional positive deviance risk management tools like value engineering that employs a systematic framework in project assessment, development and strategic execution.

However, value engineering adoptability and applicability in the project management office is still at the early adopter stage in emerging economies like Nigeria, but an accurate assessment, adoption and methodical implementation of VE in the project management office will improve project planning and implementation in the power sector in Nigeria that is currently synonymous with intractable risks and perpetual customer dissatisfaction due to inefficient project portfolio management and leadership.

Introduction and adoption of VE as a risk management tool in the energy and power sector in Nigeria will not only minimize the cost of distributing electricity in the country, but will also improve customer satisfaction through improved management process, excellent electricity project portfolio delivery, power supply efficiency which ultimately, improve the balance sheet of the electricity distribution companies, (most especially case-studied Discos) as well as improve the strategic relationship between the electricity distribution companies in Nigeria and the mutually in-exclusive value-chain and incessant stakeholders. The summary of the findings is presented in figure 6A below.

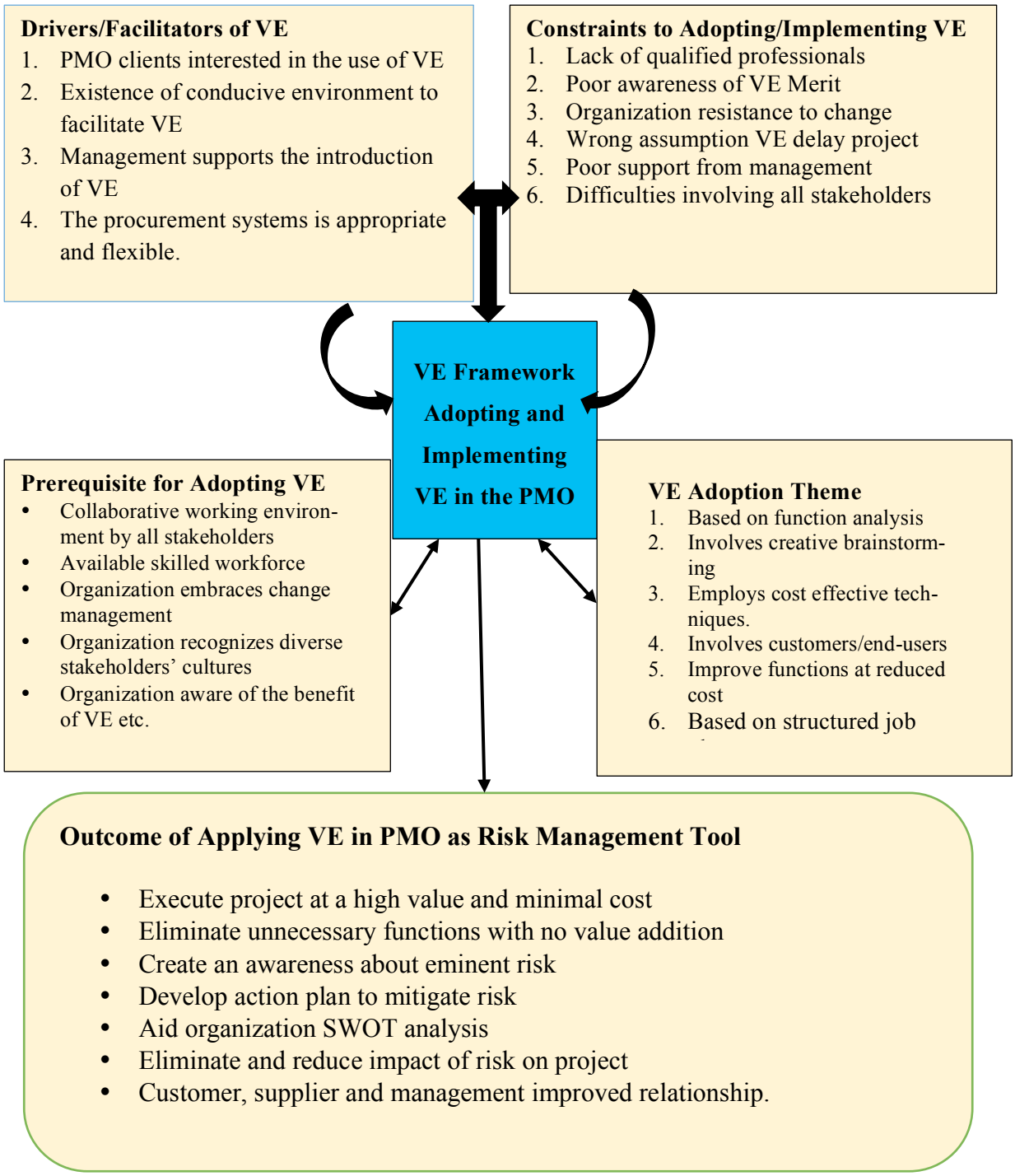

Figure 7.1: Summary of VE Adoption and Implementation as a risk management tool in the PMO

The research also noted that several literatures have investigated the adoptability of value engineering in project management and in the project management office most especially in the construction industries (see Amrute, Gupta, & Sneha, 2014; Abidin, 2015; Umar, 2015; Saibu & Agawal, 2016; Behrouz, Abdul, & Saleh, 2017). Nonetheless, a few research works have discussed the concept of value engineering and its relationship with the project management office. Hence, this makes this research work very unique by proposing the adoption of value engineering in the (PMO).

Given the empirical findings as discussed above, a framework was developed to facilitate the successful adoption of value engineering as a risk management tool in the PMO. As such, this research work contributes to the body of knowledge by proposing and providing a framework for successful adoption of value engineering as a risk management tool in the project management office. Successful adoption and implementation of VE in the PMO will improve the service delivery of the power distribution companies in Nigeria that are currently operating below potential capacity with poor returns on investment, declining returns on assets, diminishing returns on equity, dissatisfied customers with a huge unprecedented indebtedness.

Chapter 8: Conclusions and Recommendation

8.1 Research Summary and Reflection

This research proposes the need to adopt and deploy value engineering as a risk management tool in the project management office given the increasing business risks and operating complexities in today's business world. The global economy faces a dearth of unconventional and innovative management methodologies and strategies that can deliver bottom-line results and top-line growth. This research advocates for the adoption and application of value engineering as a risk management tool to mitigate the business risks faced by organization leaders, project managers and the project management office in the new global economic order and its attendant business intricacies.

The research reviewed several literatures on the project management office, its application and factors hindering its successful adoption in emerging and developing countries like Nigeria. Necessary and inevitable conditions that facilitate the adoption of value engineering in the project management office have been evaluated and discussed. The study starts with an introduction where the researcher discussed in detail the genesis of value engineering as an alternative solution to the widening gap in strategic project portfolio management most especially as it relates to risk management in the PMO.

The research was motivated by the unprecedented proliferation of the PMO in both the private and public sectors, the increasing rate organizations gravitate toward implementing strategic plans as business projects and, the old pathway the organization tread to actualize its strategic goals. Much in the same vein, the current level of performance of

the PMO in Nigeria and Africa all combined to ignite a thought process in the researcher, on the need to introduce unconventional strategy in a bid to change the old order. Therefore, incorporating value engineering as a risk management strategy to streamline the current method the PMO leverages to deliver project portfolio will not only reposition the PMO but also ensure higher returns on investment to the organizations.

Chapter two reports an extensive review of value engineering's theoretical underpinnings. It was revealed from the literature that value engineering is a systemic application of recognized techniques by multi-disciplined teams which identify the primary functions of a product or service, establish a worth for that function, generate alternatives through the use of creative thinking, and provide the needed secondary functions at the lowest overall cost.

The evolution of value engineering was traced to Lawrence D. Miles, an employee of General Electric. It was gathered that though VE has been largely embraced in developed countries like USA, Canada, UK, Germany among others as a risk management tool, its application in developing countries is still almost non-existence most especially in Nigeria (see the College of Estate Management, 1995; Green and Moss, 1998; Palmer et al., 1996; Finnegan, 2001; Male, 2002; Karunasena et al., 2016; Sabiu & Agawal, 2016).

Chapter two also reviewed the adoption or the establishment of the project management office as an organizational platform that integrates project portfolio management process with the overall business goals and strategic objectives of the organization. The evolution of the PMO, its development, application and critical success factors were re-

viewed and the research discovered that the PMO has been largely adopted and applied by many corporations and business entities especially in developed countries, where it has achieved landmark success in aligning organization project portfolio management with the overall business strategy.

PMO leadership provides policies, methodology, procedures, principles, best practice, training, mentoring and coaching to the PMO stakeholders, project managers and ultimately, the organization staff to prepare them to implement projects and operating deliverables seamlessly in a bid to deliver quality and values to the organization and the clients at a minimized cost (See Rohm, et al., 2013; Hubbard & Bollies, 2015; Abeni, 2017).

Chapter three discussed the methodology adopted, the research design that guided the achievement of the questions and objectives of the research. The research method adopted in this study was descriptive survey, where the researcher collected quantitative data with the use of structured questionnaire using five Likert scale format. The data collected were analyzed using descriptive method i.e mean and standard deviation, etc.

In chapter four, the researcher reviewed the history of the power sector in Nigeria with emphasis on electricity distribution subsector and the two electricity distribution companies (Abuja Electric and Kano Electric) case-studied to enable a more robust insight and understanding of the peculiarities of the research background. It is noted that this study investigated the adoption of value engineering as a risk management tool in the PMO using Abuja Electric and Kano Electric in Nigeria as case studies.

The choice of the two power distribution companies among the eleven stems from the fact that as at the time of this research, PMO has only been introduced in these two electricity distribution companies by the researcher himself who was previously an employee of both companies at different periods as Chief Strategy Officer at Kano Electricity Distribution Company and Regional General Manager at Abuja Electricity Distribution Company.

The research reviewed the energy sector in Nigeria, the origin, performance, transformation, privatization and government policies in the sector over time. It was revealed from the study that the power sector in Nigeria has perennially suffered poor management for over a century orchestrated by corruption in the system, poor funding from the government and bureaucratic bottleneck which all combine to hinder effective generation, transmission and distribution of electricity in Nigeria.

The poor performance of the power sector in Nigeria over the years induced by poor management and overbearing monstrous structure propelled the government to embark on a series of transformations to achieve better performance. The major transformation in the sector is the privatization exercise in 2013 that saw the power sector unbundled into three sub-divisions with six generating companies (Gencos) to generate electricity, one transmission entity (Transco) to transmit the electricity generated and 11 distribution companies (Discos) to distribute electricity to the end-users. The private sector investors own 60 percent equity and the federal government retains 40 percent equity in the discos.

Chapter five reviewed different topologies of the PMO and identified overriding topologies with different methodologies. Current practice of risk management in organizations was also dissected to crystalize the growing importance of business risk management and the recent surge among corporate leaders worldwide to approach organizational risk management using unconventional methodologies like the value engineering given the increasing relevance of the project management office in corporate governance structure. This chapter also put forward the critical success factors of the PMO as the overriding metrics to evaluate the efficiency of the PMO. It was unanimously agreed that the PMO has attained the status of a vision-driven strategic partner, an integrator and a catalyst for organizational change and a driver of corporate success.

Chapter six presented the research data for analysis and interpretation with an overview of the research methodology and research objectives: 1) to examine the drivers and facilitators of initiating value engineering in the PMO. 2) to understand the theme surrounding value engineering adoption in the PMO, 3) to ascertain factors constraining the successful adoption of VE in the PMO, 4) to examine the prerequisites for the adoption and implementation of VE in the PMO, 5) to examine the role of value engineering as a risk management tool in the PMO; and the research questions: 1) what are the drivers and facilitators of initiating value engineering in the PMO, 2) what are the themes surrounding value engineering adoption in the PMO, 3) what are the factors constraining the successful adoption of VE in the PMO, 4) what are the prerequisites for the adoption and implementation of VE in the PMO, 5) to what extent does value engineering acts as a risk management tool in the PMO?

Chapter seven is the hallmark of the research, as it enables the investigation and development of a framework for adopting and implementing value engineering as a risk management tools in the project management office. Based on the objective of the study, which sought to assess how prudent adoption of value engineering decision-making process as a risk management tool can enhance the efficiency of the Project Management Office in making profitable investment decisions.

In summary, factors such as the flexibility of value engineering as a tool in project management, ability of value engineering to deliver higher value in project at a minimized cost, interest of the project clients and customers in the adoption and application of value engineering in the PMO, support from the organization management and leadership, willingness of the professional bodies to genuinely see to the successful adoption and implementation of value engineering application in the PMO, are the major factors driving the introduction of VE as a risk mitigation strategy in the PMO.

It was gathered that value engineering has peculiar features that make it expedient to adopt as a risk management tool in the project management office. These features include: value engineering is function based, VE aims at improving the functional value of a product, service or system at a minimized cost, the emphasis here is that value engineering creates additional values at a minimal cost. Other features of VE methodology is that it is based on a structured multi-disciplinary team, it employs a range of analytical tools in project decisioneering and execution based on team effort.

Lack of professionals to integrate VE into project management and the PMO, the misconstrued notion that VE results in scope creep which delays project schedule, lack of

general awareness by the stakeholders on the merit of the application of VE in project implementation process, fear that employing VE as a risk management tool in project development and execution effect negatively on the organization strategic business plan, the organizational structure, business culture and the hierarchy of authority, all further combined as impediments to the adoption and implementation of value engineering in the project management office.

Factors such as the availability of conducive environment where project team can brainstorm and share ideas, stakeholders' fair knowledge of the benefits of VE methodology are some of the prerequisites for the adoption and application of VE in the PMO. Among the leading human capital factors necessary for successful adoption of VE is the buy-in from the project team including well-coordinated trainings and capacity development to improve the skill and innovative abilities of the PMO team and organization employees, play a crucial role in the adoption of VE in the PMO.

Conclusively, if VE is well designed and coordinated, it shortens project duration rather than increase the scope because all the project stakeholders are involved in the project portfolio decisioneering process, which further eases the buy-in that makes the project execution process and the achievement of the project outcome, seamless.

8.2 Research Contributions

This research advocates for the adoption of value engineering as a risk mitigant in the project management office. The choice of the focal point of this research work stemmed from the necessity to introduce unconventional management (engineering)

strategy and methodology capable of addressing operating problems inherent in the energy sector in Nigeria. One would rightly expect that after the power sector privatization in 2013, electricity management would have improved in operations and service delivery, since it is now owned and managed by the private sector investors who are assumed to possess the management and leadership capabilities to manage the bottomline.

However, available statistics reveal that the reverse is the case, instead of the sector improving, it stagnates and tilts negatively on the side of the end-users who have had to pay higher tariff with no commensurate supply of electricity because the new electricity distribution companies only invested heavily on new tariff collection channels and technology. The ongoing stagnation creates the need for a total shift of focus away from the conventional methodology and strategy employed hitherto in project portfolio execution and risk mitigation in the power sector in Nigeria, most especially, the distribution sub-sector.

The current poor performance of the post-privatized electricity distribution companies in Nigeria prompted the board of directors, the executive management, the investors, and the stakeholders to seek alternative management strategies to improve performance through systemic management of electricity project portfolio to improve service delivery to the consumers, higher returns to the investors and satisfy the needs of the stakeholders. Despite the privatization of the power sector in 2013, major impediments to the performance of the power sector in the pre-privatization era still remain in the post-privatization era, most especially poor leadership and incompetent management.

The management style, the business strategy and the methodology of project portfolio delivery parochially employed by the power sector leaders and decision makers in Nigeria are not only obsolete but also wrongly conceptualized and applied, thereby creating more problems for the sector rather than solving them. The self-interested project portfolio execution and management strategies employed by the power sector leaders and decision makers rarely aligned with the organization overall strategy, mission, vision and the mandate of the Federal Government of Nigeria.

The challenge of not aligning the organization project portfolio management with the overall strategy is that it creates difficulties for the organization to meet all the stakeholders' needs and difficult to create value for the clients and customer (Abeni, 2017). The ability to measure the value addition from the implemented project portfolio on the overall performance of the organization becomes difficult due to the informal style of project and portfolio execution employed by the power sector leaders and decision makers. The thirst to resolve the management and leadership crisis prevalent in the newly privatized electricity distribution companies in Nigeria brought to limelight the potential of establishing the project management office in Kano DisCo in 2014 and Abuja DisCo in 2017 and now, to be established in each of the Discos in Nigeria as later recommended by the USAID Power Africa initiative in its 2019 final report on Nigeria Electricity Distribution Commercialization Support Program.

The need to establish the PMO stemmed from the capabilities of the PMO to provide support functions, execute strategic initiatives, establish principles, policies and procedure, methodology, guidelines, trainings, mentoring and capacity development to the

power sector on best practices in project portfolio development and implementation. Going forward, the PMO should be repositioned to serve as the new leadership academy for DisCos where the next generations of Discos leaders will emerge.

It is believed that the establishment of the PMO in all the DisCos in Nigeria will improve the performance of the power sector in the country through better realignment of the project portfolio with the overall strategic objectives as well as the mandate of the Federal Government of Nigeria. Like every other sector, the power distribution sector is facing a serious scarce in resources to meet the needs of its customer, which now requires the distribution companies to incorporate unconventional engineering strategies like value engineering decision making process into the power sector project management offices as a way to optimize scarce resources, streamline project portfolio delivery and mitigate business risks associated with electricity distribution in Nigeria.

8.3 Recommended VE Policy for the PMO

The research discussion revolved around the need to adopt value engineering as a risk management tool in the project management office of the electricity distribution companies in Nigeria. The research work revealed that the project management office is an integrated arm of an organization that provides methodology, standards, guidelines, principles, procedures, trainings and mentoring to the project managers and the entire workforce on project management best practice to engender systemic execution of project portfolio to ensure strict alignment with the organization strategy. As such, this research recommends that all electricity distribution companies in Nigeria should put policies in

place to facilitate smooth adoption of the project management office to facilitate seamless and efficient development and implementation of project portfolio designed to achieve the organizational vision, ensure customer satisfaction and fulfill stakeholders' interests.

It has been argued that two-thirds of PMOs failed to perform the strategic role they were established to perform. Therefore, this research advocates the following measures to be in place to ensure the success of the PMO in the electricity distribution companies in Nigeria or any organization for that matter. The measures are:

1) The organization should ensure that all stakeholders, most especially, the board of directors support the PMO establishment
2) The PMO should create awareness of the PMO mandates and benefits to the stakeholders and crave for its unflinching support organization-wide
3) PMO leaders should learn and be versed in the organization corporate culture, structure, strategy, process, the vision and the mission

Since this research aimed at developing a framework for the adoption and implementation of VE as a risk management tool in the PMO, this research recommends that;

1) Organization should recruit VE professionals (or sponsor employees) to integrate VE as a risk management tool. This was identified as one of the greatest challenges facing the successful adoption of VE in the PMO.
2) There is also the need for the PMO leadership to develop a workplan for adopting and integrating value engineering in the PMO and, present the charter to the organization leadership for approval before implementing

the methodology to ensure it receives maximum support from the executive management and the board.

The implication of creating awareness organization-wide is to ensure that all stakeholders buy into the idea and support the innovative strategy from the outset. The awareness will further remove various degrees of misconception that the stakeholders may have about the adoption and application of VE in the PMO. The research also recommend that for successful adoption of value engineering in the project management office, the value engineering team must first gather information regarding the project that need to be implemented in terms of the cost, specification, scope, risk contents, human resources and the performance evaluation metrics required for successful implementation. This will help the team to critically identify all the associated risks and thereby give the organization some leverage to overcome common risk pitfalls.

Since, value engineering is geared toward reducing unnecessary project cost caused by poor communication and lack of information, value engineering team should therefore aim at bridging the communication gap. This research recommend that organization adopting value engineering should ensure that the identified drivers and facilitators of VE, the essential requirements for its success are readily in-place prior to the establishment and the constraints to its integration addressed or eliminated before adopting VE methodology in the PMO.

8.4 Recommendation for further Research

This research has investigated the possibility of integrating value engineering as a risk management tool in the project management office. Like every other research, this research is not exhaustive. As such, this research recommends further investigation into the effectiveness and efficiency of value engineering methodology as a risk management tool in the project management office post-integration. This might further reveal pragmatic practice factors as lessons learned to continuously improve the success of VE as a risk management tool in the PMO in Nigeria and other developing countries of Africa.

The research also advocates for further study on the role of the PMO leadership and the PMO project managers in the successful integration of value engineering in the project management office. This stems from the fact that the adoption of VE as a risk management tool in the PMO critically depends on the perception of the PMO leadership, the corporate executive management and the board of directors.

Appendix 1 — Questionnaire

Dear valued respondent,

I am currently conducting a research study aimed at understanding and validating value engineering decisioneering as a risk management tool in the PMO. The following questionnaire will require approximately 8-10 minutes of your time. There is no compensation for responding nor is there any known risk. **In order to ensure that all information will remain confidential, please do not *include your name.***

If you choose to participate in this survey, please answer all questions as honestly as possible and return the completed questionnaires immediately by replying to the email. Participation is strictly voluntary, and you may refuse to participate.

Thank you for taking the time to assist in the research endeavors. If you would like a summary copy of this study, please send me a request through e-mail. If you require additional information or have questions, please contact me immediately.

Section A: Demographic Information

In this section, the researcher would like to find out a little more about you. Kindly tick the appropriate block as it applies to you.

A1	**Gender**	Male ☐			Female ☐	
A2	**Age**	Under 30 years ☐	30-39 years ☐	40-49 years ☐	50-59 years ☐	60 years and over ☐
A3	**Years of Experience**	Below 10 years ☐	10-20 years ☐		Above20 years ☐	

A4	**Highest Level of Education**	
	First Learning certificate/ SSCE	1 ☐
	OND/NCE	2 ☐
	Certificate (professional courses)	3 ☐
	Degree (BSc/HND/B.Ed.)	4 ☐
	Masters (MSc/ MBA)	5 ☐
	Doctorate (PhD)	6 ☐

Section B: Drivers/Facilitators for introducing Value Engineering:

The following are some drivers/facilitators for introducing and implementing Value Engineering. For each question, indicate by clicking/coloring the box (☐), the option that best represent your situation/opinion.

Drivers/ Facilitators		Strongly disagree	Disagree	Neither Disagree or Agree	Agree	Strongly Agree
B1	PMO clients are interested in the use of the value engineering	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
B2	There is the availability of well-trained individuals to act as facilita-	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

	tors in the workshop					
B3	There is general awareness by the stakeholders on the benefits of the value engineering.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☒
B4	There is excellent and collaborative working relationship among PMO stakeholders	1 ☐	2 ☐	3 ☐	4 ☒	5 ☐
B5	There is commitment and cooperation of professional bodies to implement value engineering.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
B6	Other stakeholders have interest/support in the use of value engineering.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
B7	There is conducive project environment to facilitate the introduction of value engineering	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
B8	Management supports the introduction of value engineering	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
B9	There is appropriate and flexible procurement system	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

Section C: Unique Features of Value Engineering that facilitates its adoption

The following are some characteristic elements (features) of value Engineering. For each question, indicate by clicking/coloring the box (☐), the option that best represent your situation/opinion

Features		Strongly disagree	Disagree	Neither Disagree or Agree	Agree	Strongly Agree
C1	It is function based.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
C2	It involves structured multi-disciplinary team-based workshops.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
C3	It employs a range of analytical	1	2	3	4	5

	tools.	☐	☐	☐	☐	☐
C4	It involves creative brainstorming.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
C5	It follows a structured 'Job Plan'.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☒
C6	It is led by a qualified value practitioner.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☒
C7	It involves customers/end users.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
C8	It causes study team to achieve sustained improvements.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
C9	It uses cost-effectiveness techniques.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
C10	Its main aim is to improve function at reduced cost	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

Section D: Barriers to adopting and implementing Value Engineering.

The following are some obstacles against successful introduction and implementation of Value Engineering. For each question, indicate by clicking/coloring the box (☐), the option that best represent your situation/opinion.

Barriers		Strongly disagree	Disagree	Neither Disagree or Agree	Agree	Strongly Agree
D1	There exist lack of awareness or knowledge of Value Engineering.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
D2	There is Organizational resistance to change.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
D3	There is lack of qualified value engineering practitioners.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

D4	Wrong belief that value engineering impedes and/or delays projects.	1 ☐	2 ☐	3 ☒	4 ☐	5 ☐
D5	There is fear of incurring additional cost due to Value engineering.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
D6	There is a lack of commitment to implement value engineering by the Management.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
D7	Over-emphasis on cost, sometimes at the expense of performance and quality.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
D8	There exist wrong notion that value engineering reduces the project's scope.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
D9	There are difficulties in establishing mutual objectives by all participating organization.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
D10	There are difficulties in involving all key stakeholders in project processes.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

Section E: Essential requirements for introducing and implementing VE

The following are pre-requisites for introducing and implementing Engineering. For each question, indicate by clicking/coloring the box (☐), the options that best represent your situation/opinion.

	Requirement for Introducing Value Engineering.	Strongly Disagree	Disagree	Neither Disagree or Agree	Agree	Strongly Agree
E1	The Procurement Acts practiced in the states we are located or executing projects in, supports value engineering implementation.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
E2	Organization staff members embrace changes and the opportunities thereto.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
E3	Organization recognizes the cultures of all stakeholders	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
E4	Collaborative working environment between our organization and others.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
E5	Current organizational structure provides an environment that suits the adoption of value engineering.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
E6	Recognition and involvement of end-user's contribution to processes.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
	HUMAN CAPITAL					
E7	Organization is capable of adopting value engineering.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
E8	Organization is aware of the success recorded by using value engineering in projects elsewhere and its contribution in achieving value for money	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
E9	We have within our organization people who can conduct Value Engineering workshop as "facilitators".	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
E10	There is clear definition of roles and responsibilities of each staff working within the organization	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
E11	We do have staff with the ability to implement newly introduced concept quickly and accurately.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
E12	We have confidence in the expertise and competence of other project stakeholders	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

	BUSINESS PROCESS					
E13	Our procurement and contract strategy is appropriate for value engineering implementation	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
E14	We acknowledge and appreciate the benefits of embracing new concepts for improved service delivery	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
E15	We participate an open and effective communication among project stakeholders	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
E16	We do attend regular project workshops to discuss progress and concerns about ongoing project	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
E17	We have change management strategy that will ensure smooth introduction of new techniques	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
	ISSUES/INFORMATION					
E18	PMO clients excellently communicates the requirements and needs	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
E19	Value for money is clearly spelt out and understood in carrying out individual projects	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
E20	Contract durations are definite and well defined	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

Section F: Value Engineering as a tool for Averting /curbing risk

The following are some value engineering rationale for risk management in the PMO. For each question, indicate by clicking/coloring the box (☐), the options that best represent your situation/opinion.

Value Engineering as a risk Management tool		Strongly disagree	Disagree	Neither Disagree or Agree	Agree	Strongly Agree
F1	Value Engineering helps to create awareness about importance of risk management in your organization	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
F2	Value Engineering ensures that risk management is performed formally in your organization.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
F3	Efforts are in place to identify and document risks encountered in your organization.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
F4	Value engineering is used in the identification /planning for risk	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
F5	Value engineering in the PMO aids SWOT analysis.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
F6	PMO using value engineering ensures that risks identified are analyzed to determine their potential impact.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
F7	Risks so identified and estimated have little chance of occurrence.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
F8	Organization examines and documents the effectiveness of the risk response strategy, and management process.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
F9	PMO using value engineering ensures a quantitative risk analysis is done in your organization	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
F10	Detailed risk response plan is prepared for risks that warrant action/attention	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

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