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THE COMPLEMENTS TOWARDS DEVELOPING A NEW RISK MANAGEMENT FRAMEWORK AND ITS APPLICABILITY TO THE NIGERIAN POWER SECTOR

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May 2015

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The Complements Towards Developing a New Risk Management Framework and Its Applicability to The Nigerian Power Sector

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THESIS SUMMARY

The availability of regular supply has been identified as one of the major stimulants for the growth and development of any nation and is thus important for the economic well-being of a nation. The problems of the Nigerian power sector stems from a lot of factors culminating in her slow developmental growth and inability to meet the power demands of her citizens regardless of the abundance of human and natural resources prevalent in the nation. The research therefore had the main aim of investigating the importance and contributions of risk management to the success of projects specific to the power sector. To achieve this aim it was pertinent to examine the efficacy of risk management process in practice and elucidate the various risks typically associated with projects (Construction, Contractual, Political, Financial, Design, Human resource and Environmental risk factors) in the power sector as well as determine the current situation of risk management practice in Nigeria. To address this factors inhibiting the proficiency of the overarching and prevailing issue which have only been subject to limited in-depth academic research, a rigorous mixed research method was adopted (quantitative and qualitative data analysis). A review of the Nigeria power sector was also carried out as a precursor to the data collection stage. Using purposive sampling technique, respondents were identified and a questionnaire survey was administered.

The research hypotheses were tested using inferential statistics (Pearson correlation, Chi-square test, t-test and ANOVA technique) and the findings revealed the need for the development of a new risk management implementation Framework. The proposed Framework was tested within a company project, for interpreting the dynamism and essential benefits of risk management with the aim of improving the project performances (time), reducing the level of fragmentation (quality) and improving profitability (cost) within the Nigerian power sector in order to bridge a gap between theory and practice. It was concluded that Nigeria's poor risk management practices have prevented it from experiencing strong growth and development. The study however, concludes that the successful implementation of the developed risk management framework may help it to attain this status by enabling it to become more prepared and flexible, to face challenges that previously led to project failures, and thus contributing to its prosperity. The research study provides an original contribution theoretically, methodologically and practically which adds to the project risk management body of knowledge and to the Nigerian power sector.

KEYWORDS

Risk management, Risk implementation framework, Nigerian power sector, Electricity

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DEDICATION

This work is dedicated to God almighty, the giver of life and to my parents Engr. Dr & Mrs. Uujamhan for being loving caretakers.

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ABBREVIATIONS

APM	Association for Project Management
APMBOK	APM Body of Knowledge, United Kingdom
AS/NZS	Australian Standards/New Zealand Standards
CAQDAS	Computer Assisted Qualitative Data Analysis Software
CSF	Critical Success Factors
ERM	Enterprise Risk Management
GDP	Gross Domestic Product
IPA	Interpretative Phenomenological Analysis
IPP	Independent Power Producers
KPI	Key Performance Indicators
PLC	Project Life Cycle
PMBOK	Project Risk Management Handbook
PMI	Project Management Institute
PPP	Public Private Partnership
PRM	Project Risk Management
RBS	Risk Breakdown Structure
RIMS	Risk Insurance and Management Society
RM	Risk Management
SME	Small and Medium-sized Enterprises
SWOT	Strength, Weakness, Opportunity and Threats
UK	United Kingdom
USA	United States of America
WBS	Work Breakdown Structure

GLOSORY OF TERMS

RISK	Risk is an uncertain event, probability and impact or condition that usually affects at least one of the key performance indicators, such as time, cost, scope, or quality in a positive or negative way.
UNCERTAINTY	Uncertainty concerns an occasion or action which is expected to occur in the future which no one has any control over. It can neither be mitigated nor quantified.
RISK MANAGEMENT	Risk management is a continuous process essential to developing the strategic management of a company in terms of identifying, analyzing, assessing, treating, monitoring and communication based not on predictions, but on the information that is already known and on constant reassessment of risk. This allows the firm to decide on the optimal allocation of resources in order to reach its aims and objectives in the most effective manner
ENTERPRISE RISK MANAGEMENT	An approach designed to establish a link between risk management, on the one hand, and business strategy with regards to how a company projects its objectives, on the other. ERM bares an influence on how control, accountability and decision-making choices are performed within the company.
PROJECT RISK MANAGEMENT	A process concerned with the actions carried out within a project, team or company in order to optimise project risks.

PROJECT LIFE CYCLE (PLC)	A Sequential phase of a project in which the success of a project is dependent on from start to finish
CRITICAL SUCCESS FACTORS (CSF)	CSFs are tasks or attributes that should be prioritised by an organisation's project or team management because they represent significant characteristics, variables or conditions that can improve performance, but can just as easily determine the failure of a certain endeavor.
KEY PERFORMANCE INDICATORS (KPI'S)	KPIs are defined as quantitative measures that can verify whether a project is heading towards success or not. A good rule of thumb for KPI's on a project includes; Aligned, Optimized, Measurable, Realistic, Attainable, Clear, Understood, Predictive, Agreed and Reported.
SWOT ANALYSIS	SWOT analysis is an effective tool for the broad and strategic analysis which highlights problematic areas of concern while showing future trends and possible solutions of a particular phenomenon under investigation.

CHAPTER 1 – INTRODUCTION

Risk is a probability or threat of liability, damage, injury, loss or some other unwanted occurrence that takes place due to either internal or external vulnerabilities
(Stoneburner et al., 2002)

1.1 Background

The concept of risk is a multidirectional concept closely related to that of uncertainty, but it can also be linked to concepts that have positive connotations. Emblemavag and Kjolstd (2006) reveal that there are two main characteristics for defining risk: the probability of occurrence; whether some event will take place in the future or not, and repercussions of occurrence: the intensity of the event's impact. Different definitions exist about what risk is and what it entails. However regardless of the definition adopted, certain keywords are associated with various definitions of risk, including threat, uncertainty, probability, possibility, occurrence (Raz and Hillson, 2005). The researcher has learnt that there are two kinds of risk that every individual or activity can be faced with: the generic/general risk and the peculiar/specific risk. For instance, death is inevitable but a man who engages in smoking multiple cigarettes a day is at risk of having cancer, which is a peculiar risk to him due to his actions and/or inactions. This also applies to organisations, which can have both generic and specific risk(s).

It is essential to have adequate knowledge on the existing and anticipated risks so as to gain the opportunity to mitigate the uncertainties (Brent and Labuschagne, 2007). However, Smith et al (2014) and Saunders et al (2015) reveals that it is wrong for risks to be categorised as good or bad because if dealt with properly, one can convert the risk into an opportunity, but if neglected or not handled properly, it may result in negative adversity. Thus, it can be said that two elements that consistently accompany risk are progress and opportunity.

Smith et al (2014) further asserts that if an organisation wants to achieve consistent progress, it is essential for it to understand, handle and mitigate risk to acceptable levels. This can happen irrespective of the domain that a specific company operates in and, although favourability towards certain levels of risk may vary based on different company activities/operations, urgencies and losses, it still needs to always be addressed properly (Zavadskas, 2010).

This study intends to analyse the risk associated with the Nigerian power sector and to identify how a high quality and successful risk management strategy would impact this particular area. The power sector plays a very important role in the economic and social life of any nation as it is typically regarded as one of the main indices of growth and development. Small and medium scale establishments require power to drive their businesses. According to a report published by the Nigerian Economic Outlook, a stable power supply will reduce the costs associated with business in Nigeria by more than 30% and this in turn, will attract more large firms that are capable of producing goods and services that conform to international standards (Nigerian Economic Outlook: 2013-2017). A stable power supply can enhance the economy of a country by ensuring that necessary energy supplies are provided at a lower cost. This should advance all economic sectors, including production, manufacturing and services for servicing households. A stable power supply can reduce costs, increase productivity and efficiency as well as facilitating distribution and transportation. A stable power supply creates a high multiplier effect on an economy and so it is consequently imperative to understand the risks associated with projects in the power sector.

1.2 Statement of Problem

Sandberg and Alversson (2011) acknowledged that the aspect of under-researched areas in existing literature is known as neglect spotting. However, in contrast to their views, it becomes evident that most studies within the context of risk management (identifying, analysing, responding and monitoring risk) till date had not fully drawn parallels in retrospect that can be underlined and associated with risk management in the Nigerian power sector and its applicability on projects. In other words, the research will contribute in the field of knowledge of risk management. This further justifies the views of Olsson (2007) and Chapman and Ward (2003) who argued that the existing risk management processes (RMP) differ in statuses and that there is a profound need to improve the RMP as a result of several shortcomings and challenges (organisations scope and approach to RM) which include the ineffective tools and techniques which have their limitations and deemed unsuitable for the Industry.

Moreover, there are issues and existing problems on the dependency and in implementing a formal project risk management method as prior research conducted has indicated [See (McHugh and Hogan, 2011; Kutsch and Hall, 2010 and Soderlund 2004)]. On the one hand, this justifies the critiques of Hogart (1980) who argued that as tools lack the flexibility to capture the essence of many significant problems. While on the other hand, Packendoff (1995) posits that it is not about the use of particular methods or techniques, but to rather perform suitable and comprehensive RM framework to suit and address the preferences for the defined project specification. Thus, the research further emphasises and signifies that the use of existing tools and techniques might not necessarily contribute to the overall performance of the power projects in Nigeria as they tend to have their various limitations as earlier highlighted by various researchers.

Nonetheless, in addition, the worldwide electricity market is regarded as one of the most sensitive and susceptible sectors within any nation due to the important role it plays in the national economic sustainability. The development and economic dynamics of a nation is usually tied to the availability of electricity (Olugbenga et al., 2013). One of the main drivers of economic growth in a nation is Small and Medium-sized Enterprises (Eniola, 2014).

According to Umeora (2013), in 2012, Small and Medium-sized Enterprises (SMEs) contributed a staggering 46.54% to Nigeria's gross domestic product (GDP). In the views of Eniola (2014) who posits that SMEs contributes immensely towards the engine drive of the Nigerian Economy. He further reveals that SMEs employs 87.9% of work force in the Nigerian power sector.

There is also the suggestion that SMEs account for approximately 95% of all enterprises across the world (Ayyagari et al. 2011). Ghatak (2010) claims that in India, 80% of all the country's businesses are SMEs, while in Europe, SMEs are considered to represent the backbone of the economy (Okwu et al., 2013). They constitute 99.6% of the United Kingdom's economic sector and 99.8% of Belgium's.

Also, according to Ntiamoah (2014), SMEs contribute to up to 60% of China's GDP, 55.3% of Japan's and 50% of Korea's. Moreover, according to Abor and Quartey (2010), it is estimated that SMEs make up approximately 91% of a country's formal business entities.

Although SMEs are relevant to a country's economic development, there is a dense network of interconnected and interdependent factors that act together in order to provide meaningful results in economic development. Within this network, SMEs are just one of its components. Das (2010) indicates that the development of a nation is hugely dependent on the availability of power, and argues that without power there can be no meaningful development. Power is required to drive SMEs and project operations, which in turn, contribute immensely to the GDP of most nations. He further asserts that countries such as India, Brazil, Russia and Nigeria have initiated different power projects due to the versatility, convenience and effectiveness of electricity as a form of commercial energy.

As the availability of power is one of the most important factors in economic advancement, and there are still countries such as Nigeria that need to be improved and developed, it is necessary to understand ways in which power projects can be successful. A project that is completed on time and under the required budget while meeting the quality expectations of the project stakeholders may be regarded as successful. There are numerous factors militating against the success of projects and these factors may be either internal or external as a result of the heightened unawareness and practical implementation of risk management within the context of the Nigerian power sector.

Onaiwu (2009) argues that as a result of inadequacy and defectiveness in power supply, the Nigerian power sector problems stems from its slow growth and development, thus leading to projects suffering from low productivity, market deregulation, power shortage, government monopoly, continued project failure, ineffective regulation which has transpired as a result of inefficiency and mismanagement within power projects due to the lack of systematic practice and implementation of risk management. This further confirms the views of Ogunlana et al (1996) who stated that developing economies are prone to adverse risk factors as a result of the challenges within various industrial sectors and thus the Nigerian power sector is not an exception. The importance of the power sector to the development and growth of a nation is non-debatable. However, the means, methods or techniques used to ensure and/or guarantee that the power sector continues to drive growth and development.

Sharma and Vashishtha (2007) posit that to sustain and maintain competitive advantage in the energy market it has become essential to integrate economic risks effectively with risks related to safety and production. It therefore is necessary for a risk management strategy to be applied to all power projects to enable the identification of risks and uncertain incidents associated with the project well in advance, to implement corrective measures on time (Das, 2010).

Okoro and Chikuni (2007) argued that despite the availability of projects cost and time control techniques, there are still shortages which are persistent, leading to project delays, cost overruns, ineffective management of power projects in terms of time, cost and quality. Onaiwu (2009) stated that Nigeria's quantity of provided energy is insufficient when it is considered that it is the largest country in Africa for its population as a result of the misappropriation and encroachment problems that have led to critical issues in the power sector.

Omoju (2014) pointed out the striking discrepancy between Nigeria and South Africa. While the former successfully provides only 5000 MW for a population of over 160 million people, the latter can produce 40000 MW for its population of only 52 million. A report published by the Federal Republic of Nigeria showed that only 50% of the Nigerian population can benefit from electricity, with 10% of those living in rural areas (FRN, 2014). According to Minelli et al (2008), major risks typically associated with power plant projects include the following:

- Financial risk
- Human resource risk
- Design risk
- Construction risk
- Environmental risk
- Political risk

The above mentioned risks also affect projects in the Nigerian power sector. Financial risk is related to the consistent investment that should be made in order to sustain the development of such projects, among other measures, by contributing to building new power-stations or re-activating old ones (Okoro and Chikuni, 2007).

Human resource risk, as well as design and construction risk, may be related to the difficult task of guaranteeing that all those involved in the power sector projects have the necessary qualification to deliver the different stages of the projects within the established timeframes, within budget and without compromising the quality requirements. These risks can also relate to the quality of the infrastructure, tools and materials provided for completing the job.

A developing economical sector always creates a certain degree of environmental risk for the region that it is intending to expand. This is particularly the case if the specific economic sector is industry-related and requires the heavy consumption of resources such as the power sector (Okoro and Chikuni, 2007).

Political risks are linked to the necessity of creating a sound political context that can both allure and motivate potential stakeholders to become involved and invest in the Nigerian power sector (Okoro and Chikuni, 2007).

Considering these factors, it is very important to have a clear idea and knowledge of how to reduce the effect of these risks on the delivery and performance of Nigerian power sector projects.

Smith et al (2014) posits that performing risk management delivers benefits to all projects regardless of the industry or sector. They further stated that adopting the concept of risk management can provide the necessary context for enhancing strategic planning, ensure the effective use of resources, improve focus, and help identify opportunities. The implementation of risk management practices may aid the development and restructuring of the power sector in Nigeria through a robust analysis of the types of general and peculiar risks relevant to power projects in Nigeria.

The intention of this research is to develop a risk management framework that provides the necessary support to mitigate risks associated with power projects intended for development in Nigeria. According to Fatemi and Glaum (2000), the development and application of risk management models helps to develop clearer decision-making criteria.

Risk management can also help in achieving the key performance indicators in a project. The identification of project risks is typically the first step in trying to mitigate its effects. Risk identification is therefore one of the steps in any risk management exercise.

Additional justification for risk management to be conducted in power sector projects includes:

- *Innovation and cost consciousness*: It helps in achieving innovation and cost consciousness regarding production goal and safety (Ahmed et al., 2007).
- *Focus on safety*: Since most of the power projects operate in uncertain environment, risk management ensures focus on economies, production and safety (Fatemi and Glaum, 2000).
- *Budget*: One more advantage of practicing risk management in the power sector is to complete the entire project within the given budget so that it does not result in financial crunch (Ahmed et al., 2007).

1.3 Focus and Purpose

As discussed earlier in the preceding subsection (See section 1.2), the research purpose delves to analyse and examine the risks associated with power projects and how the concept of risk management can improve the success of projects specific to the Nigerian power sector as it has been argued that projects are temporary, unique and distinctive of every kind with clearly defined objectives. Therefore in order to approach this purpose, APM (2004) emphasized the adoption of RM as an integral phase of god management practice and evaluating its impact on the successful completion of projects related to the power sector in Nigeria.

Risk is inherent in all project phases and therefore cannot be ignored or eliminated. According to Copper et al (2005) who posit that the extent of uncertainties and risk vary according to the size and complexity of the project specification. It is therefore imperative, for the adoption of a risk management framework, to help reduce the negative effects of potential risks that may affect Nigerian power sector projects in terms of cost, time and quality.

The entire research work focuses on projects within the Nigerian power sector and elucidates existing tools and techniques currently being practiced by project managers in the Nigerian power sector, with the aim of providing and insight in terms of

identifying, reducing and/or mitigating risks impacting on the successful completion of ongoing power projects is any even or occurrence that will pose these specified objectives positively or negatively constitutes a risk.

The rational of PRM in the research further seeks to identify and address the main challenges of completing projects in the Nigerian power sector on schedule and within a specified budget. The importance and benefits of adopting risk management strategies for power projects will also be analysed.

The following could be mentioned among the ongoing Nigerian power projects: Mambilla Hydro Power Plant Project, Zungeru Hydro Power Plant Project, Gurara II Hydro Power Plant Project, Kashimbilla Hydro Power Plant Project and Itisi Hydro power Plant Project.

1.4 Aim of Research

This research aims at conducting investigation into the importance and contribution of risk management to the success of projects specific to the power sector in Nigeria and designing a risk management framework which can be successfully applied to these projects as it is based on the prior analysis of the risks typically associated to them.

1.5 Research Objectives

The objectives of the research include:

- To examine the efficacy of risk management process in practice.
- To identify the various risks typically associated with projects in the Nigerian power sector.
- To determine the current situation of risk management practices and the importance of risk management processes to the successful completion of projects in the Nigerian Power sector.
- To develop a risk management framework/model applicable to the Nigerian power sector
- To provide recommendations on how risk management process can be used to improve the critical success factors in the Nigerian power sector.

1.6 Research Hypotheses

Creswell (2013) reveals that hypotheses aid in focusing the purpose of a study. He further contends that through the use of research hypotheses it is possible to create a relationship between variables.

In order to establish a clear need for the research and provide answers to one of the research objective, it is important to propose some research hypotheses to help validate the research. Recall that one of the outcomes of this research is to examine the efficacy of risk management process in practice (See section 1.5).

The following are the research hypotheses:

Hypothesis 1: There is a discrepancy between organisations that consider risk planning an important prerequisite for the commencement of most projects in Nigeria (Small and Large organisations).

Hypothesis 2: There is a discrepancy between organisations that perform risk assessment an important prerequisite for the commencement of most projects in Nigeria (Small and Large organisations).

Hypothesis 3: There are dedicated risk management teams tasked with implementing risk management practice within the majority of organisations involved in power projects in Nigeria

Hypothesis 4: There is a positive dependant connection between the performance of Nigerian companies and the risk assessment practices implemented at organisational level

1.6.1 Rationale for Research Hypotheses

The chosen hypotheses represent the key elements of the risk management process.

Dedicating time and resources within a company to ensure the proper implementation of risk management is the firmest proof of understanding and admitting the importance of risk management. Some stages of the risk management process can

be, and are, performed within different companies without them having agreed on and developed a risk management framework.

Addressing risks as they occur and finding solutions that help tackle and overcome an unexpected challenge is a natural and necessary reaction. Understanding the context within which a project is developed to ensure the coordination of people, material resources and time resources is also an intuitive approach to risk management. This is, however, not always performed within a clearly developed risk management framework. Besides these phases, which are natural within any project's life, a risk management process involves stages that are specific and mandatory for its implementation. Risk planning is an important component and its necessary consideration can be evaluated by observing whether its results influence the commencement of a project. This, therefore, amounts to a fundamental consideration in the decision making process.

Risk assessment is another main component of the risk management process. It implies a careful evaluation of the potential risks and is the opposite of merely reacting to existing challenges that manifest within a project that may require attention at some point.

As a risk management strategy is an important component within the management of any given organisation, it seems only natural that it would be represented by a designated team. Moreover, awarding the task of implementing risk management practices to a certain team increases the chances for successful risk management that is properly handled and confirms the importance the organisation places on the process. .

The fourth hypothesis has been considered for the purpose of the thesis as several authors have highlighted that risk assessment compliance will be beneficial for the overall organisational performance. Agwu (2013) declares that an increased productivity and profitability, as well as a decreased incident rate and better safety policy, were the result of a well-implemented risk assessment activity. Furthermore, Akintonye and Macleod (1997) and Perry and Hayes (1985) emphasizes that a

company's improved focus on risk leads to better project management assessment and will attract more competition from companies of the same profile.

Validation of the hypotheses establishes that risk management practice in Nigeria is already at an advanced stage.

However, if the research hypotheses are proved to be invalid, the research would be justified as a clear need for considering the reasons why implementing risk management for power projects in Nigeria is important. It will, on the one hand, analyse the stages of development reached by risk management strategies within Nigerian-developed power projects developed and, on the other hand, considering the success of power projects, will provide a basis for understanding if there is a relevant correlation between the two. It will therefore assess the contribution that risk management has on the success of Nigerian power projects.

Implementation of risk management can be considered to have reached a high or low level of development by analysing whether the Nigerian risk management practices are performed within a clearly developed and universally approved (within the company) framework. Intuitive approaches to risk management are placed outside a coherent framework as they do not reflect an institutional culture oriented towards encouraging the implementation of risk management. This is confirmed by awarding great importance to risk planning, risk assessment and dedicated risk management teams.

1.7 Structure of the report

To ascertain a comprehensive research review, this study is divided into eight chapters. A concise explanation of the contents of each chapter is presented below:

Chapter 1 – Introduction: This provides the research background. The aims, objectives and justifications of the research are also highlighted.

Chapter 2 – Literature Review: This chapter constitutes part of the research methodology and provides definitions for the key terms and concepts encountered throughout the research. It provides insight into existing literature on the research area and forms an important part of the research methodology. Risk management processes

and the various kinds of risks associated with projects will also be analysed. This chapter will focus on risk management frameworks, currently in practice by various researchers, with a view to understand their strengths and weaknesses to form the basis for the development of a risk management model specific to the Nigerian power sector.

Chapter 3 – Overview of Nigerian Power Sector: The Nigerian power sector will be extensively explored in this chapter and an industry analysis will be carried out using analytical techniques such as the SWOT (strength, weakness, opportunity, threat) analysis. The purpose of this chapter is to fully underline the workings of the Nigerian power sector so as to gain an understanding on how a risk management framework can be used to improve the key project performance indicators.

Chapter 4 – Research Methodology: This chapter deals with various research methodologies and highlights the methodology adopted by the author. It also offers an explanation on why the chosen method was adopted, with a view to justify its validity and reliability. This chapter is very important to the research because it provides justification for the research method adopted and also highlights the various data collection techniques used for this research.

Chapter 5 – Data Presentation, Analysis and Findings: In this section of the report data collected from primary and secondary sources is presented in quantitative form and analysed. For the basis of this assessment, findings are generated to obtain inferences for the next chapter.

Chapter 6 – Development of Risk Management Model: In this chapter, a risk management model suited for the Nigerian power sector will be developed. Practical applications of the proposed model are discussed as well as how they will enhance the success rate of projects.

Chapter 7 – Discussion, Research Findings and Conclusion: This chapter expounds the entire research and draws parallels between the research aim and objectives and the research findings.

Chapter 8 – Significance of Research, Recommendations and Direction for Future Studies: This part of the research states the significance of the research. Recommendations to improve the practice of risk management and directions for future studies on the subject matter are also presented to enable other researchers to build on the outcome of this research for future research in this field.

1.8 Chapter Summary

Electricity is one of the most important forces in our life and it is one of the key components to modern technology. The role and importance of power supply to the growth and development of any nation cannot be overemphasised. This is so because power is needed to drive industries which in turn provide employment opportunities, our computers, heating system, the internet and nearly everything needed to make life more enjoyable requires electricity.

The power sector plays an important role in the socio-economic life of any nation and it therefore becomes imperative to understand means of ensuring it attains its full potentials. Risk management provides a suitable means of helping the Power sector realise its full potentials in terms of value addition. This is so because through risk management, the factors hindering the development or actualisation of projects in the power sector can be highlighted and discussed in order to thereafter formulate potential solutions.

The power sector in Nigeria is associated with a series of risks which fall under six categories: financial risk, human resource risk, design risk, construction risk, environmental risk and political risk. Projects in the power sector are typically abandoned, suffer from cost overrun and schedule slippage. Demand for electricity in Nigeria far exceeds the supply, as mentioned before, with only 50% of the population having access to electricity, and the quality of the service is poor (FRN, 2014) and this poses a huge challenge to small and medium scale organisations. Scarcity of stable power supply has by implication resulted in a higher cost of doing business in Nigeria as organisations have to seek and utilise alternative source of power to drive their activities.

This chapter therefore provides a background to this research as well as provide justifications as to the importance of risk management to projects in the Nigerian power sector.

CHAPTER 2 – LITERATURE REVIEW

SECTION I: RISK MANAGEMENT

2.0 Introduction

This chapter is intended to identify the gap that exists in previous studies performed on the topic of risk management.

It is important to understand the meaning of risk, its identification and how it can be controlled or managed, before presenting and discussing a risk management framework. Saunders et al (2015) posits that there exists a rather erroneous misconception about risk and its effects as the impact of risks on an organisation is typically viewed in a negative light. It is important to point out that not all risks are negative as there are those which present the potential for opportunities if properly handled. While Khatta (2008) reveals that risk on its own is not a problem, Rahman et al (2013) states that if an organisation aims to achieve consistent progress then it must understand how to handle and mitigate risks to an acceptable level.

This section of the research shall underline the basic principles and importance of risk management and show a clear distinction between risks and uncertainties as devoted to a review of past studies in relation to the particular emphasis on the concept risk management and it's applicable to project success.

2.1 Definitions

There is a common misconception that risk and uncertainty are synonymous and can therefore be used interchangeably. Although risk can in fact be estimated (quantified) and dealt with according to the challenges it poses, uncertainties cannot be estimated because the outcome is unknown (Cooper et al., 2005). Samson et al (2009) asserts that in theory, risk and uncertainty are used to define some future expectations but in practice this is not so. As the power sector (construction industry) is prone to adverse risk effects due to its complexity, the concept of risk management will play a pivotal phase in improving project performances as a result of the fact that projects which are undertaken are encompass some sort of uncertainty and it is a prerequisite that must be managed properly (Zayed et al, 2008). In light of this, the definition of key

registers associated with risk management is needed to aid our understanding of the relevant research.

2.1.1 Risks

Risk is defined in accordance with the change associated with the chances of occurrence of an event and the consequences attached to it (Lee et al., 2012). The consequences associated with risks can therefore either be positive or negative.

According to the PMBok (2008:238), *“risk is an uncertain event or condition that usually affects at least one of the key performance indicators, such as time, cost, scope, or quality in a positive or negative way”*.

Stonebumer et al (2002) posits that risk may also be regarded as a probability or threat of liability, damage, injury, loss or some other unwanted occurrence that takes place due to either internal or external vulnerabilities.

According to APM, risk is any incidence where occurrence is likely to have an impact on a projects objective (APM, 1997). Chapman and Ward (2003) also reveal that risk is the idea of the presence of considerable uncertainties in the achievable level of project performance.

Risk is in every aspect of life and there may be no endeavour in life which is risk free. Every activity performed by a living being carries some kind of risk. Some activities carry an inherent risk. Climbing Mount Everest, for example, is a challenging task which involves a high degree of risk, but there is also risk in driving a car in the city. Although both cases carry a certain degree of risk, the chance of a risk occurring in the first case is higher than in the latter case (Chapman, 2006).

2.1.2 Uncertainty

Knight (2012) reveals that uncertainty concerns an occasion or action which is expected to occur in the future which no one has any control over. The uncertainty's x factor is its inability to be quantified or measured. He further asserts that uncertainty is a future activity or action where the outcomes are uncertain. Hartford (2004) first indicates the difference that exists between risks and uncertainties. He claims that both risk and uncertainty define hazard or losses as a future occurrence, but in the case of risk, these losses or hazards can be quantified and subsequently measured. On the other hand, since losses and peril cannot be quantified, it is not possible to measure uncertainty.

Knight (2012) also states that risk can be defined in terms of probability as the final outcome can be predicted. This, however, is not the case with uncertainty as it cannot be defined in terms of probability due to the unpredictability of its final outcome. According to Knight (2012), the best example of risk can be shown by considering a game of roulette at a casino. The gambler is sure about the probability that a number will be displayed once rolled. Contrary to this, placing money on a horse in a horse race is uncertain, as the jockey was fall of his horse for example, and therefore there is no guarantee that the race will be completed.;

Risk can be mitigated or eradicated, but this is not the case with uncertainty. Both concepts concern the future outcome of an activity, but in the case of risk, the negative impact of the event can be eliminated or reduced by adopting control measures. This cannot be achieved when the outcome of the actions are uncertain (Chapman, 2006).

It becomes very clear from the definitions above that although risks and uncertainties are related to the future occurrence of an event; the terms are not synonymous. According to Hartford (2004), risk is characterised by the probability of the occurrence of an event and its impact on an individual or organisation, whereas uncertainty is characterised by ambiguity about the impact of an event or an individual or organisation.

For this research, the definition put forward by APM (1997:16) will be adopted as it is considered wide enough to comprise the majority of the characteristics of risk enunciated by the above mentioned authors. APM defines risk to be any event or incidence where the occurrence is likely to impact on the objectives of a project or an organisation. The definition for uncertainty asserted by Knight (2012), which suggests that uncertainty is an event or incident likely to occur in the future which cannot be controlled or mitigated, which is also considered appropriate as it underlines the main difference between risk and uncertainty and shall therefore be adopted for this research. Considering the latter, the research is conducted so as to take into account both predictable risks as well as those which cannot be estimated at the beginning phases of a project. Uncertainty must not be ignored and the risk management framework designed in order to ensure the successful completion of projects needs to also comprise steps that aim to address it in an appropriate manner. It is also important

to notice that this is in compliance with the continuous nature of the risk management process. Performing constant reassessment of risks and risk monitoring are two of the actions directed towards this purpose.

2.2 Risk Management

According to Chapman (1997), risk management (RM) is one of the basic elements of the strategic management of an organisation. Through this framework, organisation can methodologically define various kinds of risk attached with activities and actions performed by a company to achieve specific goals and sustainability within a business. Risk management ultimately focuses on the identification of potential risks and the treatment of these risks in order to maximise the sustainable values of the firm's activities.

Continuous improvement in different fields of business has greatly helped organisations to enhance their operations, but these developmental activities are usually fraught with risks of different forms (Monetti et al, 2006). In the present business environment, risk management has therefore gained great popularity within organisations and firms. Like other management activities, risk management supports a firm in attaining its goals and objectives (Raz et al., 2002).

Risk management helps organisations in the optimal allocation of resources and in the decision-making process. It helps organisations undertake planning in order to effectively carry out its productive activities. Smith et al (2006) reveals that risk management does not deal with the prediction of future activities or events, as practically this is not possible. Instead, it is a tool or technique that facilitates a project manager to make better decisions based on available information. Akintoye and Macleod (1997) add that risk management helps to articulate the pros and cons of all the issues which may negatively impact the organisation. It is a continuous and developing process with the purpose to enhance the probability of the occurrence of positive events and reduce the probability of uncertainty and failure. A risk management strategy must also be capable of being incorporated into a business's culture and can convert strategy into operational and tactical objectives. It accounts for rewards, performance measurement and accountability, therefore supporting operational efficiency at various management levels. Shortreed et al (2003) argued that, risk management is a system comprising of various sets of elements within a company's management system, which deals with managing and controlling risk. They further asset that Risk management is associated with the structure of a firm and is an

essential component of an organisation's management. It is a framework that defines the order and timing of the processes that a company adopts for managing and controlling risk. This significantly helps make the entire process more understandable and transparent for stakeholders.

The project management institute (PMI: 2004) reveals that risk management is a very unique tool developed by companies to focus on uncertainties that they may have to face.

Figure 1 below shows a general risk management framework. It includes the planning and identification of risk, risk assessment and risk response, and monitoring and controlling its handling and termination.



Figure 1: Risk Management Process
(Source: Leonard, 2001)

The probability of the occurrence of risk may be low but its effect to an organisation may be harmful. Like other management activities practiced by an organisation, risk management must be practical, cost effective and aid the success of the organisation by ensuring it maintains and sustains its competitive advantage. The business environment is fraught with risks of various kinds, giving birth to risk management practices (Samson et al., 2009). Higher stakeholder participation, complex

scenarios, greater interaction and media scrutiny has stimulated the use of risk management in all types of firms.

However, the researcher has decided to compile a synthesis definition of risk management that comprises several aspects included in the aforementioned definitions of risk management which is relevant for this research project. This includes the idea that risk management is a continuous process essential to developing the strategic management of a company, based not on predictions, but on the information that is already known and on constant reassessment of risk. This allows the firm to decide on the optimal allocation of resources in order to reach its aims and objectives in the most effective manner (Smith et al., 2014).

This definition proves useful as it can be applied directly to the research aims of this study, which are to identify, analyse, and evaluate the various risks encountered within the Nigerian power sector and suggest possible guidelines and mitigating strategies to eliminate these risk factors that may hinder the success of a project.

2.2.1 Two types of Risk Management: Enterprise Risk Management and Project Risk Management

Risk management can be looked at from different perspectives and these perspectives are consistent to the way the process is designed and implemented.

2.2.1.1 Enterprise Risk Management

In their 2010 article, *the organisational dynamics of Enterprise Risk Management (ERM)*, Arena et al (2010), describe ERM as an approach designed to establish a link between risk management, on the one hand, and business strategy with regards to how a company projects its objectives, on the other. They point out that ERM bears an influence on how control, accountability and decision-making choices are performed within the company. However, the article does not necessarily establish the specific points that distinguish risk management from ERM.

Alternatively, Gordon et al's findings (2009) years later had indicated a significant shift in the paradigm concerning how enterprises consider risk management. They argued that, if previously, there was a predisposition to consider risk management as a system that would be relevant only for the particular sector and enterprise that it was designed for, as the years passed, this perspective changed to consider the benefits of a holistic perspective on risk management.

Enterprise risk management or ERM is the name given to the new holistic paradigm that was adopted. ERM was promoted as a means by which companies can become more successful and effective. Gordon et al (2009) developed their own argument concerning how ERM could improve a company's performance. They further argued that in order for this to happen, ERM should be adjusted to also consider environmental uncertainty, industry competition, firm size, firm complexity and the monitoring of the board of directors.

Fraser and Simkins (2010) provide a more detailed explanation of ERM. They too advance the idea that ERM could be looked at as the next natural step that risk management had to take on its scale of evolution. They recall the silo-based approach to risk management that stated that the risk related to each sector of a company and was considered and addressed separately, isolating one sector from the others and creating a fragmented structure.

The ERM approach, on the other hand, views all sectors and activities as part of the same organism that must be considered as a whole. While risk management was considered a process that was coordinated at the top, ERM is a process that implies the involvement of all employees, as risk management becomes an integrated part of their jobs irrespective of the positions they occupy within the company. By promoting a holistic approach to risk management, ERM encourages actions that can lead the correct identification of risks and, consequently, establish the applied prioritisation of the designed solutions.

2.2.1.2 Project Risk Management

Bart Jutte (2012) defines project risk management (PRM) as a process concerned with the actions carried out within a project, team or company in order to optimise project risks. His definition is consistent with that developed by the Project Management Institute (in the PMBOK Guide). The former describes good project risk management as being dependent on the support it obtains from organisational factors; on defining precise roles and awarding clear responsibilities; and on the skills of those performing technical analysis. Project risk management includes a series of processes: planning risk management, identifying present and potential risks, conducting qualitative and quantitative risk analysis, preparing risk responses and, last but not least, monitoring risks and keeping them under control.

Most of the above mentioned processes developed under project risk management assume that a detailed plan of the project development has been created. These processes are also based on what the *Project Risk Management Handbook* (2009) calls 'an unrealistic certainty' and this is why they must also consider precautionary measures for dealing with project risk.

The PMBOK Guide also defines the objectives of project risk management, namely: the increase of the occurrence and effect of positive events and the decrease of occurrence and effect of negative events on a project. It also states that the aim of project risk management is to identify and prioritise risk in advance of its occurrence, and to offer relevant information that can provide a basis for how project managers decide to act. Their decisions are to some extent shaped by probability as they must take into account events that may or may not happen, along with how these events may impact the objectives of an ongoing project. This idea points to an important aspect clearly stated within *Project Risk Management Handbook* (2009), namely, that project risk management is, by no means, a substitute for other project management processes.

Risk management is complementary and should be seen as providing an important perspective on the project development, which allows other project management processes to gain value.

2.2.2 Functions of Risk Management System

Chapman and Ward (2003) define a risk management system as a group of aspects within a company's management system that primarily focuses on the management of risk. A risk management system is one of the main parts of an organisation's management and is typically linked to its structure. The main components of a risk management system are: decision-makers, policies, strategic planning, unique corporate environment and resources. Cleden (2009) reveals some of the functions of a risk management system:

- It aids decision making
- It identifies risk criteria
- It determine, approximate, evaluate, control and commune risk
- It suggests means of mitigating the negative effects of risk and improving the positive effects of risks
- Develops healthy relationship with stakeholders

2.3 Elements of Risk Management

Damall and Preston (2010) indicate that organisations adopt risk management enable them to recognise and measure different kinds of risks. This, therefore, aids them in selecting, developing and implementing measures to eliminate or mitigate the risk and its consequences. In other words, risk management is a process and not a sequence of various events .Damall and Preston (2010) further postulate that the effectiveness of risk management depends on the planning; timely identification and assessment of the risk; incessant monitoring and reassessment; the timely adopting of remedial measures; communication, and the recording and synchronisation of all organisational activities.

There are many ways in which risk management can be structured, but the most common elements include planning, evaluation, handling and monitoring. These elements are all interlinked with each other. Once the planning takes place, remaining elements are designed accordingly (Davis and Jarvis, 2007). Figure 2 below depicts an example of the elements of a risk management process.



Figure 2: Elements of Risk Management
(Source: Leonard, 2001)

i. Risk Planning

Risk planning is the first stage or element of the risk management process. It is a non-stop process which includes developing a broad and organised approach related to managing risk. In the early phase of this stage, various strategies are established in relation to the project, and the goals, aims and objectives of the project are developed (Elkingtin and Sallman, 2002). According to Jeynes (2002), this stage also deals with the planning assessment; monitoring and controlling activities; identification of the resources required for the project; communicating the role and responsibilities to various team members; organising risk management training sessions for the members; identifying and establishing a method to assess the items which may results in risk and finally, developing a document for recording and disseminating data and information to all the participants on a continuous basis .

According to Lester (2007), some of the conditions that must be fulfilled in risk planning include the following:

- The process must have innate planning such as configuration management, supportability and productivity.

- Proper coordination among all the activities
- Recording of unremitting efforts
- Proper integration between planning of all the levels
- Proper link between the preceding and succeeding activities
- Defining deadlines for all the activities.

With time, the intensity of the risk gets altered. That is, through risk management, basically, project manager or the management tries to control the risk, which has a direct impact on its probability and repercussion as changes are implemented. With the passage of time and unfolding of the events, the risk probability, its repercussions and measures implemented to eliminate or mitigate it must be reassessed and should be changed in accordance with the situation and the requirements. Now, as stated above, all the activities are continuities and keep on changing with time, therefore, the planning process is termed as never ending process (Lyons and Skitmore, 2004).

ii. Risk Assessment

The second stage of risk management is the risk assessment step. In this the identified risk related to the life cycle of the project is assessed and analysed. In the risk identification step following activities take place:

- Determining the uncertainty associated with the occurrence of any event, driver and sources
- Altering ambiguity into risk
- Evaluating the probability related to the occurrence of the event (Emblemsvag and Kjolstad, 2006).

In a case where there is more than one identified risk, it is essential to prioritize the activities. Figure 3 shows the risk identification and assessment stage:



Figure 3: Risk Identification and Assessment
(Source: Leonard, 2001)

iii. Risk Handling

The third step of risk management is related to the handling of identified and assessed risk. This process is initiated once the risk is quantified. The main purpose of including this stage in the risk management is to eliminate or mitigate associated risks. There are various ways of handling different kinds of risk. Four of the most popular approaches are: risk avoidance, risk control, risk assumption and risk transfer (Darnall and Preston, 2010).

iv. Monitoring and Reporting

The last stage of risk management is monitoring and reporting. Risk monitoring is a never-ending process as it continues to assess and evaluate each stage and activity of the project. For assessment purposes, a feedback system, watch list and various metrics are devised to enable all activities and actions to be monitored properly (Samson et al., 2009). The outcomes of all the activities are then communicated to respective departments so that individuals working on various activities can get an idea

of the potential repercussions of the identified risks. Thus, it is the most important stage of risk management as the managerial teams can take quick and appropriate measures to reduce or mitigate the risk. Moreover, it also enables the team to prepare themselves well in time to face uncertainties (Lyons and Skitmore, 2004).

The methods employed within all the definitions of risk management, developed by various researchers, are similar and highlight risk management as a process that typically consists of risk identification, risk assessment, risk analysis and risk response.

However, as perspectives tend to become complementary as they adopt a slightly different outlook, more than one perspective on the issue must be presented. Also, after having presented several perspectives through which the risk management process is defined, it is important to point out various methods and activities through which this process can be conducted. Figure 4 below represents the basic principles and understanding the process of managing risk, proposed by Smith et al. (2006):

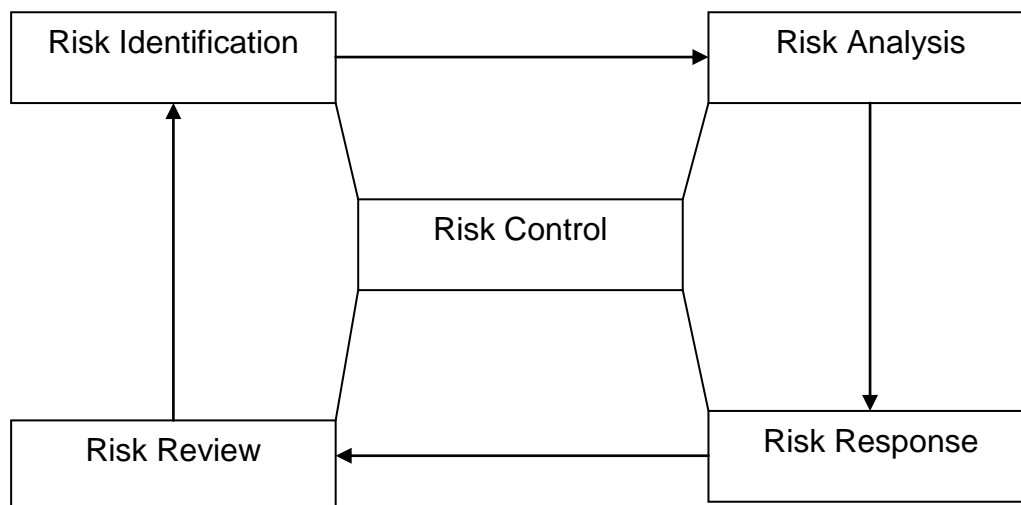


Figure 4: Risk management process
(Source: Smith et al., 2006)

The model proposed by Smith et al (2006) suggests that before initiating any project, it is essential for the project manager and management to identify all the possible risks which may negatively impact the entire project and create hindrance in

the timely completion of all project related activities. Once all the existing and potential risks have been identified, the manager must then assess each kind of risk to evaluate the impact it may have on the project. The next stage is to respond to the identified risk (Smith et al., 2006). During this stage, the manager adopts certain methods through which the risks can either be alleviated or removed. After implementing the most suitable measure for eliminating the risk in adopting various control methods, the final task of the manager is to continuously monitor and review the implemented methods to verify if it is achieving its purpose or not. If it is not, then further control measures are required (Smith et al., 2006).

2.3.1 Risk Identification Methods

Khatta (2008), like most researchers, asserts that the risk identification process starts with the identification of risks related to different activities involved in the project. The natural continuance of this stage, namely that of admitting that identifying risk is a *sine qua non* condition, is to discuss several methods that can be employed to identify various kinds of associated risks. The main methods include:

- ❖ *Brainstorming*: In this method, various individuals form a group and conduct a face to face meeting to create ideas and thoughts on one particular subject. The inputs provided by all the individuals are not evaluated at the same time. Instead, they are encouraged to develop as many ideas as they can. The inputs are evaluated once the entire session has finished (Manelele and Muya, 2008)
- ❖ *Focus Group*: In this method group of individuals are invited to discuss on the same topic multiple times so as to get their attention on the required area and to collect maximum information from them.
- ❖ *Experience Judgement*: In this only those individuals having adequate knowledge and skills on given area are consulted. This helps in collecting most authentic and valid information and assists in properly identifying the problems.

- ❖ *Flow Chart*: In this, a dynamic process is designed on a paper and then all the activities are critically analyzed for identifying the areas of higher risk (Pellegrino et al., 2013).
- ❖ *SWOT Analysis*: This is assumed to be the most effective and one of the most frequently methods for risk identification. In this, strengths, weaknesses, opportunities and threats pertaining to a situation are recognized which helps in identifying the negative and positive impacts of the events.
- ❖ *Analysis of Systems*: Before initiating any project, companies develop certain system to be followed throughout the project. Therefore, analysis of system helps in studying the manner in which the system operates within the company for identifying its weaknesses. System may be some operational system, policies and procedures or management process (Pellegrino et al., 2013).
- ❖ *Audits*: One of the traditional ways of identifying loopholes in the entire process is through auditing. In this the manager has to ensure that all the operations are performing in accordance with the documentation.
- ❖ *Scenario Building*: This method is adopted in large projects to minimize the impact of the risks on the actual project. In this, a theoretical process or situation is created similar to the project which the company is going to initiate so as to determine its potential results. This significantly helps in eradicating the ill event before it actually occurs (Manelele and Muya, 2008).
- ❖ *Accident Investigation or Failure Analysis*: In this method, the management of the team of specialists analyzes past occurrences to evaluate what went wrong which resulted in a fatal accident or failure of the project. By doing this one can identify the risky areas of the future projects.
- ❖ *Checklists*: In this, a list of various items is prepared and before initiating each stage of the process the situation or event is checked against each parameter.

- ❖ *Risk Identification Forms:* Risk identification forms are bit similar to a structured questionnaire in which standards questions are included to determine the risks associated with the project (Garvey, 2008). Generally, they are tailor made, that is, are prepared from some specific situation.
- ❖ *Feedback and Communication:* This is one of the most frequently used techniques for risk identification in the present scenario. In this, complain handling, safety meetings, etc. are practiced so as to determine the areas which require more attention.

In addition to the activities stated above, activities that can also be included in risk identification efforts are those which help define the probability and repercussion of the identified risk (Rahman et al., 2013). Rahman et al (2013) reveals that these activities include the following:

- Testing and evaluating ambiguity
- Determining probability of occurrence of an event and its impact
- Quantifying risk when it becomes difficult to understand them in qualitative nature

According to Samson et al. (2009), such activities (as listed above) are included in the risk management so as to define scope and sensitivity of the risk and also to answer certain questions such as:

- With the change in certain activities, what will be change in the risk, that is, will its pace increase, decrease or remain the same?
- What will be the guaranteed effects of the risk if certain event occurs?
- How quickly will the identified risk affect other identified risks?
- What will be the impact on overall project?
- Will the risk increase, decrease or remain steady?

2.3.2 Risk Analysis Methods

After identifying the risk, the next consideration in the risk management process is to analyse these risks. According to Raz et al (2002) the activities during this phase

of a project are performed to further refine the assessment process by analysing the identified risk in depth. It includes evaluating the complete impact of the risk on the project and identifying alternative measures that can be applied to mitigate or overcome the identified risks.

PMI (2004) asserts that in this step, the priority of various risks is determined, required information is identified to determine the risk and available methods that could be implemented for handling various identified risks are assessed. In the risk analysis step, various alternatives, opportunities and options are explored which can be used to assess risk more effectively. Further, it also creates a number of legitimate ways that enables the risk to be treated properly". In addition, the sensitivity and interrelation related to various risks is analysed in terms of performance variation. PMI (2004) also claims that the impact of internal and external changes is also analysed in this process.

According to Yulong et al (2008), two methods exist for assessing various potential or identified risks. The first method is the qualitative method and the second is the quantitative method.

Qualitative analysis is typically employed when a project is required to ascertain risks that can be analysed on from a descriptive script. For example, risks with levels that can be rated from high to low can be analysed using a qualitative method of risk assessment. Quantitative methods of risk assessment are usually adopted for risks that have a probability or occurrence which can be determined, or where the impact can be measured, using e numeric values (Cagno, 2008). However, certain risks are analysed through a work breakdown structure and are therefore evaluated individually or by a team of experts. There are risks which generally demand non-stop quantitative assessment. In addition to this, risks relating to internal processes and external influences are also evaluated by a team of experts.

Hall and Duperouzi (2011) however contend that another method exists for assessing risk and this is known as the semi quantitative method. They reveal that this method is the summation of both the quantitative method and the qualitative method. The risk is therefore described using numerical values and is quantified.

Chapman and Ward (2003) conducted a survey to reveal the important factors that must be taken into consideration when selecting a risk assessment method. Factors listed in their report, include the following:

- Cost of implementation of the chosen method
- Familiarity of the organization with the selected method
- Complexity of the method i.e. whether it is easy to understand or not
- Viability of the method, that is, it must provide complete solution
- Understanding and usability of the method
- Creditworthiness of the selected tool
- Authenticity, reliability and validity of the outcome

A. Quantitative Methods of Risk Assessment

Quantitative methods of risk assessment are complex in implementation and require thorough understanding, but they deliver more accurate and valid results. Generally, this technique is best suited for medium to large scale projects due to its complexity (Cleden, 2009). The figure below shows the various types of techniques employed in quantitative risk assessment:



Figure 5: Quantitative Methods of Risk Assessment

(Source: Darnall and Preston, 2010)

i. Modelling Technique – Sensitivity Analysis

Sensitivity analysis is usually adopted in medium and/or large scale projects to ascertain the most intimidating risk and its potential effect on an organisation. Using this

method, the organisation considers all the identified risks that would impact on a project's aims and objectives. Risks associated with a higher impact on a project are regarded as more sensitive to the organisation's objectives. These risks are more threatening and have a greater effect on the performance and operation of the organisation (Darnall and Preston, 2010).

Davis and Jarvis (2007) however contend that sensitivity analysis is only capable of assessing the effect of one risk on the final outcome of a project and does not give any kind of correlation between the impacts of all the identified risks.

ii. Scenario Technique – Monte Carlo Simulation

Monte Carlo simulation provides the best method for conducting a scenario technique. This technique is based entirely on statistics and is employed for analysing risks and their effects on the final outcome of a project (Jeynes, 2002). As the project is a combination of series of activities, the results from the simulation shows the probability of risk that are likely to occur within the duration of the project which is used in forecasting and estimation (cost and Scheduling) and is expressed in percentages by generating various scenarios. These variables are then grouped into one of three categories: pessimistic, most likely and optimistic (Lester, 2007).

iii. Diagramming Technique

The most prevalent diagramming method is the decision tree analysis and it is employed when it is known that the impact of the identified risks will have significant on the cost and time indices of the project. There are primarily two methods in which a decision tree can be constructed. First is the Fault Tree Analysis (FTA) and other is Event Tree Analysis (ETA).

Fault Tree Analysis (FTA) is employed to ascertain the probability of occurrence of risks associated with a project. It can also determine the probability of occurrence of potential risk that may affect the final outcome of the project (PMI, 2004). By drawing a proper tree diagram, the management can decide which branch to follow, in order to mitigate/ eradicate the negative impacts of any potential risk during each scenario attached to a particular phase of the project.

According to Westland (2007), the event tree is used to identify the cause and effect relation between a situation and its outcome showing the failure modes.

B. Qualitative Methods of Risk Assessment

Quantified risk assessment is considered to be the formal approach of quantifying the risk in terms of the probability of the occurrence of an event and its consequences. It is generally based on a top down structure process which makes use of a work breakdown structure. Through this, the risk is evaluated by assessing, simulating and calculating the statistical probability of the occurrence of the event (Chapman and Ward, 2003).

Lyons and Skitmore (2004) argue that it is the most common method of analysing the intensity of the risk is through the use of a risk matrix rather than using complicated calculations which require computed aided software. A matrix shows the probability of the occurrence of an event along one axis and its consequences or intensity on another, to determine its relative risk (Brent and Labuschagne, 2007).

When an organisation needs to evaluate risk and its effects on descriptive scale, or when they need to elucidate the likelihood and impact of a risky scenario, the qualitative method is employed. Qualitative risk assessment methods are simple to implement and understand. Organisations employ these techniques when they are short of time and money (Zou et al., 2007).

Chapman and Ward (2003) claim that although risk assessment steps and techniques are used to identify and assess the risk, it is an effective way of analysing the risk associated with any project. However, it is still considered to be cautious while implementing these tools and techniques. The project manager and the management must not solely rely on the quantitative numbers determined from analysis and simulation. In addition to simulation and numerical values, the project manager must also consider the source of the risk and its consequences on the entire project. By performing various tests, one cannot eliminate risk, rather, it only provides information that helps analyse and assess the risk. Above all, it is essential to give proper consideration to the manipulation of risk scales and the risk index; even though this is quantified information that is determined and assessed by experts since such

information is highly relative and subjective. In many cases, it is not possible to define risk solely on the basis of these numbers. Therefore one must not rely only on the numbers and even if quantitative information is considered, a sensitivity analysis must be applied to it (Cleden, 2009).



Figure 6: Quantitative Methods of Risk Assessment
(Source: Zou et al., 2007)

i. Risk Probability and Impact Assessment

This method is applied to identify the probability of the occurrence of any of the identified risks and the effect of those risks on the entire project. To assess risks through this method, organisation needs to focus on three main parameters: assessment, probability and impact (Zou et al., 2007). Cleden (2009) reveals that this method helps organisations to assess the impact of risks and aids management in determining the likelihood of each of the identified risks and their impact.

ii. Probability/ Impact Risk Rating Matrix

According to Westland (2007), this method involves prioritizing risks. Risk priority is calculated by multiplying the probability of occurrence with the impact of the risk. An example is shown in table 1 below:

Table 1: Probability Impact Matrix

Probability Impact	Very Low Risk (0 – 5%)	Low Risk (6 – 10%)	Moderate Risk (11 – 20%)	High Risk (21 – 40%)	Extremely High Risk (41 – 80%)
0.9	0.045	0.09	0.18	0.36	0.72
0.7	0.035	0.07	0.14	0.28	0.56
0.5	0.025	0.05	0.1	0.2	0.4
0.3	0.015	0.03	0.06	0.12	0.24
0.1	0.005	0.01	0.02	0.04	0.08

(Source: Heldman, 2011)

Arranging the risks based on the probability matrix, those risks which are higher in the priority list require immediate attention whereas those which are lower in the priority list are taken care of if and when needed (Raz et al., 2002).

iii. Risk Categorization and Risk Urgency Assessment

Claden (2009) reveals that risk categorisation and risk urgency assessments are less frequently used techniques. Under risk categorisation, organisations categorise risks based on certain parameters (such as the source of the occurrence of the risk). He further posits that the work breakdown structure (WBS) is the most commonly used technique within this system. Using the WBS, the entire work is divided into smaller tasks called activities which are easier to control and manage.

Smith et al (2006) explains the choice between using a quantitative or qualitative risk assessment. The qualitative method is best suited for risks that are low on the

priority list while quantitative methods are best employed for risks that are high on the priority list.

2.3.3 Risk Response

Risk response and risk control are steps that proceed in tandem and it is at this stage that organisations consider all available actions and measures which can be taken to mitigate the impact of the identified risks (Hoag, 2011). In this stage, it is necessary for organisations to collect the responses of all the people involved in the risk management process before selecting the appropriate risk response (Raz et al., 2002). This is important as it helps make a very informed decision on selecting the risk response plan that should be adopted.



Figure 7: Risk Response
(Source: Lester, 2007)

i. Avoidance/Prevention

This approach tries to avoid risks and can be achieved by either altering or eliminating events which will result in high risk and uncertainty. It involves a plotting trade-off between risk and performance or other capabilities and is an important activity in risk management. Before implementing this, it is essential for the project manager to prioritise all the constraints and requirements (Davis and Jarvis, 2007).

Raz et al (2002) posits that preventing or avoiding identified risks is typically the first step in any risk response procedure. When risks, which can impact a project's goals and objectives, are identified by the risk management team, it becomes imperative for them to review the aim and objectives of the project. For example, if the identified risk severely impacts the objectives of the project, and measures required to mitigate such risk are not cost effective, the organisation must modify its aims and objectives instead of implementing a risk control measure (PMI, 2008). They assert also that in a situation where it is impossible for the organisation to provide an effective counter measure for the identified risk, and then it is better to terminate the project rather than waste resources on it.

Avoidance is one of the best risk response techniques. According to Darnall and Preston (2010), if the elimination of risk requires drastic project changes, it is better to implement tried and tested strategies rather than develop new ones. Darnall and Preston (2010) argued that, even if the new strategies are cost effective and efficient, it is still better to employ well known strategies. This significant concept of adopting tried and proven risk response strategies has been known as one of the best ways to avoid risk as they are familiar and easy to understand (Smith et al., 2006).

ii. Reduction/Mitigation

Situational analysis management helps organisations identify and evaluate the risks that may negatively impact project performance. Making alterations on the project areas identified as being affected by the risk reduces the impact of an identified risk, thus helping organisations mitigate the effects of these risks. It is typical for organisations to maximise their profits by reducing expenditures. One of the most efficient means of risk reduction is to deploy funds towards activities that may prove to be cost effective in the long term. For example, hiring a team of external consultants will result in financial outgoings, but the team will identify remaining risks or those that have not been considered by the staff (Smith et al., 2006). Risk mitigation techniques proposed by Smith et al (2006) include:

- Developing plans for managing crisis management
- Planning for contingency situation

- Repositioning of resources and activities
- Developing disaster recovery plan
- Quality assurance
- Crisis management plan

iii. Acceptance

In case the identified risk has a very low probability of occurrence or if the repercussions of the risk are limited and weak, the risk or the event is accepted by the project manager. The identified risks are within acceptable levels and will not have considerable impact on the overall project and other interrelated activities. Two popular methods of handling accepted risk are: budgeting and scheduling, and continuous assessment (Rahman et al., 2013). This will ensure that risks are maintained below the acceptance level. The level of acceptance must be carefully defined in this process.

iv. Transfer

Another risk response technique employed by organisations is risk transfer. This involves transferring identified risks to some other person or party better skilled in effectively dealing with the risks (Potts, 2008). Risk can be transferred by delegating or assigning the task to another party (PMI, 2008). For example, in many cases, by hiring an external professional consultant, companies transfer the risk to them and it now becomes their duty to minimise the negative impact of the risks on the company or the project (Lyons and Skitmore, 2004).

Other methods of transferring risk include warranties, insurance and incentive clauses. Practically, it is not possible to truly transfer the risk, but one can mitigate its impact by delegating the activities to a more compatible agency. Before delegating tasks and activities, it is essential for the management to emphasise the following areas:

- Is the party to whom the risk is delegated compatible enough to handle the risk? It is advisable to transfer the risk only when the risk taker can handle it effectively.

- Is it possible or not to integrate the solutions provided by the risk taker in the overall project?

If the overall efforts and suggested solution cannot be implemented, arguably, delegating risk does not make sense (Rahman et al., 2013). The best example of this can be seen in a warranty. If there is no coordination between operator and maintainer, it is useless and fails to provide an adequate solution.

The project manager or management must analyse whether the method of delegating activities is appropriate or not, before implementing it into the project. The transfer mechanism must be valid to achieve the transfer of risk effectively (*PMI*, 2004).

It is advisable that the risk must be transferred to those actors who can handle it in a better and more effective manner (Lester, 2007). Here actors refer to contractors, clients, designers, subcontractors, consultants, etc. Although there are typically costs associated with risk transfer, in the long term, it has proven to be cost effective. By transferring risk to another party the risk is not mitigated, it is merely transferred to a more compatible party that can handle it more effectively (Perry and Hayes, 1985).

v. Retention

Risk retention is usually the last step in the risk response process and is typically employed when the risk cannot be transferred or avoided. However, risk retention does not state that the risk should be ignored, but rather, it implies that management must adopt control measures aimed at cushioning the impact of the risk. This measure is only advisable when all other risk response techniques are proven to be unfeasible or uneconomical (Lester, 2007).

2.3.4 Risk Control

When all the risk response techniques available to an organisation for mitigating its risk have been evaluated, the next logical step is the implementation of the adopted risk response strategy. The implementation of a risk response technique is as important as the initial identification of a risk response technique suited for mitigating or eliminating organisational risk.

However before the implementation of the adopted strategy, it is important that organisations establish that the adopted method is the best suited and most economical option for tackling the risk.

There are various control techniques available such as:

- i. To propose multiple concurrent designs so as there are more than one option available to attain the objective (Elkingtin and Sallman, 2002).
- ii. To make use of lowest risk design option that mitigates the risks so that they can come within acceptable level
- iii. To practice incremental development, which develops high risk component separately
- iv. To make use of technological maturation, so that high risk components can be separated from the less risky components (Jeynes, 2002)
- v. For achieving lower risk design, it is essential to test, analyze and fix the risky events
- vi. To develop a robust design that provides appropriate flexibility so that, in accordance with the requirements, changes can be made in the design to reduce the identified risk
- vii. To practice the use of an open system approach so that solution to the problems related to the designing can be proposed by using generally acceptable interface standard (Lester, 2007).

2.3.5 Monitoring and Review

Monitoring and review is the next step typically employed after the implementation of a risk control technique. This phase is crucial as it helps the risk management team observe the impact of the adopted risk response strategy on the identified risk (Khan and Burnes, 2007).

It is essential to continuously monitor and review the risk management process as it helps organisations to critically observe the status of the risk, which in turn, helps them know when additional corrective measures are needed (Davidsson, 2010).

2.4 Project Life Cycle

Every project, regardless of the sector in which it is operating, has a start and finish time. This same theory is therefore applicable to both the power sector and other engineering projects. This helps to systemise the entire process. To improve the performance of the project, many management gurus have started considering the term project life cycle as a management tool. Although the main stages of a project life cycle remain the same for all projects operating in various sectors of the business, its scope and terminology relating to the various phases of the project may vary from project to project and industry to industry (Bing et al., 2005). Often, a single risk or phase may be used in different stages of the same project. From the discussion above, it is clear that finding a project life cycle's specific definition is a very challenging task. Furthermore, developing a common scope within systematic processes is also difficult for project manager and the management team.

In the view of Smith et al (2006), it is essential to define various stages of the project life cycle. These stages are shown in figure 8 below:



Figure 8: Project Life Cycle

According to Pinto and Prescott (1988), there are four basic stages in any project life cycle. These stages are conceptualisation, planning, execution and termination (Pinto and Prescott, 1988). Westland (2007) also proposed a project life cycle mode consisting of four major phases, namely: initiation, planning, execution and closure. Ward and Chapman (1995), however, propose that there are also project life cycle has three stages: concept, planning, execution and termination.

For a better understanding of each stage, Chapman and Ward (1995) further broke down each stage into smaller steps. According to Ward and Chapman (1995), dividing a stage into sub stages helps to better identify and manage various kinds of project risks.

Depending upon the nature of the project, a project life cycle needs to be adjusted. It is essential to follow an individual approach. When looking at the scope and structure of the stage, that particular stage is divided into a number of others. The nature of all these projects differs, making it practically impossible to implement a similar kind of framework in all the projects. The table 2 below shows phases, stages and steps in a project life cycle, as proposed by Chapman and Ward (1995).

Table 2: Phases, Stages and Steps in Project Life Cycle

Phases	Stages	Steps
Conceptualization	Conceive the product	Initialization of event Capturing concept Categorizing Purpose Elaborating the concept Evaluating the concept
Planning	Design the product strategy	Developing preliminary design Developing performance criteria Developing design Evaluating developed design
	Plan the execution strategically	Resource planning and identifying basic activities Setting targets and milestones Development of plan Evaluation of plan

	Allocate resources tactically	Activity based plan detail and basic planning Developing criteria for resource allocation Allocation development Evaluation of resource allocation
Execution	Execute production	Managing and controlling all the activities Monitoring entire process Modifying set targets Modification of resource allocation Control evaluation
Termination	Deliver the product	Verifying basic deliverable Modifying deliverable Modifying development criteria Deliver evaluation
	Review the process	General review Review development Review evaluation
	Support the product	Liability perception and basic maintenance Developing support criteria Development of support perception

(Source: Chapman and Ward, 1995)

2.4.1 Project Organisation

Project organisation is an important part of the project life cycle. It is at this stage that the key project personnel are identified and assigned responsibilities. The choice of project personnel is an important process of risk management as a team that is not suitably skilled to handle project responsibilities poses a risk to the successful completion of the project. Most projects in the power sector are typically of a large scale and usually involve a considerable number of activities and interactions that occur among all stakeholders throughout all phases of the project life cycle (Akintoye and Macleod, 1997).

In all projects related to the power industry, the entire project is headed by a project manager. However, since it involves a large number of activities which is impossible for a single person to handle, the entire team is divided into smaller teams, and each team is assigned a specified task. These teams act as temporary origins.

Once the project is completed or their respective project task is finished, they are deployed to another project. In the words of Winch (2006), a project is a task that encompasses specific aims and objectives that ought to be achieved within a stipulated period, which also entails a combination of different resources including project managers, budget allocations, design specification, material (project planning, implementation, monitoring and control). As all projects are different in nature and have different requirements and purposes, the combination of these resources varies significantly.

The project team consists of human resources, which is the main actor of the project. The prime aim of human resources is to attain the objectives of their team and that of the entire project. In the hierarchical structure, one should easily be able to see the dependencies of each actor on another (Perry and Hayes, 1985). Temporary projects are led by a project manager, who looks after all the activities. His main responsibility is to organise all activities into a sequence and ensure that all the activities are performing as planned and are running in accordance with the schedule. Any delay will affect the scheduling of the remaining activities as all project activities are interconnected (Winch, 2006). Therefore, it is the main responsibility of the project manager to look after the timely completion of its activities. Teams are formed in accordance with their expertise, and human resources are also divided in accordance with their own capabilities and knowledge.

In addition to a project's timely completion, the project manager has to ensure that the project is completed within the given budget and maintain the high standard of quality throughout. All project activities and resources are exposed to risk and uncertainty so, it becomes essential for the project manager to make use of a risk management model in the power project. This will help managers to identify, analyse, and manage and control all types of risks. To achieve this purpose, some large global companies have separate risk management departments consisting of individuals who have ample knowledge of risk management. They work in association with the project manager, who assists them in dealing with identified problems. Risk can be managed by the temporary organisation in association with the risk management department of the company (Akintoye and Macleod, 1997).

2.4.2 Risks associated with the Project Life Cycle

To ensure that all parties associated with the project are well aware of the risks involved, one general definition must be developed for the specific project for the purpose of quantifying determined risks.

One way to describe risks associated with any organisation or project is to use risk registers. A risk register is a table in which various risks associated with the projects are arranged in order of priority, the most threatening risk sitting at the top on the register. Risk is associated with every stage of the project life cycle (Lee et al., 2012). From start to finish, there are various kinds of risks associated with projects and in most cases the impact of these risks changes throughout the project stages.

Akintoye and Macleod (1997) reveal that risks are part of every project and inherent in every stage of the project. It is essential for the project manager to identify all types of risks that may hamper the performance of the project in a timely manner, so that adequate measures can be implemented. This will help the project manager and the management eliminate or mitigate the ill effects of the risks on the overall performance of the project.

Raz et al (2002) posits that, risk management is very important to all aspects of a project and it starts with the first stage of the project and continues throughout the entire project life cycle; from defining to planning, execution, control and to the closure phase. Similarly, Lyons and Skitmore (2004) posit that in all the stages of a project life cycle (PLC), planning and execution are the two stages where risk management is most frequently used. Elkington and Sallman (2002) also state that the concept of risk management is very important during the conceptualisation stage.

In his study, Westland (2007) reveals certain stages of the project where it is essential to implement risk management. Initially, in the first phase, feasibility of the project is carried out based on the project proposal. Thus, this stage is characterised by a number of options and it is important to identify and evaluate the various options, so that risks associated with all the alternatives can be identified along with their proposed solutions. In the next phase, the planning phase, the project manager has to plot a risk plan to identify the potential risks related to the planning stage of the project life cycle. When formulating this risk plan, it is essential that all the stakeholders associated with the project contribute as it will help to identify all types of potential risks relating to the

project. This risk plan not only reflects potential risks, but it also consists of a possible solution for eliminating or mitigating all identified potential risks. With the help of a risk plan in the planning phase, managers will be able to overcome problems before entering into the execution phase. If the risks identified in the phases before the execution phase are not treated on time, they will prove very costly for the company and the client.

In accordance with the studies of Westland (2007) who argued that it is essential to perform risk assessment in all the phases of the project life cycle, when any project starts, a high degree of risk is associated with it, but gradually, as the project progresses, the degree of risk declines. Whenever any doubt arises, the project manager needs to review all the activities from the origin. This wastes time and resources as it requires the project manager and the management team to go back to the earlier stages and once again discuss the problems with new assumptions. In order to fix the problem they may hinder the project's future development, and therefore they need to make adjustments in the previous stages of project life cycle. Westland (2007) concluded that if a project manager needs to alter some decisions to ensure the smooth processing of all the activities in the coming stages, it may result in changing the concepts of the remaining stages which were made during idea generation during the initial phases of the project life cycle.

Smith et al (2014) also found that it is essential to implement risk management in the execution stage of the project life cycle. For this purpose, monitoring and controlling activities are performed to ensure all processes are performing their activities in accordance with the plan, and there is no major variation in the planned and actual performance. Further, it will also ensure that all identified risks in the initial stages are handled properly. It is essential for the project manager and respective departmental heads to continuously monitor the progress of the project from the starting stage, where different types of risks are identified, to subsequent phases. Finally, once the project is completed and is ready to be handed over to the client, it is essential for the manager to evaluate the entire project and summarise its objectives and benefits. Finally, all the main parties associated with the project must discuss the activities and the risks which were not managed thoroughly in the project so that proper measures can be taken for future projects.

The table 3 below summarises the various kinds of risks identified throughout this research when reviewing the works of Akintoye and Macleod (1997); Raz et al (2002); Lyons and Skitmore (2004); Elkington and Sallman (2002) and Westland (2006), as well as those of Sambo (2012); Onaiwu (2009); Olugbenga et al., (2013) and IseOlorunkanmi, (2014).

Table 3: Various kinds of risks associated with projects

S/N	Risk Type	Premises for Risk occurrence	Examples
1	Financial	Budget allocation Cost overrun	Nigerian power sector projects have proved to suffer significant draw backs due to insufficient investment in infrastructural development, thus proving an ineffective allocation of budget (Sambo et al., 2012).
2	Political	Political instability Government policies	Nigeria's energy supply crisis prompted the Federal Executive Council to approve in 2001 the National Electric Power Policy (NEPP) with the intention to render the power sector more effective by changing the ownership, control and regulation associated to it, however, the government bureaucracy prevented the NEPP to be enforced before 2005. This corresponds to a problem which can be more generally described as a delay of the market deregulation process (Olugbenga et al, 2013).

3	Environmental	Force majeure	<p>Environmental force majeure events represent risks which can be associated to any project as they are independent of human action and intervention and they cannot be predicted. Typical examples are: flooding, hurricanes, earth-quakes and tsunamis. The list is not extensive. All the above mentioned events might occur and affect the completion of a project within the pre-established timeframe and budget.</p> <p>Other environmental risks were identified by Sada (2007) who pointed out that the Nigerian hydro generation stations are significantly affected by the low level of rainfall. This is due to the general climate change and although it is experienced throughout the year it is even more pregnant during the period extended from March to June which is marked by draught. (Sada, 2007).</p>
4	Technical	<p>Faulty design</p> <p>Wrong scope definition</p>	<p>Inappropriate design of power projects is also a source for risk associated to this sector as it can affect the proper</p>

			completion of the project. Faulty design can also be correlated to the political background which might account for incorrect allocation of projects and therefore for employing insufficiently skilled professionals for planning and realising the specifics of the project (Olugbenga et al, 2013).
5	Project	Contractual Planning and scheduling Quality and safety issues	In discussing the risks that affect the viability of gas power plants Onaiwu (2009) argues that contract negotiation and changes can affect the planning and scheduling of projects to the point of delaying the construction of the plant. The example provided to support this argument is that of the recalls the AES Barge IPP project.
6	Human	Lack of skilled personnel Poor stakeholders analysis Cultural differences	Human risk can be associated to political issues such as corruption which might determine that the allocation of projects to bidders is made without taking into account their integrity, competence and professionalism (Olugbenga et al., 2013).

7	Market	Demographical Social	In Nigeria the demand for electrical power is higher than the supply that can be provided, moreover since it has been noticed that the capacity for generating electricity decreased while the Nigerian population increased which has led to inadequacy in constant power supply and poor regulatory management (Olugbenga et al., 2013).
8	Safety	Security	As a consequence of sabotage, theft and poor transmission, Nigeria only uses 58% of installed generation capacity (2,628 MW). (Ilan, 2013)
9	Material	Poor supply chain management Procurement	The poor maintenance of the Nigerian power sector infrastructure can be perceived as an example of poor supply chain management as it can affect the procurement process as well as the energy transmission process. (Olugbenga et al., 2013; IseOlorunkanmi, 2014)

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

ii. Political Risk: Political risk includes problems relating to government and legal rules and regulations. Generally, legal policies do not affect projects significantly, but an unstable government considerably impacts the functioning of the project (BurtonShaw-Gunn, 2009).

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

iv. Technical Risk: This is one of the most frequent risks, which most projects face at some stage of the project life cycle (Chapman, 2011). This occurs due to failure of either engineering or designing equipment/tools. Engineering and designing is completed before the initialisation of the project, but often, problems arise at the time of actual operation.

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

vi. Human Risk: This risk is associated with all types of projects, irrespective of the nature of the project and sector in which it is operating. It includes risks such as culture, labour and stakeholders. Most projects experience risk from labour or stakeholders. At the initial stage, projects find it difficult to attract investors, and the problem intensifies if the company managing the project is relatively new to the market. Companies generally face problems relating to the availability of labour (Hillson, 2003). Often, there is a shortage of labour or it is unavailable. This significantly impacts overall project. Cultural risk does impact projects but it has a negligible impact on operations and functionality.

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

viii. Safety: In every project there is risk to human life. Therefore, no project can be risk-free. In fact, safety risks are inherent to all projects. In large projects, where people have to work on heavy machineries, a small negligence on the part of the company (contractual or labour) may result in a fatal accident (Hillson, 2003). If proper security measures are not adopted by the project manager or the company, it may result in several legal charges.

ix. Material: The risk relates to the shortage of material or poor quality material, which is also associated with the majority of projects. For any project, various materials are required from time to time. It is not possible for the project manager to purchase all materials at once, so materials are purchased in batches. There is the possibility that there will be a scarcity of material in the market, which will result in the delay of the project. In the absence of materials, it is not possible for the manager to operate the project smoothly.

In addition to this, the prices of raw material fluctuate so if the price of a certain raw material exceeds the expected price it will again make it difficult for the manager to complete the project within a specified budget (Chapman, 2011). Poor logistic facilities may also hamper project operations.

2.4.3 Importance of Decision Making in Risk Management

According to Chapman and Ward (1995), decision-making is an important aspect of risk management as every organisation needs to make various decisions at every stage of the risk management process. They further suggest that the decision-making process is a cognitive process, which involves selecting the most appropriate course of action among available alternatives.

This results in a final approach or strategy, which will eventually be adopted. Chapman and Ward (1995) also reveal that the decision-making process consists of the following steps:

- ❖ Defining goal and setting objectives
- ❖ Assessing available data and information

- ❖ Identifying various available alternatives
- ❖ Setting criteria for selection of alternative
- ❖ Evaluating final outcome of all the alternatives
- ❖ Analysing and selecting an alternative
- ❖ Comprehension and management of selected variant

The decision-making process is also replete with inherent risks as suggested by Riplova (2007). The table 4 below summarises the risks associated with each stage in the decision-making process:

Table 4: Risks associated with decision making process

Step	Activity Description	Risk
1	Defining goal and setting objectives	Missing verification of collected information Late identification of problem High cost of information processing
2	Assessing available data and information	Omitting information that may clearly define the declared objective and decision process
3	Identifying various available alternatives	Choosing the wrong solution
4	Setting criteria for selection of alternative	Creating a large criteria list that may complicate decision making Dangerous manifestation of subjectivism
5	Evaluating final outcome of all the alternatives	Overlapping criteria
6	Analyzing and selecting an alternative	Selection of wrong alternatives Choosing the optimal alternative without consideration to the disadvantages
7	Comprehension and management of selected variant	Wrong communication and cooperation of manages and other workmen

(Source: Riplova, 2007)

The purpose of risk management in the decision making process is to guarantee the deduction of risks and uncertainties associated with it (Riplova, 2007). The decision making process is very important to the risk management process; however risk management is inherent also in the decision making process (Zou et al., 2007).

2.5 Critical Success Factors for Effective Risk Management

As both Shehu and Akintoye (2011) and Ranong and Phuenngam (2009) point out, the concept of Critical Success Factors (CSF) was first used by Rockart (1982) when discussing, in a larger context, the risks and prerequisites for successful projects in association with information systems and project management.

According to Shehu and Akintoye (2011), researchers (Rowlinson and McDermott, 2005; Thomsen, 2008) describe CSF as the fundamental aspects that a project contains, which need to be sustained in order to ensure the cohesiveness of the team and processes involved in a project to guarantee its success. Other researchers cited by Shehu and Akintoye (2011) in their study *The critical success factors for effective programme management: a pragmatic approach*, include as Jaramillo and Marshall (2004) and Keck *et al.* (1995), who argue that CSFs should be regarded as tasks or attributes that should be prioritised by an organisation's project or team management because they represent significant characteristics, variables or conditions that can improve performance, but can just as easily determine the failure of a certain endeavour.

In revising the impact that effective risk management has on a certain project's success, Kishk and Ukaga (2008) find it important and relevant to also refer to CSFs. In their definition, CSFs are components of the project's context or environment that must be administered to increase the chances of a project's success. They also argue that while maintaining these factors within the desired parameters might not ensure success, there is a high probability of failure if they are ignored and improperly handled. Kishk and

Ukaga (2008) go one step further in the analysis of CSFs and examine the results of other studies to develop a list of CSFs that have been identified as being important for driving a project to success.

The list they have proposed encompasses eight factors,: defining clear goals; ensuring management support; developing a detailed project plan; creating a clear defined control mechanism; the ability to communicate; acceptance; and, if it is the case, client consultation throughout the project; the involvement of competent and well trained professionals; a flexible project manager who can properly address uncertainties and, last but not least, the project owner's sincere interest in the project.

The relevance and importance of all eight factors can be easily explained. It is critical to clearly define the goals of a project as it will then be easier to direct the project towards the expected results. These will ultimately be easier to formulate and understand. Also, clearly defined goals are important for easily maintaining a critical perspective of the project's development and it will be less difficult to assess the progress or the delay of a project if the end results are clearly stated. Moreover, it is important to keep in mind that, a project requires the concerted effort of a team, and while the team will ideally work in harmony to meet the exigencies imposed by the project, different people may work together without necessarily having the same understanding of the goals they are supposed to reach. Therefore, clearly defined the goals can prevent difficulties that might arise from divergent or different interpretations.

Management support is also considered to be a critical success factor as it can act as a binder both for the team involved in the completion of the project and for the different stages of the project development itself.

Producing a detailed project plan is just as important as clearly defining the project's goals, because it is closely related to ensuring a correct approach is applied to project development. Besides offering a precise understanding of the stages the project must follow, a minute description of the project will provide necessary information to correctly position decisions, to abide by projected timeframes and for raising awareness about potential risks or drawbacks that may be encountered.

A well-defined control mechanism will ensure that the project will not stall. It will also double the effect of the aforementioned CSFs by constantly supervising the accomplishment of the desired outcomes, both in the final stages of the project and throughout the intermediate ones. As well as being aware of its own role, and conducting it properly for the successful development of the project, a well-defined control mechanism can also act as an enforcer of the rules defined within the context of the project. As well as protecting them against injustices, it can also reassure all those involved that the entire process is closely supervised and that no tragic errors can occur.

In addition to the factors considered critical for ensuring the success of a project, maintaining a positive attitude by communication and accepting decisions is also paramount. This factor is probably, to a larger extent than others, an intuitive one. We have nowadays developed a culture for communication and for tolerance precisely because we have realised the benefits that derive from such an approach. We award great importance to communication because through it we understand and be understood. Language is a necessary tool for sharing our ideas and expectations with others, but it can also function as a potential risk factor if not handled correctly. Its connotative qualities and contextually-determined meaning can create confusion. Communication, client consultation and acceptance throughout a project life cycle are significant CSFs.

Although all the above mentioned factors are critical for ensuring the successful completion of a project, little can be achieved without the input of a team of professionals. Qualified workers are needed at all levels of project development, both at directory and executor level. Besides the obvious benefits of having well-trained personnel working on the project, creating a team of professionals will ensure a better group dynamic and cohesiveness. If team members trust each other's expertise and opinions they are more likely to cooperate and work together towards reaching the same goal. Moreover, competition may also play an important role in stimulating workers to improve their results and, as a consequence, the results of the project.

The flexibility of the project manager is also appreciated as a strong CSF because it can act as a means of gaining control over the project's progress. A project

manager who proves capable of manifesting flexibility in dealing with various potential project challenges is valued as an important CSF. Despite all the preparation, predictions and analysis, there is still a real chance that unexpected events will occur. A project manager who has the necessary spontaneity to face such potential events can, undoubtedly, handle them better to increase the chances of overcoming them successfully.

Last, but not least, for a project to reach its desired outcomes, all individuals involved in its development must make an effort in achieving its aim. Although it might seem redundant, one necessary observation that needs to be stressed is that the project owner must take an interest in the advancement of the project too. Keeping a distance can be misunderstood and translated as a lack of interest or indifference, and such a perspective does not encourage the other parties involved to give their best. On the other hand, if the owner takes an interest in the performance this can act motivate others to perform at their job better and as a supplementary means to evaluate performance and correct potential drawbacks.

When analysing CSFs, it is also important to examine the circumstances that influence the execution of the project, to the point of it being compromised. In *The Impact of Effective Risk Management on Project Success*, Kishk and Ukaga (2008) identify the circumstances, identified by Rozenes et al (2006) that may potentially contribute to the project's failure. There are seven such circumstances: owner interference/ scope creep, inadequate constructor experience, financing and payments, labour productivity due to learning curve, sickness, absenteeism, slow decision-making, improper planning and the subcontractor's late deliveries.

After analysing the CSFs that might influence a project's success and the circumstances that might influence these factors to the point of compromising its success, a few words should be mentioned on assessing a project's success. In the previous study, Kishk and Ukaga (2008) mention benefits management and Key Performance Indicators (KPIs), concepts used for evaluating a project's success. The role of benefit management is defined as identifying the benefits that might arise, monitoring these benefits monitoring and ensuring the achievement of these benefits. KPIs are defined as quantitative measures that can verify whether a project is heading

towards success or not. A good rule of thumb for KPI's on a project includes; Aligned, Optimized, Measurable, Realistic, Attainable, Clear, Understood, Predictive, Agreed and Reported (PMI, 2008).

Hillson and Simon (2012) also construct a concise list of CSF categories. They came up with four main categories: supportive organisation, culture, competent people and appropriate methods, tools and techniques.

In order to discuss how a supportive organisation could benefit from a project's risk management process, Hillson and Simon (2012) first develop a taxonomy of organisations based on the attitude of different organisations, and how, just like with different people, this might have an effect on risk management.

They identify several prominent attitudes, namely 'risk-averse', 'risk-tolerant', 'risk-seeking', 'risk neutral' and 'risk-mature' organisations. Each and every one of these attitudes impacts severely on the process of risk management. Those that manifest a 'risk-averse' attitude might even go as far as to develop hostility towards risk management as they view themselves as sufficiently precautionous and deny the need for risk management. They therefore, unconsciously, increase the chances of planning and decisions to be made without a proper understanding of the potential associated risks. On the other hand, organisations with an appetite for risk, those categorised as 'risk seeking', may become so open to meeting risk that they reach a point beyond which they can no longer manage it, and will discover that they have compromised their ability to calibrate themselves according to the risk to they have been willingly and consciously exposed to. Both attitudes mentioned are rather extreme; however Hillson and Simon (2012) also came up with 'risk-neutral' organisations which they described as being a mix of the two. In their view, 'risk tolerant' organisations are those which combine short-term risk aversion with a stronger tendency to seek risk.

The fruitful approach to risk management is considered to be a 'risk-mature' one, which will not deny either the existence, or the beneficial potential of risk and that will, therefore, foster a supportive culture capable of properly addressing risk issues and seek related opportunities.

'Risk-mature' organisations admit the necessity of spending money, time and other resources to provide the required resources for risk management, but they are also convinced that they will gain more in the long-term as they will be equipped with budgets, schedules and knowledge enabling them to boldly meet events that are classified as perilous.

The four categories of how Hillson and Simon (2012) group CSFs for risk management have been mentioned. The first category is that of a supportive organisation. Such an organisation understands the importance of risk management and takes on the task of supporting this process. It will help encourage all stakeholders to support the process as necessary but it will also ensure that they are able to enjoy the resulting benefits. Supporting risk management implies reserving time within the project's schedule, but equally, granting access to its resources. Leading a project towards success is understood as a means to providing pertinent answers (be it funds, time, effort and so on) for the requirements that might arise.

Culture, the second mentioned category to comprise CSFs, is defined as encompassing the values, beliefs and knowledge that unite a group of people in their endeavour to reach certain predefined objectives. Culture, therefore, reveals itself as being both collective and individual, although the two aspects are assumed to be consequent. A culture that would prove relevant for risk management is one that would exhibit a supportive attitude. Both the individuals and the organisation should be able to understand and manage risk; they should act towards valuing risk management and taking the necessary precautions to make it work effectively.

The third category mentioned by Hillson and Simon (2012), competent people, refers to creating the necessary context for people to become aware of the importance of assuming a proactive attitude towards risk management. Such an attitude is neither common sense, nor intuitive and, therefore, involving the staff in training programmes increases the chances that the company will gain a unitary perspective on risk management. As a result, it creates better coordination and collaboration that can be oriented to participate in the process of risk management. Good training may raise awareness among staff members of the importance of being involved in risk

management, and of its benefits, therefore motivating them to participate. In order to be effective, training should be regarded as an ongoing process, rather than an isolated event or limited series of events. By introducing it as an ongoing process, training will also contribute to shaping the organisational culture mentioned previously, and create a cohesive team of people who can relate to each other and consequently share a somewhat common perspective, knowledge, behaviours and attitudes.

Just as attitudes differ in the way different organisations relate to risk management, so too do the approaches that relate to specific characteristics within the implementation of risk management. These projects are shaped both by the organisation's risk appetite and by its overall exposure to risk (as different organisations, depending on their activity domain can prove riskier than others). Another aspect that cannot be ignored is that of available resources (be it funds or expertise). Each organisation that decides to implement a risk management strategy needs to first decide on the level and complexity of risk implementation that is both relevant and affordable. Only at this point, after having already been implemented, can risk management be supported by employing appropriate methods, tools and techniques.

Appropriate tools, methods and techniques have been chosen by Hillson and Simon (2012) to define the fourth category containing CSFs. Infrastructure is one example of a CSF. If the infrastructure provided is not sufficiently developed that it can support the implementation of risk management, it can compromise the proper development of the process. Also, if the infrastructure is so dense that it implies an overly bureaucratic platform, it can just as well prove ineffective and even harmful.

In analysing the literature on CSFs related to risk management, Ranong and Phuenngam (2009) consider several pertinent groups of essential factors in the implementation of a risk management process, as proposed by different authors. Ranong and Phuenngam produced a more complex model of risk management activities, which is based on those previously identified by others. Their model consists of seven CSFs or procedures, as they are also called within the paper. Most of them (and even a few others) have already been discussed above, when presenting the analyses of Kishk and Ukaga (2008) and Hillson and Simon (2012).

However the model proposed by Ranong and Phuenngamen incorporates two other important CSFs that are important and, therefore, also need to be considered. These are Information technology and trust.

Information technology is defined as the necessary link between people and units, a link which, if formed correctly, can increase the speed and performance of processes, while simultaneously reducing costs. IT can provide both quick access to information as well as data security, thus ensuring efficient searches and quick access to information in a secure environment (secure both for the user as for the provider of information, considering that the latter will have the chance to better operate between confidential and non-confidential information).

Trust, another CSF that Ranong and Phuenngam (2009) argue in favour of, refers to the relationship that exists between the trustor and the trustee. It describes the trustor's readiness to be vulnerable to the actions performed by the trustee, when these actions are considered important by the trustor. Trust also represents a key prerequisite of cooperation. Ensuring trust within a company suggests the advancement towards creating an effective work environment. In analysing the role of trust, Ranong and Phuenngam (2009) present two important ideas, which were previously expressed by McAllister (1995), and Grabowski and Roberts (1999). McAllister discusses the need for organisations to address the problem of alliance-like organisational structures, as these can be a source of insecurity in the context of a fluctuating environment. Grabowski and Roberts (1999) underline the positive effect that trust has on allowing members to concentrate on their work without worrying about whether others are able or willing to perform their jobs correctly, without compromising the ensemble.

2.6 Section Summary

Risk management is a technique for organisations who desire to remain profitable and maintain a reputation for excellence. This is so because it enables an organisation understand its business environment and the peculiar challenges in its environment. This Section highlighted risk management, its definitions and the techniques employed to identify, plan, analyse, handle and control risks. The role risk management has in identifying the risks in a projects life cycle was also explored and this helped provide the foundation for understanding the critical success factors for the practice of risk management and the implementation of different risk management strategies. Also the importance of continuous improvement in risk management was also highlighted as being crucial to the successful implementation of risk management. This will also serve as a precursor as earlier highlighted in objectives (See Section 1.5) in providing strategies and recommendations and in accordance with the results from the analysis (See Chapter 5, Section 6.4 and 8.2) and discussion on how RM can be used to improve project performances with the context of the Nigerian power sector

This section thus helps us grasp the fundamental techniques employed in risk management and laid a foundation for the research. It also provides the launch pad for the next section which seeks to critically examine risk management models currently employed in industry.

SECTION II - RISK MANAGEMENT MODELS

2.7 Introduction

The preceding section highlighted the different methods available to risk managers for identifying, analysing, managing and controlling risk. However it is pertinent to note that without proper implementation, monitoring and control, it is difficult to sustain risk management. The implementation of risk management is made possible through risk management models or frameworks. A risk management model shows at a glance the sequential steps or processes involved in risk management. It is important to study risk management models currently available, thus this section discusses risk management models currently practiced in industry. It plays a very important role in the final outcome of this research as it helps highlight the typical steps involved in model generation.

2.8 Risk Management Frameworks/Models

Risk management models are roadmaps for the successful practice and implementation of risk management. According to Randall (2008) and Raz et al (2002), before any risk model is proposed for adoption in industry it is imperative that the risk typically associated with that industry be thoroughly identified and suitable guiding principles and recommendation methods be chosen with the aim of mitigating, monitoring and controlling the risk. Various risk management models are discussed below with the view of examining their structure and suitability to form the basis for the development of a model suitable for the Nigerian power sector.

2.8.1 Linear risk management model

Perry and Hayes (1985) developed one of the earliest and simplest risk management processes. The main aim of this model was to increase the probability of the occurrence of positive events and their repercussions, while minimising the probability of the occurrence of adverse events and their impacts on the overall project. Perry and Hayes (1985) believed that the risk management model must include a minimum of three simple but essential stages. These stages in figure 9 below are systematic in representing all the major functions of the risk management framework (Perry and Hayes, 1985).



Figure 9: Linear Risk Management Model
(Source: Perry and Hayes, 1985)

The linear risk management framework comprises of three stages:

- i. Risk Identification,
- ii. Risk Analysis, and
- iii. Risk Response

In accordance with this model, identification of risk and the analysis of the identified risk are carried out throughout the project life cycle. At all the stages of the project, the project manager has must properly analyse all the internal and external activities and determine potential risks which may have a negative impact on the project's performance.

Once identified, all potential risks are analysed for their impact on the various project activities. It is essential for the manager to perform an analysis of all the identified risks using either qualitative or quantitative techniques to determine how intensely they will impact some or all the actions of the team (Perry and Hayes, 1985).

On the basis of intensity and probability of the occurrence of the risk, the project manager decides how to respond to a particular type of risk. Thus, one can decide the appropriate risk response action beforehand. In view of many researchers, such as Carter et al. (1994), Kliem and Ludin (1997) and Baker et al. (1998), the linear risk management process is linear in nature and is sufficient at the starting phase of any project. In other words, the model's success is limited to only the initial phase of the project (Carter et al., 1994).

It can be argued that there is a chance that the activity selected as a response to the identified risk may result in some other risk as it is described as a three phase linear RM model and thus must then also be identified and assessed by the project manager to mitigate subsequent unforeseen circumstances leading to project failures due to the nature of the model (Baket et al., 1998). This shows that risk management is a cyclic process.

2.8.2 Risk Management Model of Ranong and Phuenngam (2009)

This model in figure 10 entails a risk control and risk financing as its nucleus and can thus be regarded as a risk control model. However, before emphasis can be placed on risk control and risk financing, the risk is first identified and evaluated.

The evaluation process helps in determining the best control method to be adopted.



Figure 10: Risk Control Model
(Source: Valsamakis et al., 2004)

This model is centred on the concept of financing risk control processes. However, it does not provide an indication of the risk identification and risk evaluation technique to be adopted before employing control measures (Ranong, and Phuenngam, 2009).

2.8.3 Six Stage Cyclic Risk Management Model

Carter et al (1994) proposed a cyclic model of risk management, which consists of six phases. These are based on those risks that can be monitored and controlled. The six main stages of the process are described below in figure 11:

- i. Risk Identification and Documentation
- ii. Risk Quantification and Classification
- iii. Risk Modelling or Risk Analysis
- iv. Risk Reporting and Strategy Development
- v. Risk Mitigation, Risk Reduction and/or Risk Optimization

vi. Risk Monitoring and Control



Figure 11: Six Stages Cyclic Risk Management Model
(Source: Carter et al., 1994)

In accordance with this model in figure 11 above, the risk management team endeavours to identify all the potential risks associated with a project, and document them. These documented risks are then communicated to the project stakeholders. The identified risks are categorised (i.e. political, financial, construction, contractual) and analysed to determine the probability of the occurrence and level of impact each risk will have on an organisation or project. After thorough evaluation, the results of analysis are reported to all the departments. This is not only to make them aware of the consequences, but to seek their advice on different measures that can be implemented in order to either eliminate risk or alleviate it (Carter et al., 1994).

The last or the sixth stage is monitoring and control. Once the control measures are implemented, it is essential for the risk management team to assess its outcome. Often, it may be possible that a certain kind of response may result in some other risk. Therefore, to ensure effective implementation, as well as ensuring that the risk response measure adopted does not give rise to another risk, it is essential to monitor

the final outcome. In a case where the selected control tools result in other risks, the risk management team has to once again repeat the entire process from the initial stage.

2.8.4 Four Stage Cyclic Risk Management Model

Three years after the six stage cyclic model was proposed by Carter et al (1994), another cyclic model was proposed by Kliem and Ludin (1997). According to Kliem and Ludin (1997), the model proposed by Carter et al (1994) was complex, repetitive and thus lengthy. They therefore proposed a four stage risk management framework which comprised of as seen in figure 12 below:

- i. Risk Identification
- ii. Risk Analysis
- iii. Risk Control
- iv. Risk Reporting



Figure 12: Four Stages Cyclic Risk Management Process

(Source: Kliem and Ludin, 1997)

Comparing the model of Kliem and Ludin (1997) in figure 12 above with that of Carter et al (1994) in figure 11, it can be argued that Klien and Ludin (1997) emphasise the fact that there is no need to categorise the risk and report it to different departments. According to them, once the risk has been identified and analysed, the risk management team or the project manager must take immediate control measures to reduce or eliminate the identified risk. In their views, categorising and reporting the risk wastes time and makes the entire process of risk management more complex and time consuming. In addition to this, it may also result in misconceptions within the risk management team or the project management team (Klien and Ludin, 1997).

2.8.5 Five Stages Cyclic Risk Management Model

A year after the four stage model was proposed by Kliem and Ludim (1997), Baker et al (1998) suggested a slightly different model from that proposed by Kliem and Ludin (1997). They argued that it is essential to estimate risks before evaluating them and therefore, the model proposed by Baker et al (1998) consisted of five stages. It fragmented the first and the last stage, that is, risk identification and risk monitoring and control into two different stages. Figure 13 shows the five stages of their risk management model consist of:

- i. Risk Identification
- ii. Risk Estimation
- iii. Risk Evaluation
- iv. Risk Response
- v. Risk monitoring



Figure 13: Five Stages Cyclic Risk Management Model
(Source: Baker et al., 1998)

The model in figure 13 above of Baker et al (1998) reveals that it is essential to first estimate the probability of occurrence of the types of risks associated with a particular project and their impact. It is only through risk estimation that risk prioritisation is possible. Risk estimation will enable the project manager to first work on those risks which are more threatening and then, once high intensity risks are treated, move on to less prioritised risks (Baker et al., 1998). The rest of the stages of this model are more or less similar to the models discussed above.

2.8.6 Five Stages Risk Management Process

Prior to these cyclic models, Grammer and Trollope (1993) also came up with a five stage risk management process. From figure 14, the main stages involved in this process are to:

- i. Identify Risk
- ii. Analyze Risk
- iii. Reduce Risk
- iv. Plan again and Manage Risk

v. Review Risk (Grammer and Trollope, 1993).

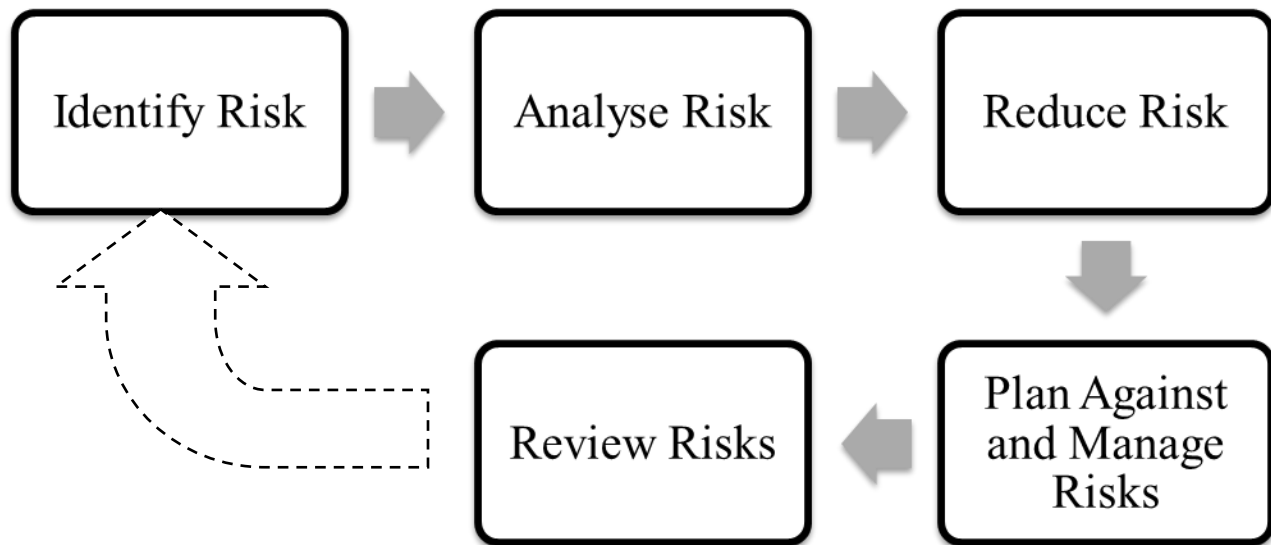


Figure 14: Five Stages Risk Management Process
(Source: Grammer and Trollope, 1993)

The first stage from figure 14 above of the model deals with determining all types of existing and potential risks, coupled with the project. Once the risks are determined, it is essential for the manager to define which category the risk belongs to. In the second stage of this model, the project manager has to determine the probability of the occurrence of all the identified risks and their impacts on the performance of the project.

Risks with a huge negative impact on the project or frequently occurring risks have to be treated with precautionary measures. After estimating the probability and impact of all the risks, the project manager has to arrange them in order of priority i.e. those risks which need immediate attention and those which do not require immediate attention as they do not pose a huge threat to the assignment (Grammer and Trollope, 1993). After determining the probability and impact of each risk, appropriate measures are taken in the next step.

The main purpose of these control actions is to either mitigate the risk or eliminate it completely. Generally, it is not possible to eradicate the risks completely, thus, project managers focus on ways to alleviate the impact and probability of the occurrence of the risks. The next stage is to write a risk reduction plan for the ongoing

activities. Usually this action is not performed by the project manager, but is instead, carried out in the board meeting and the managing director or general manager underwrites the plan. The last stage is reviewing the risk and adopting the measure used to reduce the risk.

To ensure that the applied control action is functioning in accordance with plans, it is necessary for the project manager to review the adopted risk reduction method. Often, applied risk mitigation processes are not effective enough to control the risk. In these cases, a frequent review process helps the manager to timely identify the loopholes in the existing method, enabling an alternative measure to be applied on time (Grammer and Trollope, 1993). The response to one risk may also result in other risk factors. Thus, the final stage assists the project manager tracking the actual results and if some other risks arise due to a control action, the manager can take immediate action on them also. This shows that the overall risk management process is cyclic in nature and continuous, until the project is completed and handed over to the client.

2.8.7 Nine Stage Risk Management Model

Chapman (1997) proposed a generic model for risk management which provides a more detailed structured RM framework. The model in figure 15 as suggested by Chapman (1997) was divided into nine phases:

- i. Define
- ii. Focus
- iii. Identify
- iv. Structure
- v. Ownership
- vi. Estimate
- vii. Evaluate
- viii. Plan
- ix. Manage

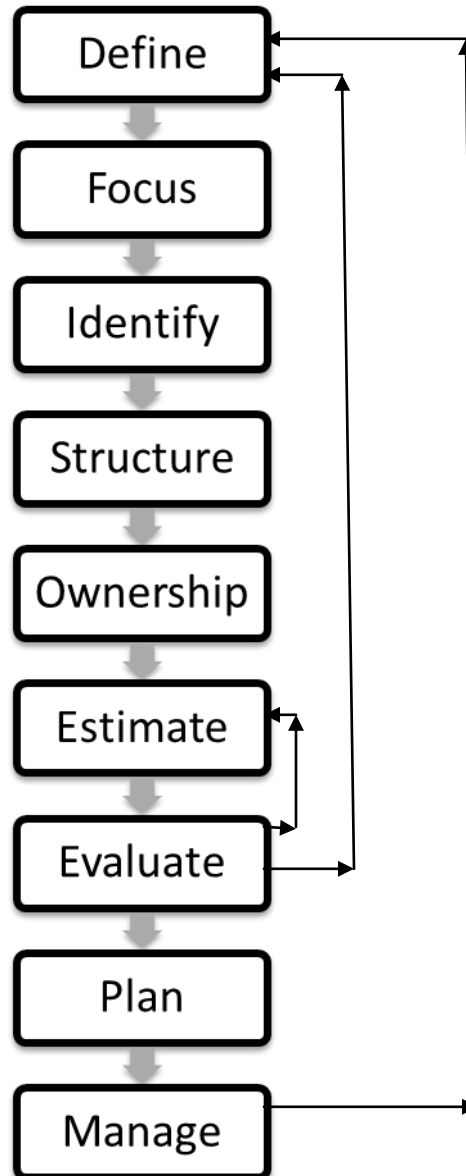


Figure 15: Nine Stages Generic Risk Management Model

(Source: Chapman, 1997)

The first stage from figure 15 above of the nine stage generic model proposed by Chapman (1997) is to define the key aspects of a project. This includes scope, time, cost, quality and the risk associated with the project. According to Chapman (1997), it is essential for the project manager to define all of these key aspects. This will enable the project manager to effectively evaluate the events which may negatively impact the project.

The second step of the model is to develop a strategic approach towards risk management. When an organisation initiates a project that exploits the opportunities available in the environment, there is a high chance of the occurrence of downside (negative) risks and events. A risk reward profile is allied with all such events. Therefore, it is mandatory for the project manager to formulate a strategic approach towards risk management to boost the chances of events beneficial to the project occurring, and reduce all those events which may impact the project negatively (Chapman, 1997).

The next step of the generic model is to identify all possible events which may hamper the smooth functioning of the mission. There are various ways in which it can be achieved: past experience, brainstorming, Delphi technique, templates, checklist, literature review, benchmarking, interviews, consultants and many others. In addition to this, all project areas that are prone to risk are also marked. This assists in streamlining the framework of risk management in regards to identifying potential risk factors.

The fourth stage is related to structuring the information on risk assumptions and relationships. In this stage, past information regarding identified risks is assessed to determine what impact it will have on the overall status of the project. In addition to this, the manager or the risk management team draws a relationship between the identified events and different sections of the projects. Once it has been determined which risk will impact which area of the plan, the fifth stage focuses on assigning ownership of these risks and responses (Chapman, 1997). In this phase a different risk is assigned to the different departments that will be affected in that event occurs. All departments are cautioned against the identified risk and responsibilities are assigned to the departmental managers. Now it is the responsibility of the departmental managers to take appropriate measures against the risks.

The sixth stage of this process is to estimate the probability of occurrence of the uncertain event. Since all the identified risks are linked with different probabilities, it is necessary to determine the probability. In the seventh stage, the impacts the risk will have on the activities are evaluated after determining the probability. There are two major techniques for assessing the impact of the risk assigned to different sections: departments may either use quantitative methods or qualitative methods for evaluating the risk. After evaluation they can determine the level of impact that event has on the

overall project. Once the risk has been evaluated, in the eighth stage, the departmental managers must respond to the risk. Generally, this can be done in four ways: risk avoidance or prevention, risk transfer, risk retention, or risk reduction or mitigation. In accordance with the nature of the risk and the capabilities of different departments, the decision regarding the response to the event is taken.

The final stage of this model (Chapman, 1997) is similar to the final stage of all the models discussed above. After responding to the risk, it is essential for the manager to frequently observe the process to evaluate its outcomes. It may be possible on several occasions that a particular response to the identified problem may lead to certain other risks. Therefore, a continuous watch over the applied action is essential.

2.8.8 Australian / New Zealand Risk Management Standards

The Australian-New Zealand Standard (1999) is another risk management model. The main difference between the earlier models and this model is that it includes continuous monitoring and extensive feedback loops. This model explicitly identifies the function to 'communicate and consult'. This is the first framework that introduced the concept of 'context'. Context helps project managers in setting relationships between decision-makers, along with scientific and technical evaluation of risks (Randall, 2008). It establishes the organisational, strategic and risk management context at the initial level only, which is then followed in the later stages of the process. In this process, it is essential to establish the criteria on which the risks will be assessed and the manner in which it will evaluate the event. The figure 16 below represents the Australian / New Zealand Risk Management Standards (AS / NZS 4360:1999):



Figure 16: Australian / New Zealand Risk Management Standards (AS / NZS
4360:1999)

(Source: Ranong and Phuenngam, 2009.)

From figure 16 above, another benefit of using this model is the clear definition of the criteria against which each of the identified risks will be assessed. In certain projects, the criteria for assessing the risk may be broad, making use of both quantitative and

qualitative techniques which includes economics, social preference, cultural, absolute limit and political criteria. With the help of already existing controls, the Australian framework explicitly distinguishes between risk assessment practices. After this, even if some residual risks exist, they can be treated by implementing additional treatment options to bring it in the acceptable range. An essential phase of this model is the development of the concept of risk communication (Randall, 2008). The continuous process of 'communication and consultation' ensures that risk is effectively communicated to all the entities involved in decision-making.

2.8.9 Risk Management Model of Burke (2000)

Another risk management model designed by Burke (2000) in figure 17 below is based on integration and interactions of the risk management process.

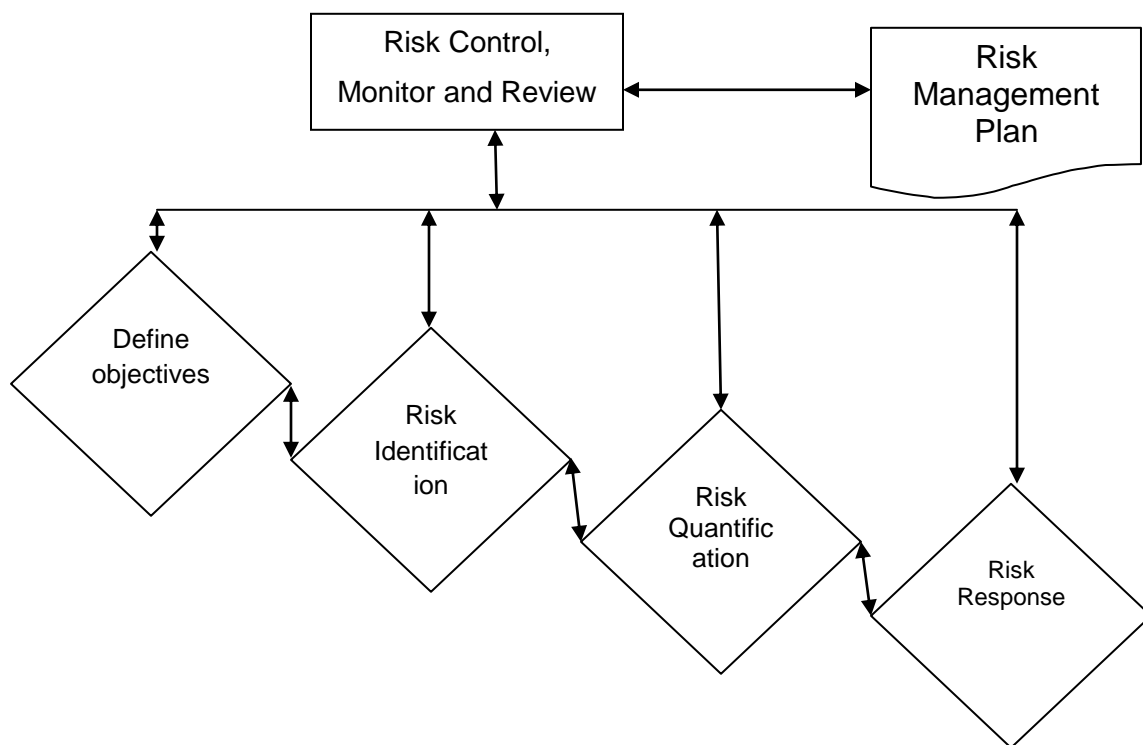


Figure 17: Burkes Risk management model
(Source: Burke, 2000)

The risk management model developed by Burke (2000) from figure 17 above depicts the logical sequence of the entire risk management activities and shows how all

of these activities are integrated with one another. Risk identification, Risk Quantification and Risk Response are associated with the Risk Control, Monitor and Review activity, which are also fundamental to the organisation's Risk Management Plan. The company management, therefore, also knows how their project will be managed and how the risk will be identified during this period.

The model which was designed by Burke (2000) is a detailed process of another risk management model designed by the Gray and Larson (2006). Their model is developed from Burke's model. Though some of the steps are similar, there is slight difference between their models and each step is detailed in a precise way which has been further developed in figure 18 below.

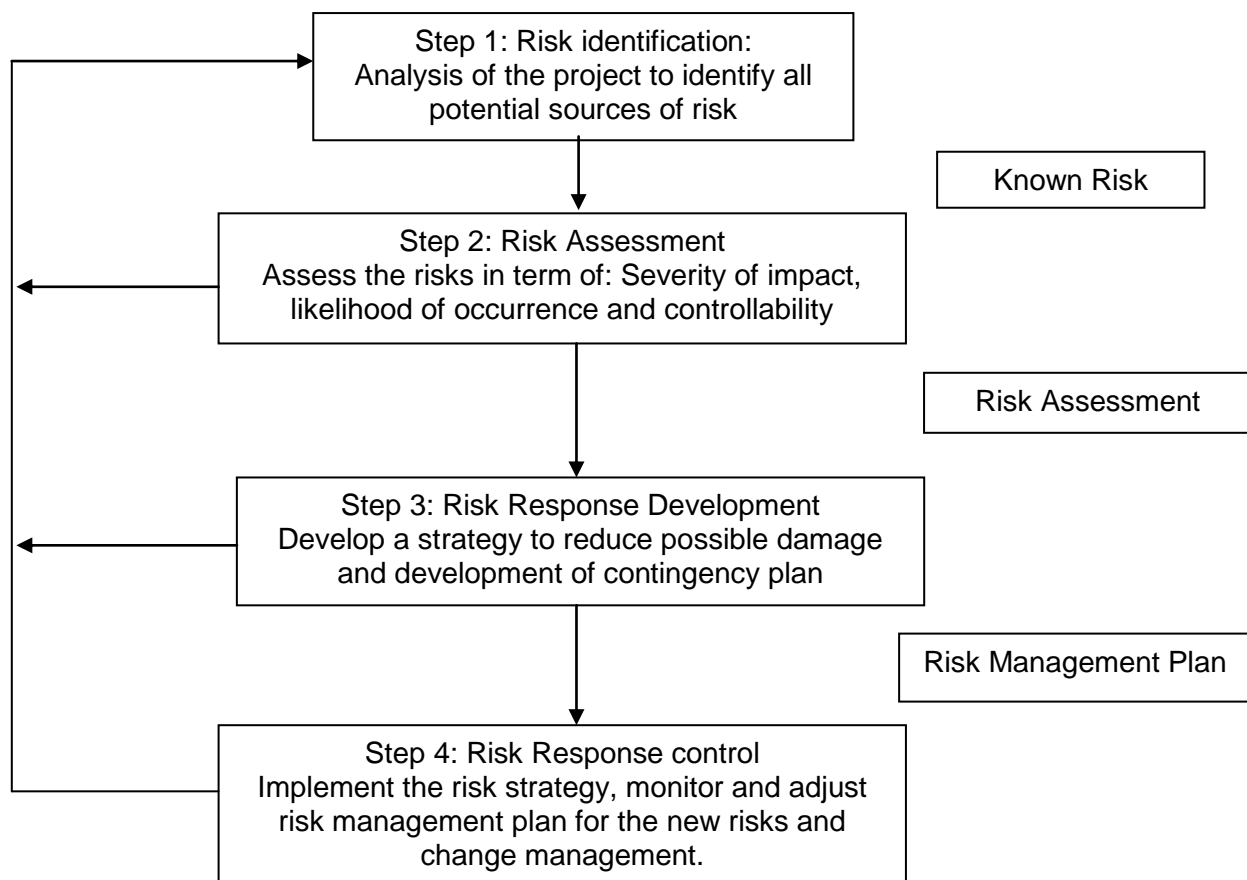


Figure 18: Gray and Larson's Risk management model
(Source: Gray and Larson, 2006)

Gray and Larson's (2006) risk management model in figure 18 is to some extent similar to Burke's (2000) model, they have gone into further detail. In their model, each step of risk management is detailed in a very specific way. The first step is Risk Identification, which depicts the analysis of the entire project so that all the potential sources of risk associated with the project can be recognised. The risks identified in this step are known risks; no new risk is evaluated in this stage. Also in this second step risks are assessed in terms of the severity of their impact and therefore may cause a delay in the successful completion of the project. The likelihood of the occurrence of risk in this step is measured on the basis of developed risk response development plans and is also assessed in terms of controllability. This risk assessment stage also provides the opportunity to assess new risk.

Gray and Larson (2006) provide details on the risk response development system that are not clearly detailed in the model presented by Burke. At this stage, a strategy is developed to mitigate the risks and the possible damage which may affect the company's project. A risk management plan is developed along with a contingency plan to manage and reduce the severity of the risk. In the last step of the risk management model, risk response control is defined as the implementation of a developed risk control strategy. At this stage, those risks identified at the initial level and during the risk assessment process are monitored and adjusted, and then risks within the new risk management plan are also adjusted (Ranong, and Phuenngam, 2009).

2.9 The Global Standard for risk management - ISO 31000:2009

ISO 31000:2009 *Risk management – Principles and guidelines* was developed as a necessary support for managing risk effectively. Since risk is considered to affect organisations by impacting their economic performance, their reputation and their overall results, along with the environment, safety and the wider society, this standard provides the principles, framework and process for better dealing with risk. It is designed to be used by any enterprise irrespective of its dimension or activity sector. It is designed to provide the necessary tools for increasing an organisation's chances of

achieving its aims, of becoming aware of the opportunities and treats that might arise and to distribute resources to effectively address risk.

ISO 31000:2009 provides a detailed description of the components of a risk management implementation framework. As shown in the figure 19 below, the main component of this framework is mandate and commitment. The next four components (design of framework, implementation of risk management, monitor and review of the framework and the improvement of the framework) are developed within the main framework which also functions as a directive.



Figure 19: Framework for managing risk (based on ISO 31000)
(Source: AIRMIC, 2010)

Although from the framework in figure 19 above, which provides the principles necessary for guiding internal or external audit programmes, this standard cannot be used for certification purposes. It is a recognised international benchmark that can help companies evaluate their internal risk management practices by comparing them to principles that have proved effective for ensuring sound management and corporate governance.

The risk management principles and guidelines specified in ISO 31000:2009 are complemented by ISO Guide 73:2009, *Risk management – Vocabulary* and ISO/IEC 31010:2009, *Risk management – Risk assessment techniques*. While the first provides

useful definitions for understanding terms relating to risk management, the latter focuses on techniques that can help deliver risk assessment.

This standard aims to present and clarify the concepts, processes and techniques that are necessary for raising awareness among stakeholders regarding the potential risks that might impact on the successful completion of their project and on the measures that can be undertaken to reduce these risks.

2.10 Section Summary

This section examined risk management models as proposed by different schools of thought. The similarities and differences between models were highlighted with the view of providing an understanding on the best techniques to be adopted in the development of a model suitable for the Nigerian power sector. From this preceding subsection of the existing models, the next phase from Table 5 presents a summary of the different risk management models studied and highlights the main focus of each model as well as the limitation of each model's applicability with a view for a conceptual framework.

Table 5: Comparison of Risk Management Models

Existing Models	Characteristics	Focus	Inadequacy
Linear Risk Management Model (Perry and Hayes, 1985)	Consist of three stages and one of the simplest risk management model	To analyze the probability of occurrence of positive events and to minimize the impact of the risk on the project.	Baker et al. (1998) and Carter et al. (1994) stated that's this model cannot be used for large project and it only posits only identification, analysis and response. There is no monitoring and control measures and is not a cyclical process
Risk Management and control Model (Valsamakis et al., 2004)	It is an ongoing process and it can be mainly used in the business and event risks. It is divided into four different categories.	It primarily concentrates on financial risk of the project.	Lays its major emphasis on financial risk control process only. The risk analysis stage has not been included in this model (Ranong and Phuenngam, 2009).
Six Stages Cyclic Risk Management Model (Carter et al., 1994)	Comprised of six stages and it is very complex and lengthy risk management model.	Identify those risks also which arise due to implementation of control measures	Categorizing and reporting of the risk makes the model more complex and time consuming

Nine Stages Generic Risk Management Model (Chapman, 1997)	This model is divided into nine different phases and also considered as one of the best model during that period.	It focuses in each and every activity of the risk associated with the project	Very lengthy and time consuming process and did not fully draw much emphasis on the aspect of risk assessment. It is also not cyclic in nature which means that the model is based sequentially and does not go back to review all the previous stages of the model after the final stage.
Australian / New Zealand Risk Management Standards (Randall, 2008)	It is also termed as Risk Treatment Process and it mainly helps in decision making process.	Focuses on continuous monitoring of the risk.	Does not lay much emphasis for addressing the unidentified risk factor (preparing insurance plans, considering back up team members)
Risk Management Model (Burke, 2000)	Helps in determining the risk tolerance for the business.	Focuses on process of integration and interactions of the risk management.	This risk management model cannot be perfectly implemented in the large projects.
The Risk Management Model (Gray and Larson, 2006)	It is comprised of four steps and each step has further description of Burke's Risk management model.	It focuses on each and every step of the model, which is what needs to take place in each and every stage of the model to be applied on a project.	This risk management model does not consider the primary step that is "setting objective" or what the company wants to achieve with its

			<p>risk management model (Shaw et al., 2012). It is not a cyclical model as It also does not lay much emphasis on communication and consults as well as continues room for feedback reviews. It also does not give room for comparison between initial plan vs actual plan.</p>
<p><u>ISO 31000:2009</u></p>	<p>This model is comprised of one main component that defines the approach and four secondary ones that need to be developed in accordance with the direction imposed by the main one.</p>	<p>It is designed so as to be used by any company irrespective of its size or of the sector in which it conducts its activity.</p>	<p>It provides the necessary guidance for risk management implementation rather than a framework that would help develop the entire risk management process (Cooper et al., 2005).</p>

2.11 Rational for Developing an Integrated Risk Management Framework

Haghnevis and Sajedi (2006) argue that the concept of risk management has been undertaken as adopted as a methodological process to improve project related activities and risk mitigation. They further posit that no specific or precise model or methodology has been developed to fully address all projects, as every project is unique and cannot necessary be applicable to every organisations project specification. The reasons is because most commonly used standards and methodologies for addressing the aforementioned issues tend to be specific to a particular project and have their various limitations, especially in industrial procedures which have encompasses unique structure that require highly specialized instructions (Haghnevis and Sajedi, 2006). This further justifies the research purpose in conjunction with Haghnevis and Sajedi (2006) as to why a need for new RM framework to be developed with a focused view towards the context of the Nigerian power sector as not all existing models or methodologies can be well applicable and suited directly to this sector.

Additionally, this moreover further justifies the problem statement (See section 1.2) which was argued by Hogart (1980) and Olsson (2007) of the need to develop and improve exiting risk management frameworks, since these existing methods and techniques possess their various limitations and might not precisely be suitable and applicable to every projects specification as they are distinctive and unique due to the circumstances in every pattern with aims and objectives, which differ from every aspects of various industrial projects.

As mentioned in the proceeding chapter (See Section 1.4), the aim of the research investigation into the importance and contribution of risk management to the success of projects specific to the power sector in Nigeria and designing a RM framework which can be successfully applied to these projects as it is based on the prior analysis of the risks typically associated to them.

After analysing the models proposed by other researchers in the field and presenting, comparing and in contrasting both their positive characteristics and their inadequacies or deficits, it seems appropriate to propose a different risk management model that would use the features and sequences of those mentioned above (See Table 5), while trying to avoid repeating their weaknesses, and at the same time taking

into consideration with regards to understanding their limitations as to why a new model has to be developed based on the survey results from the analysis (Quantitative and Qualitative) and hypothesis which will be further reviewed in chapter 5 (Data analysis) and further developed and integrated into a new framework (See Chapter 6 Model development).

The risk management framework created as a response to those presented comprises of six main sequences that are interconnected and one additional sequence that is somewhat complementary to the second main sequence.

1. Establishing objectives for the risk management process (through feasibility studies).
2. Planning and identification of risks by considering both internal and external factors- performing a thorough and in-depth analysis of the project to become aware of its potential and most probable risks.
 - 2.a. Considering measures for addressing unidentified risk - preparing insurance plans, considering support team members that could substitute others or help them perform better on a tighter schedule.
3. Designating a risk management team which will conduct risk assessment and which will be responsible for proposing and supervising the implementation of appropriate risk response - analysing the probability of the identified risks to occur and their potential impact on the project development.
4. Conceiving risk response - addressing the identified risk in the most effective manner, while taking into account the overall context.
5. Implementing and evaluating risk response – acting according to the previously designed answers and evaluating the effect of these responses.
6. Adjusting the project strategy by taking into account the overall context and the previously conducted steps.

The framework proposed is a circular sequential one which implies addressing risk by undertaking the actions defined in the stages above in a consecutive order. Each

step of the proposed framework will be based on the results of the analysis and tested on a project which will be further validated on an existing project in chapter 6 (Model development and practical application - See Section 6.3).

2.12 Chapter Summary

This chapter explored the concept of risk management and the various techniques employed in the risk management process. Various means for risk identification were also explored. The importance of monitoring and control as a critical aspect of the risk implementation process was also highlighted.

Different models proposed by other researchers were presented and concise explanations regarding the workings of these models were given. This chapter helped elucidate this research by helping to illuminate some of the research objectives.

CHAPTER 3 – OVERVIEW OF THE NIGERIAN POWER SECTOR

3.0 Introduction

The steady and sustainable availability of power supply is the hallmark of any developed nation and steady power supply is a catalyst for the growth and development of a nation (Obadote, 2009). Power is needed almost in every aspect of our daily life. According to Idris et al. (2013), with a population of more than 150 million people, Nigeria has the potential and capability to be at the forefront of the power sector in Africa. However, Adegbulugbe et al (2007) claims that although there is a very high demand for electricity throughout the entire nation, it lacks the generation, transmission and distribution capacity. Adenikinju and Omojolaibi (2014) reveals that only approximately 43% of the total electricity needed in Nigeria was generated in 2003 and added that, at present, only 42% of the entire population has limited/minute access to electricity.

In Nigeria, there is a significant need to improve the supply of electricity and this can be achieved through the restructuring of major developments in the power sector so that these are attainable and represent other nations which have placed a large emphasis on their power sector projects (Kenneth and John, 2013).

3.1 Electrification of Africa

It is important to understand the growth of the power sector in other African countries as this will provide an indication of the progress or lack or lack of progress of the Nigerian power sector (Okafor, 2008).

According to Rogers (2014), the total electricity generating capacity of the entire sub-Saharan Africa (made up of 49 countries with an estimated population of about 826 million) is the same with that generated output of Iran. It is also worthy to note that over 60% of the 68GW capacity generated in Sub-Saharan Africa is generated by South Africa alone. Agdoghe et al (2009) argued that the implication of this is that the power generated by most African nations falls way short of what is needed to drive their economy forward which is depicted in figure 20 showing the electricity capacity generation in Africa by comparison.



Figure 20: Electricity Capacity Generation in Africa
(Source: World Bank; CIA Factbook)

Obioma and Obioma (2012) reveal that having recognised the immense importance and contribution of power to the development of any nation, the International Atomic Energy Agency (IAEA) initiated a project dubbed the *Sustainable Energy Development for Sub Saharan Africa (RAF/0/016)*. Ahmed (2008) highlights that the

project's main objective is to help nations in the Sub-Sahara Africa region increase their energy capacity through proper planning, execution and implementation of projects and policies.

Table 6: Electricity consumption per capita in selected countries

Country	Electricity Consumption per capita(KWh)
Nigeria	136
Libya	4,270
India	616
China	2,944
South Africa	4,803
Singapore	8,307
United States	13,394
Gabon	900
Ghana	284
Kenya	125

Source: IseOlorunkanmi (2014)

Africa has been dubbed the 'dark continent' and this can be attributed to the slow pace of development, brought about by its inability to generate enough power to meet the demands of its population by way of comparison as seen in table 6 above. However, the projection for Africa's developing electricity generating capacity over the next six years is optimistic. This projection is based on programmes that have already received funding and are currently in their initiation or execution stages.



Figure 21: Energy Generation Projection
(Source: World Bank; CIA Factbook)

Figure 21 above is a map of Africa showing the anticipated power generation capacities of African nations. This increased capacity according to Rogers (2014) can be achieved for selected nations through the following means in table 7:

Table 7: Energy generation Means

S/N	Country	Method for Increasing Energy Generation
1	Algeria	Addition of six gas powered stations
2	Angola	Proposed investment of about \$23bn in the power sector by 2017 Proposed addition of 15 new power plants
3	Botswana	Expansion of existing facilities Addition of a Greenfield coal plant
4	Cote d'Ivoire	Private sector investment and participation of independent power producers
5	Chad	Planned building of rural mini solar plants
6	Democratic Republic of the Congo (DRC)	Construction of a huge dam and six power stations for hydroelectric power generation
7	Gabon	Proposed construction of hydro, gas and heavy fuel power station
8	Ethiopia	Construction of a dam to generate addition 60GW power Construction of three 100MW solar plants
9	Ghana	Construction of the largest solar plant in Africa
10	Nigeria	Proposed construction of a dam to boost generating capacity

Source: Rogers (2014)

3.2 Electricity Generation and Distribution in Nigeria

It is imperative to understand the concept of power generation and distribution in Nigeria because nearly every project in the power sector is geared towards enhancing electricity generation and supply. There are presently 14 electricity generating power plants in Nigeria supplying electricity to the national grid. However, there is a shortfall in electricity supply in the nation and so to address this, the Federation has initiated an electricity reform programme aimed at improving the supply and distribution of electricity. Koledoye et al (2013) reveals some of the objectives of the electricity reform programme in Nigeria:

- To maintain and sustain the minimum generation of existing electricity capacity of 5800 MW

- To reduce the wastage of power during transmission and distribution of electricity to different parts of the nation
- To develop better infrastructure so that technical losses could be reduced while transmitting and distributing energy
- To make use of advanced technology in generation, transmission and distribution of power so that improvement can be achieved in terms of safety, health and environmental measures

3.2.1 Energy Demand in Nigeria

Using a model for the analysis of energy demand (MAED), the energy commission of Nigeria (ECN) proved that the current generating capacity in Nigeria falls short of the quantity demanded (Obioma and Obioma, 2012). According to Owizy (2014), MAED was used to determine the projections for energy supply, having first identified key drivers for energy demand such as demography and technology.

To effectively ascertain the energy consumption in Nigeria, it is broken down in a consistent manner within each sector into individual end user categories. This breakdown in table 8 below is essential as it helps in determining various economic, social and technical factors which govern the final energy demand in the individual categories (Babatunde, 2011).

- Optimistic Scenario I – 11.5% GDP Growth
- Optimistic Scenario II – 13% GDP Growth
- High Growth Scenario – 10% GDP Growth
- Reference Scenario – 7% GDP Growth

Table 8: Electricity Demand Projections per Scenario, MW

Scenario	2005 (MW)	2010(MW)	2015(MW)	2020(MW)	2025(MW)	2030(MW)
Reference (7%)	5746	15730	28360	50820	77450	119200
High Growth (10%)	5746	15920	30210	58180	107220	192000
Optimistic I (11.5%)	5746	16000	31240	70760	137370	250000
Optimistic II (13%)	5746	33250	64200	107600	172900	297900

(Source: Sambo et al., 2012)

3.2.2 Energy Generation in Nigeria

A gap exists between the demand for power and the supply and distribution of energy in Nigeria compared with most African nations as a whole. This gap is mainly due to the generating capacities in these nations. Blankson (2011) claims that the generating capacity of the 14 power plants in Nigeria is estimated at 7876 MW, but at present these plants are only generating around 4000 MW. This difference is attributed to the age of the plants coupled with inadequate maintenance.

Tables 9 and 10 shows the existing power generation capacity and the planned total present and future electricity generation infrastructure in Nigeria

Table 9: Existing Power Generation Capacity in Nigeria

S/N	Plant	Plant Type	Location State	Age in Years	Installed Units	Installed Capacity in MW	Units Available
1	Egbin	Thermal	Lagos	22	6	1320	4
2	Egbin AES	Thermal	Lagos	6	9	270	9
3	Sapele	Thermal	Delta	25 - 29	10	1020	1
4	Okpai	Thermal	Cross River	2	3	480	2
5	Afam	Thermal	Rivers	25	20	702	3
6	Delta	Thermal	Delta	17	18	840	12
7	Omoku	Thermal	Rivers	2	6	150	4
8	Ajaokuta	Thermal	Kogi	NA	2	110	2
9	Gerenu	Thermal	Kogi	1	3	414	3
10	Omotosho	Thermal	Ondo	New	8	335	2
11	Olorunsogo / Papalanto	Thermal	Ogun	38 – 40	8	335	2
	<i>Sub Total (Thermal)</i>				93	5976	44
12	Kainji	Hydro	Niger	24	8	760	6
13	Jebba	Hydro	Niger	22	6	540	6

14	Shiroro	Hydro	Niger		4	600	2
	<i>Sub Total (Hydro)</i>				18	1900	14
	Grand Total				111	7876	58
SUMMARY		<i>Thermal (%)</i>			84	76	76
		<i>Hydro (%)</i>			16	24	24

(Source: Koledoye et al., 2013)

Table 10: Planned Total Present and Future Electricity Generation Infrastructure in Nigeria

S. No.	Power Station	Type	State	Capacity in MW	Status
1	Egbin	Thermal	Lagos	1320.00	Existing
2	Afam	Thermal	Rivers	969.60	Existing
3	Sapele	Thermal	Delta	1020.00	Existing
4	Ijora	Thermal	Lagos	40.00	Existing
5	Kainji	Hydro	Niger	760.00	Existing
6	Jebba	Hydro	Niger	578.40	Existing
7	Shiroro	Hydro	Niger	600.00	Existing
8	Delta	Thermal	Delta	912.00	Existing
9	Orji	Coal	Rivers	20.00	Existing
10	Geregu	Thermal	Kogi	414.00	Ongoing
11	Omotosho	Thermal	Ondo	335.00	Ongoing
12	Papalanto	Thermal	Ogun	335.00	Ongoing
13	Alaoji	Thermal	Abia	504.00	Ongoing
14	Omoku	Thermal	Rivers	230.00	New IPP
15	Rain / Ube	Thermal	Bayelsa	225.00	New IPP
16	Sapele	Thermal	Delta	451.00	New IPP
17	Eyane	Thermal	Edo	451.00	New IPP
18	Egbema	Thermal	Imo	338.00	New IPP
19	Caliber	Thermal	Cross River	561.00	New IPP
20	Mambilla	Hydro	Taraba	2600.00	New

21	Zungeru	Hydro	Niger	950.00	New
22	AES	Thermal	Lagos	300.00	Commissioned IPP
23	AGIP Okpai	Thermal	Delta	480.00	Commissioned IPP
24	Omoku	Thermal	Rivers	150.00	Approved IPP
25	Obajana	Thermal	Kogi	350.00	Approved IPP
26	Ibom Power	Thermal	Akwalbom	188.00	Approved IPP
27	Ethiope Energy Ltd.	Thermal	Sapele	2800.00	Approved Licenses IPP
28	Farm Electric Supply Ltd.	Thermal	Ogun	150.00	Approved Licenses IPP
29	ICS Power	Thermal	Abia	624.00	Approved Licenses IPP
30	Supertek Ltd.	Thermal	Kogi	1000.00	Approved Licenses IPP
31	Mabon Ltd.		Lagos	39.00	Approved Licenses IPP
32	Geomatic Ltd.	Gas	Enugu	140.00	Approved Licenses IPP
33	Aba Power Ltd.	Gas	Enugu	0.00	License Distributor
34	Westcom Tech & Energy Service Ltd.	Thermal	Ogun	1000.00	Approved Licenses IPP
35	Lotus & Bresson Nig Ltd	Thermal	Ogun	60.00	License Granted IPP
36	Anita Energy Ltd.	Thermal	Lagos	136.00	License Granted IPP
37	First Independent Power Co. Ltd.	Thermal	Eleme	95.00	License Granted IPP
38	First Independent Power Co. Ltd.	Gas	Omoku	150.00	License Granted IPP
39	Hudson Power Station Ltd.	Thermal	Ogun	200.00	License Granted IPP

40	Ibafo Power Station Ltd.	Thermal	Ogun	640.00	License Granted IPP
41	Shell Distribution Co. Ltd.	Gas	Afam	100.0	License Granted IPP
42	AgbaraShoeline Power Co. Ltd.	Thermal	Ogun	1800.00	License Granted IPP
43	Index Thermal Power Ltd.	Thermal	Lagos	1800.00	License Granted IPP
	Total			27659.00	

(Source: Koledoye et al., 2013)

Rogers (2014), claims that the government of Nigeria aims to increase the generating capacity of the nation from 5.9GW to 40GW. However he also asserts that it is unlikely to achieve this target due to documented records of public maladministration in the country.

3.2.3 Projection for Energy Supply

The projections for the total supply of energy were calculated by adopting Model for the Energy Supply Strategy Alternatives and their General Environmental Impact (MESSAGE). To devise the supplying strategy, projected energy demand was used as one of the inputs. MESSAGE is a model used for projecting the supply of energy (Kenneth and John, 2013). This model represents the utilisation processes of the energy system and energy conversion, and the impeding factors on the environment due to large demand of final energy. This model is extremely useful for formulating strategies for short- to medium-term projects (Idris et al., 2013). It is extremely necessary to limit the timescale of the project as the future is uncertain because of the everyday advancements in technology.

A multi-period approach is used for moulding the dynamic that is associated with the energy system. This model helps in developing a technique which makes use of existing technology and future technological developments (Obioma and Obioma, 2012). For better results, MESSAGE considers the variation in the demand and supply of the energy during different hours of the day, week and year. In addition to this, it also

emphasises political constraints and technological differences in energy supply considerations.

This model is based on the environment and energy, which enable the users to evaluate the development taking place in the energy sector and its adverse impact on nature (Idris et al., 2013). The implementation of MESSAGE results in a least-cost inter-temporal mix of emission control technologies, energy conversion and primary energy for all scenarios (Chupka et al., 2008). Table 11 and figure 22, shows the supply projections for Nigeria:

Table 11 : Electricity Supply Projections per Scenario, MW

Scenario	2005 (MW)	2010 (MW)	2015 (MW)	2020 (MW)	2025 (MW)	2030 (MW)
Reference (7%)	6440	15668	28356	50817	77450	136879
High Growth (10%)	6440	15861	30531	54275	107217	192079
Optimistic I (11.5%)	6440	15998	31235	71964	177371	276229

(Source: Sambo et al., 2012)

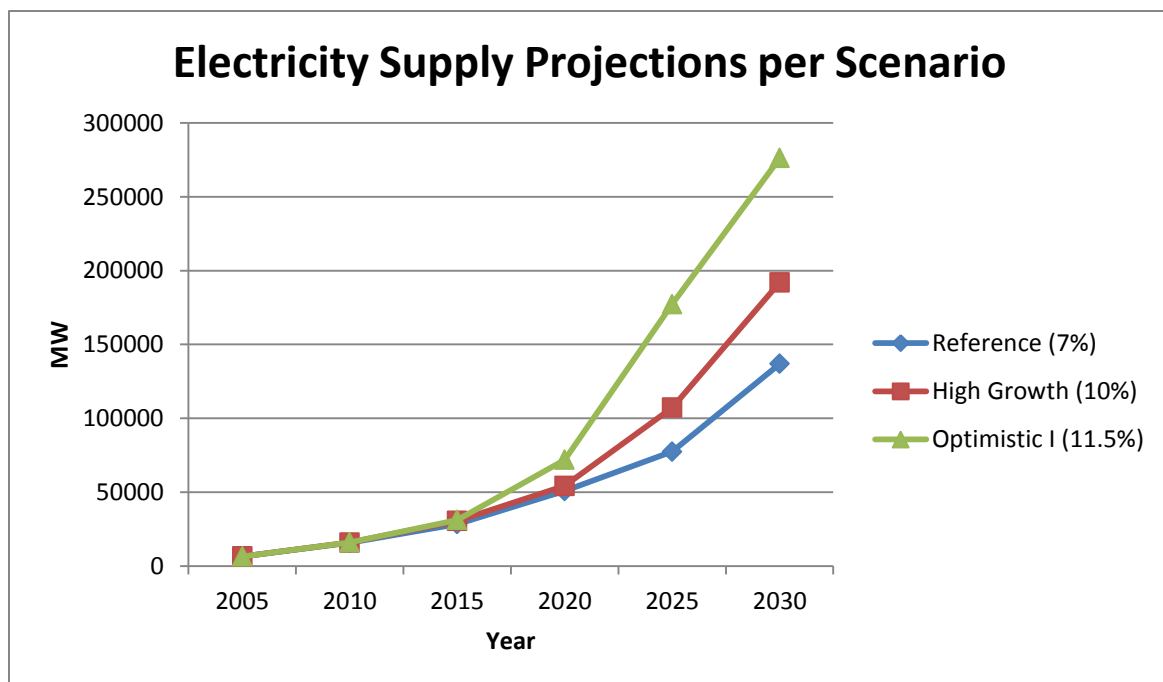


Figure 22: Electricity Supply Projections per Scenario, MW

The projection of the electricity supply from table 11 and figure 22 above was taken after considering the variations in demand of final energy and based on which supply was predicted. These supply projection scenarios are predicted after analysing the increase in GDP growth within Nigeria. If there is growth of 7% GDP in the country, then it will be a reference scenario, 10% GDP growth and there will be a high growth scenario. If the GDP is to increase by 11.5%, as projected in the supply of electricity until 2030, then it will be an optimistic scenario (Sambo et al., 2012).

3.3 Major Challenges in the Electricity Reform Process

One of the major challenges faced in the generation and supply of electricity in Nigeria was its responsibility to generate, distribute and transmit power as this was solely vested with the government through Nigeria's national electrical power authority (NEPA). However, this agency was not able to meet the energy demands of the nation, which led the government to introduce reforms aimed at boosting the generating capacity of Nigeria and also ensuring effective distribution and supply. Thus, it can be argued that these major challenges can be considered in risk management process as the concept of RM provides techniques for planning and identifications of these major challenges which could impede a project success as well as provisions for evaluating and analysing such related issues of a project performance (Akintoye and Macleod, 1997). According to Okoro and Chikuni (2007) and Ibitoye and Adenikinju (2007), the aim of the energy reform programme initiated by the federal government of Nigeria was:

- To separate NEPA (National Electrical Power Authority) into 18 companies incorporated in PHCN (Power Holding Company of Nigeria)
- To privatize the unbundled companies.
- To come up with Nigerian Electricity Regulating Commission as a new regulatory agency
- To establish an agency for rural electrification and for fund raising
- To institute electric power consumer assistance fund

Table 12: Key Performance Indicators of Nigerian Power Sector

Scenario	2012	2015	2020
Average number of hours of power availability per day	16	22	24
Installed capacity(MW)	9920	19258	23000
Available Capacity(MW)	6522	9758	18500
Capacity delivered(MW)	4517.6	9213	16032
Number of System Collapse per Year	16	22	24
Rural Electrification:			
Number of Local Governments electrified	698	728	774
Number of Towns connected to the Grid	32000	35000	38520
Percentage of Towns connected to the Grid (%)	40	43.75	48.15
Percentage of Towns connected to the off Grid (%)	40	95	100
Number of Staff Trained in the Sector	1227	1554	2260
Number of Jobs created in the Sector	1528	6588	10596

Source: Adenikinju and Omojolaibi (2014)

Olugbenga et al (2013) argues that despite the attempts of the Nigerian government to increase the supply of electricity through its reform programmes, a substantial gap still exists between the demand and supply of power (market risk). The following sections highlight the reasons for these shortfalls:

3.3.1 Slow Growth in Power Generation

There has been slow growth in power generation regardless of the government's attempts. The introduction of independent power projects (IPP) coupled with huge investments aimed at enhancing the capacities of Nigeria's generating stations have not yielded the expected results (Okoro and Chikuni, 2007).

In 2005, the federal government of Nigeria launched a 5000MW IPP aimed at increasing the power generation capacity in the country, but by 2008, this additional capacity for 5000MW had not yet been realised (Woods, 2011). According to Oni (2013)

the per capital consumption of power worldwide is 1KW and as shown in the table below, Nigeria falls far below this benchmark. This can be attributed to corruption and the bureaucratic approach that the government takes towards power projects (IseOlorunkami, 2014). Table 13 below shows the electricity generation capacity in Nigeria due to the redundancy and inefficiency in the power sector.

Table 13: Electricity Generation Capacity in Nigeria

Year	Total Generation Capacity (GWh)	Average Generation Capacity (MW)	Per Capital Consumption (kW)
1999	16089	1837	0.151
2000	14727	1681	0.134
2001	15463	1765	0.138
2002	21544	2459	0.178
2003	20183	2304	0.172
2004	24275	2771	0.201
2005	23539	2687	0.187
2006	23110	2638	0.178
2007	22978	2623	0.177
2009	18817	2148	0.139
2010	24872	2839	0.179
2011	23652	2700	0.179
2012	-	4100	-

(Source: Koledoye et al., 2012)

One of the impeding factors that stems the slow growth and development in the Nigerian power sector is that most of the policy formulation and implementation of the regulatory system and management as depicted from the graph below in figure 23, which shows a decline in energy production and consumptions as compared to the energy tariff.



Figure 23: Per Capital Electricity consumption average growth rate

Source: Adenikinju and Omojolaibi (2014)

3.3.2 Market Deregulation, Process Delay and Interference by Government

Government interference in the power sector poses another challenge in the ongoing quest to improve the power generated in the country. According to Oni al. (2013), the executive arm of the government approved the National Electric Power Policy (NEPP) in 2000, which was aimed at privatising the power sector. The purpose of this policy was to ensure that the ownership, control and regulation of the power industry shifted from the hands of the local government to those of private players. This policy was not exercised into law until 2005, five years after it was made, because of government irregularities. Oni (2013) also reveals that another setback faced in the power reform programme was caused by the inappropriate location of the Independent Power Projects (IPPs). Instead of considering the economics of power generation, more emphasis was placed on politics. Most of IPP locations were selected inappropriately. The main raw material required for the generation of power, gas, was not sufficiently available in the vicinity. This has significantly raised the cost of IPPs (Sambo, 2011).

3.3.3 Vandalisation of Power Lines and Equipment

The major problem experienced by the power sector of Nigeria is the vandalisation of underground cables that are required for transmission distribution and equipment. These problems were very common before the ongoing reforms, and the present scenario is not much different (Iwayemi, 2008). There are many players who are responsible for this, but the main culprits are the power brokers and the power generation importers. Despite timely payments to the third parties who look after the maintenance and repairing of transmission equipments and distribution lines, the respective agencies do not perform their work sincerely (Okolobah and Ismail, 2013). Among all the problems faced by the power sector, this is the most threatening issue for the authorities and requires immediate action.

3.3.4 Negligence in Maintenance of Existing Power System

One of the reasons behind the epileptic nature of the power supply in Nigeria is the poor maintenance of its power systems and infrastructure. Power plants are continuously making efforts to increase the generation capacity and to a large extent have succeeded, but due to the malfunctioning of transmission and distribution lines, and loopholes in the maintenance activities carried out by the power sector staff, the final outcome is unimpressive (Babatunde, 2011). Fault clearing in any of the processes takes a very long time and there is no maintenance schedule. PHCN, earlier known as NEPA, is not able to send an uninterrupted supply of gas to many of the private multination organisations which have a dedicated private gas turbine generator (Okolobah and Ismail, 2013).

Due to the interrupted supply of gas for turbines, most companies have no choice but to switch to the diesel generator. This result in a large number of workers being laid off every financial year as the cost of providing an alternative source of power, occasioned by the use of diesel generators, adds significant costs (Khan, and Burnes, 2007).

3.3.5 Corruption

Most African nations are on track to achieving for development, but, in the whole of Africa, corruption has set Nigeria back the most. Corruption has its deep roots in all the economic sectors of Nigeria, including the power sector (Koledoye et al., 2013). Even power reforms are affected by its venom. Here are some of the corruption issues existing in the country's power sector:

In 2009, the Rural Electricity Agency (REA) was suspended because the agency's management was involved in a 5.2 billion Naira scam. In addition, members of the National Assembly and Ministry of Power were also involved in the swindle (Sambo et al., 2012). The PHCN workers' pension, totalling of 88 billion Naira, was accrued from of a 7.5% deduction in workers' salaries (Gujiba et al., 2010).

Every year the federal government claim to invest \$2 billion dollar for the development and maintenance of power sector whose average generation capacity is 2000 MW. It means that over the last two decade the federal government has spent around 40 billion dollar on the maintenance and development of the power sector, but the actual development of this sector is still unsatisfactory and deficient due to its inefficiency and ineffective regulatory conditions (Sambo et al., 2012).

According to reform agenda (Kenneth and John, 2013), if around 3.5 billion dollars is spent every year for the next ten years in the development and modernization of power sector, the actual power generation capacity of the nation can be increased to 40000 MW, but looking at the past performance of the sector, it is practically impossible for the power companies to achieve this (Gratwick and Eberhard, 2008).

3.3.6 Limitations in the implementation of a sound risk management framework

Besides the reasons mentioned above, the results of the pilot study (Chapter 5 data analysis) conducted to support this research can also help formulate several hypotheses in reference to the challenges that the Nigerian power system is facing.

Although the majority of those who participated in the survey strongly agreed (68%) or agreed (20%) that risk management represents an important component of a company's strategic management, the percentage decreases when they are asked

whether they consider that risk management is actually looked at as a part of their organisation's management (only 40% strongly agree to this and 20% agree). Percentages indicating the importance awarded to risk management within companies decline even more when that question arises. When answering question five from the second section of the questionnaire, "Does your organisation consider risk management to be of high importance in the project management process?", the majority of respondents strongly disagreed (31%) or disagreed (26%) with this assertion. Moreover, most of those have been asked (57%) either strongly disagree or disagree that people within their companies use shared language or the definition of risk management.

Although risk management is considered an important component of a company's strategic management, there is still a long way to go before reaching the level of consideration that would ensure the adoption of the necessary resources capable of increasing its effectiveness.

It is not unreasonable to consider that the challenges faced by the Nigerian power reform is facing would be largely overcome if companies became more aware of the relevance of the risk.

3.4 Risk factors affecting the profitability of Projects in the Nigerian Power Sector

It is essential to recognise the risk factors that are typically associated with power sector projects (Gratwick and Eberhard, 2008). Onaiwu (2009) reveals risks which directly affect the actualisation of the key project performance indicators, such as time, cost, quality and scope in developing countries like Nigeria. Some of these factors are contained in the following sections.

3.4.1 Completion Risk

This risk concerns the likelihood that the project will be completed on time, and within the company's specified budget. According to Hall and Duperouzel (2011), completion time and funds injected into power projects is directly influenced by project delays and abandonment. One of the major difficulties encountered in Nigerian power projects regards the inability of the power plant to meet its required performance thresholds.

As pointed out by many researchers (Olugbenga et al., 2013; Oke, 2010; and IseOlorunkanmi, 2014) who have investigated the development of the Nigerian power sector, the inadequate infrastructure is another crucial component that increases completion risk.

3.4.2 Regulatory Risk

These risks are mainly encountered by companies already operating in Nigerian power projects. Unilateral changes in the law and government regulations are a risk to the successful completion of the project. Regulatory risk becomes very difficult for companies to mitigate as they are not within the control of company management (Akatova and Curran, 2013).

Moreover, underlining the challenges represented by regulatory risk, Oke (2010) argues that despite the incentives provided for investors, it is unlikely that they would be convinced that funding the Nigerian power system would be a sound and profitable investment. He sustains his argument by employing the idea according to risk and profit. “Is an investor more likely to give funds to a state that is politically stable and socially reliable, even without receiving incentives, or invest in one which is characterised by a turbulent and politically unstable atmosphere”.

3.4.3 Economic Risk

Economic risk factors consist of risks relating to price and revenue. Volatility in the price of fuel and other economic and political factors, directly impact Company projects (Garvey, 2008). Fluctuation in prices has also generated a risk in price electricity, and due to the increase in electricity prices, consumers are not ready to expend the payments on the government (Hall and Duperouzel, 2011). Efficient pricing is very important for sustaining the well-functioning of the sector. IseOlorunkanmi (2014) argues that Nigeria still sells energy below production costs, which makes it hard to cover operating costs, and even harder to meet the necessary budgets needed to consider expanding and improving the system.

Another important aspect to consider is that the privatisation of PHCN in 2013 implied that many of those who acquired parts of the company had borrowed money from banks. This made it difficult for them to provide systematic funding. Given that the

power system is one that requires extensive investments, funding poses a significant economic risk (IseOlorunkanmi, 2014).

3.4.4 Fuel Risks

This risk is associated with the failure to supply fuel, which is required for production of power from the companies' power projects (Fatemi, and Glaum, 2000). If the fuels are not supplied on time, this may result in deficiency in power production. The chances of deficiency in production of power and another risk is price risk..

The power system is closely related to gas resources. It is dependent on how well the gas can be provided in order to fuel the power plants. The deficient infrastructure has proved to be an important setback in the development of the power sector as it has prevented gas being gathered, processed and transported effectively as needed by the fuel power plants. To support this argument, IseOlorunkanmi (2014) uses the example of plants such as the Alaoji 1074 (MW), Egbema 338MW, Geregu 848MW and Omotosho 786MW gas turbines, developed by the Obasanjo's administration, which remained unutilised as they were not provided with the necessary supply of gas.

3.4.5 Foreign Exchange Risk

In accordance with the study of Onaiwu (2009), it is argued that the foreign exchange risk is mainly encountered by the project sponsors including the power sector organisation and lenders, as projects also require foreign currency to perform their operating activities. Fluctuation in the value of currency also affects the cost of the project and any expenses needed.

3.5 Risk Mitigation Strategies

There are some possible risk management activities through which risk can be mitigated. How much this influences the successful completion of the project and success of the risk management activity depends on the level of execution adopted by power sector companies.

In the power sector, risk is related to the completion of the project as it requires a project to be completed on time, within the required budget and in accordance with project specifications. This can only be mitigated by retaining the reliable management of the procurement process, along with the engineering and construction of the project. Through this, their performance can be enforced contractually (Idris et al., 2013). Project management can also utilise the assistance of external contractors to test the feasibility of the project on the basis of associated risk factors.

Regulatory risk or political risk cannot be controlled by project management as this is regulated by the Nigerian government. This risk can be managed by influencing the viability of the projects in the country, by analysing which regulations can be modified (Owizy, 2014). During the transition stage of a project, the FGN can guarantee the owners that changes in policy will not influence their projects.

Economic risk and foreign risk are included in the cost of project capital and processes. These risks are uncontrollable and involve a higher ranking risk factor level. Both risks also affect the viability of the project. In the Nigerian power sector, this risk can be managed or mitigated by recognizing the factors which increase the costs and which prices can be changed by taking assurances from the government. Similarly, risk, which in terms of revenue perspective, can be mitigated by guaranteeing facilitation by credit worthy government agencies (Akatova and Curran, 2013).

Fuel supply risk can be mitigated in three different ways. Firstly, the assistance of the FGN will help in delivering and supplying fuel that is required in power plant projects (Gratwick and Eberhard, 2008). Secondly, a contract can be signed between the Nigerian Gas Company and any government organisation, agreeing the supply of essential resources to enable the successful completion of a project. In a large number of power projects, it is very important that a contract exists between the supplier and the company (Hillson, 2003) as this maximises project reliability. The last option available to companies is that they work with the government organisation by generating money through an equity fund. The risk outlining the requirement for fuel resources can then be mitigated as the FGN is also participating in the project.

3.6 SWOT Analysis of the Nigerian Power Sector

To have a clearer understanding of the Nigerian power sector it is imperative to carry out an analysis to elucidate the strength, weakness, opportunities and threats (SWOT). The analysis was achieved through a contemporary study of the Nigerian power sector.

Table 14: SWOT analysis of The Nigerian Power sector

<p style="text-align: center;"><i>Strength</i></p> <ul style="list-style-type: none"> • Availability of cheap manpower • Availability of natural resources and raw materials • Large number of graduates from foreign Universities 	<p style="text-align: center;"><i>Weakness</i></p> <ul style="list-style-type: none"> • Uneven distribution of power projects • Poor management of resources allocated to power projects • Lack of technological know-how • Lack of transparency in power project contract award • Lack of motivation of workforce • Poor implementation of power reforms program • Frequent breakdown of generation plants and equipment because of inadequate spare parts • Capacity under utilization • Poor investments and funding for power projects • Obsolete and limited infrastructures
<p style="text-align: center;"><i>Opportunity</i></p> <ul style="list-style-type: none"> • Opportunities for growth and expansion through foreign investors • Large market due to the population of the country • Collaboration with foreign companies presents excellent opportunities for growth • Catalyst for economic growth and development of the nation • Job creation through initiation of new projects • Excellent opportunity for wealth creation through public private partnership 	<p style="text-align: center;"><i>Threat</i></p> <ul style="list-style-type: none"> • Vandalization of gas pipelines and oil pipelines needed for transmission and distribution of electricity • Theft of equipment and materials • Over dependence on expatriates has limited the growth of indigenous companies • Slow growth in power generation is leading to over reliance on other means of power generation such as generators and solar panels • Government interference • Shortage of gas needed for electricity generation • Scarcity of capital to finance capital intensive power projects

(Source: Sambo et al. 2012; Anger, 2010; Eti et al., 2006; Ibrahim et al, 2006; Adenikinju, 2005; Tallapragada, 2009)

3.6.1 Strengths

One major stimulant of economic growth within a country is the abundance of cheap labour. As a result of Nigeria's high rural population, under-development levels (Felix and Wilson 2011), and poverty— over 70% of the population is living on less than \$1 a day (Anger, 2010)— Nigeria has considerable access to cheap labour which serves as a major strength for the Nigerian power sector.

Sambo et al (2012) found that Nigeria has extensive rich reserves of natural resources and raw materials. Nigeria is the second largest producer of natural gas in Africa with a reserve rate of 176 trillion cubic feet. It also has a large presence of bitumen and coal with proven reserves of 2 billion metric tonnes.

A large number of Nigerian graduates exist both in and outside of Nigeria, creating a vast pool of human capital that can be easily utilised to drive the growth of the Nigerian power sector. This forms the basis of a major strength, as a vital driver to the success of power generation is human knowledge and ability.

3.6.2 Weakness

As a result of the high level of corruption prevalent in Nigeria, there has been a gross mismanagement of the allocation of resources within the power sector (Olukoju, 2004). This has led to a high level of inefficiencies and a lack of transparency, especially in regards to the bidding process and awarding contracts.

Ineffective government policies and the poor implementation of power sector reforms within Nigeria have also stalled growth in the Nigerian power sector (Iwayemi, 2008). Coupled with the constant breakdown of power generating equipment resulting from a poor maintenance culture (Eti et al., 2006), along with the additional problem of inadequate spare parts, and this has served as a major weakness of power generation within Nigeria.

The inability of the Nigerian government to finance new projects and improve existing power infrastructures has been cited by Bacon and Besant-Jones (2011) as a major impediment to power sector improvement in developing countries. With Nigerian employees frequently being laid off, the government-owned PHCN and lack of

employee motivation has been to blame for the under-development and underutilisation of the Nigerian power sector (Tallapragada and Adebuseyi, 2008).

3.6.3 Opportunities

With a population of over 150 million, a large subserviced market for power generation, transmission and distribution exists within Nigeria. Public private partnership with the power sector in Nigeria will greatly reduce associated power project risks, especially in terms of project financing and political risk, thereby increasing growth opportunities and wealth creation (Ibrahim et al., 2006).

Foreign investment plays a major role in the Nigerian power sector as this leads to job creation and new technological innovations (Ayanwale, 2007).

3.6.4 Threats

The frequent vandalisation of gas pipelines feeding the Nigeria power sector has been a major threat to the Nigerian power sector. It has led to frequent disruptions and falls in power generating capacity due to gas shortages (Tallapragada, 2009). As a result of Nigeria's limited supply of power, consumers (individual and companies) have increasingly been relying on diesel and fuel-powered generators and solar electricity (Akinbami, 2001). This thereby serves as a source of threat to the generation of income in the power- generating economy in Nigeria (Adenikinju, 2005).

Frequent government interference stemming from rapid changes in government policies and political patronage has formed the basis of projects. The power sector has cited inadequate government commitment and financing as a serious threat to power sector development in Nigeria.

3.6.5 Justification of Swot Analysis

The SWOT analysis was applied as it is an effective tool for the broad and strategic analysis of power sector planning and understanding (Terrados et al., 2007). SWOT analysis helps present the facts through displaying information and future trends (Helms and Nixon, 2010). It highlights problematic areas within the Nigerian power sector, particularly in relation to risk management, while also showing future trends and possible solutions.

One major feature of the SWOT analysis is its ability to support strategic decision-making (Kajanus et al., 2012), which is commensurate with risk management and which is also aimed at aiding decision-making

The application of the SWOT analysis within this project enabled the researcher to present the information on the scenario within the Nigerian power sector, while also portraying the benefits of the application of risk management in power projects. This was achieved through the presentation of strengths, weaknesses, opportunities and threats.

3.7 Practical application of SWOT analysis to risk management

The SWOT analysis can be considered as an important basis for the development of strategic management as it indicates the strong points of a system under observation and the opportunities it faces, both of which can be integrated and exploited in a plan designed to aid the development and well-functioning of this system. The SWOT analysis also points to the threats and weaknesses that have a potential negative impact on the project. Although identifying the feeble points of the system and its threats are relevant for constructing a managerial strategy, they are just as relevant for the risk management process.

The weaknesses and threats identified through the SWOT analysis are, among those that would also be revealed by the risk assessment stage within a risk management process. Therefore, approaching the weaknesses from a risk management perspective is a relevant practical exercise, as well as a strong argument in favour of the opportunity to implement risk management will be explored in table 15.

Table 15: Effects and benefits of Risk management on the weakness of a power project

Weakness	Effects	Benefits of Risk Management
Uneven distribution of power projects	<ul style="list-style-type: none"> • Uneven distribution of energy supply • Uneven consumption of resources 	Enables designing a plan for ensuring and equal provision of energy and a better balanced use of resources.
Poor Management of resources allocated to power projects	<ul style="list-style-type: none"> • Obsolete equipment • Inadequate financing for new projects • High inefficiency and corruption level 	Enables effective strategy aimed at putting in place structures and plans for efficient management and close loop holes to mismanagement
Lack of technological know-how	<ul style="list-style-type: none"> • Compromising the completion of power projects • Endangering the well-functioning of these programs and the possibility of providing adequate maintenance 	Creates a structure through which by providing proper training and importing know-how power projects can be effectively dealt with.
Lack of transparency in power project contract award	<ul style="list-style-type: none"> • Determining a lack of interest among potential private investors 	Signals the aspects investors are sensitive to and helps create an approach that will gain their trust and ensure effective

		cooperation on both sides.
Lack of Employee Motivation	<ul style="list-style-type: none"> • Employee disenfranchisement • Low employee morale • Non commitment of workforce 	<p>Enables planning of effective employee motivation tools such as</p> <ul style="list-style-type: none"> • Training • Good compensation packages • Performance management and bonuses
Poor Implementation of Power Reform Programs	<ul style="list-style-type: none"> • Inconsistent policies • Hinders Foreign investment 	<p>Set up risk management plan that transfers risk through</p> <ul style="list-style-type: none"> • Board tasked with proper implementation of power reform program • Removing policy barriers and obstacles that hinders foreign investment
Frequent breakdown of generation plants and equipment because of inadequate spare parts	<ul style="list-style-type: none"> • Unequal distribution of effort among those remaining active • Increased repair costs 	<p>Employing a risk management strategy that will help</p> <ul style="list-style-type: none"> • Identify in advance the feeble infrastructural problems

		<ul style="list-style-type: none"> Preparing an d providing necessary spare parts
Capacity under utilization	<ul style="list-style-type: none"> Incapacity of providing a sufficient supply of energy Increased production and distribution costs 	Planning a flux that would enable employing all existent power sources.
Poor investments and funding for power projects	<ul style="list-style-type: none"> Lack of development perspectives Maintaining high prices for energy 	Conceiving a plan that would highlight investment opportunities.
Obsolete and limited infrastructures	<ul style="list-style-type: none"> Limiting the well-functioning of the system High costs for maintenance and repairs 	Designing an investment plan that would prove profitable on the long run.

3.8 Chapter Summary

It is important for Nigeria to meet the increasing and continuous demand of power as it is the key that unlocks the door to growth and development. In order to be able to meet the demands for electricity supply, the quantity of power supplied must be greater than or equal to that demanded. The challenge therefore now lies in generating and distributing power to meet the population's demand.

This chapter undertook a critical analysis of the Nigerian power sector and explored the current situation with regards to power generation as well as the demand and supply of countries within Africa. This critical analysis showed that Africa as a continent is regarded as the dark continent, which is due to the poor state of power supply, notwithstanding the enormous natural resources it has access to. Factors mitigating power sector growth were highlighted and include corruption, government interference and ownership, poor government policies, lack of employee motivation and project citing. Of these factors, corruption was highlighted as one of the more damaging reasons that restricts Nigeria's power sector in its quest for sustainable power for all.

Based on an extensive literature review a SWOT (strengths, weaknesses, opportunities and threats) analysis was undertaken to identify potential areas for improvement in the power sector. Nevertheless, the analysis ought not to be perceived as all conclusive and espousal as there may be other possible factors interposing or contributing to either the strengths and weaknesses or the opportunities and threats which the literature did not disclose.

In conclusion, this chapter highlighted the prevailing problems inherent within the Nigerian power sector and showed that the inability of conducting a thorough risk management plan was a major reason for the highlighted problems. It also showed the benefits of risk management in providing solutions and mitigating problems and risk, thereby leading to a more efficient and effective power sector.

CHAPTER 4 – RESEARCH METHODOLOGY

4.0 Introduction

Research methodology is used to elucidate the analysis of any subject matter in order to gain a comprehensive foothold on the research subject (Saunders et al. 2009). Woods (2001) reveals that research methodology encompasses all the tools and techniques and helps to highlight how the research objectives will be accomplished in an efficient manner.

According to Bell (2005) and Brown (2006), research methodology also helps highlight the methods of data collection as well as how the collected data are analysed for the purpose of fulfilling the aims and objectives of the research.

This chapter will expound on the various tools and techniques employed in a research such as the research philosophy, research approach, research design, types of research methodologies, research methods, types of data and data sources and also a justification will be provided for the different tools and techniques adopted for this research work.

The research aims to answer the question of the importance of risk management in the execution of projects in the Nigerian power sector. The research problem was identified and defined and the research objectives established. According to the research methodology framework proposed, after the research objectives were established, a research plan was developed. The research plan includes the methods of data collection, the sources of primary and secondary data, the validity, reliability and generalisation of the research outcome was also considered in the research plan.

The research methodology framework proposed by the researcher is to provide at a glance the process adopted for the entire research (See figure 24).

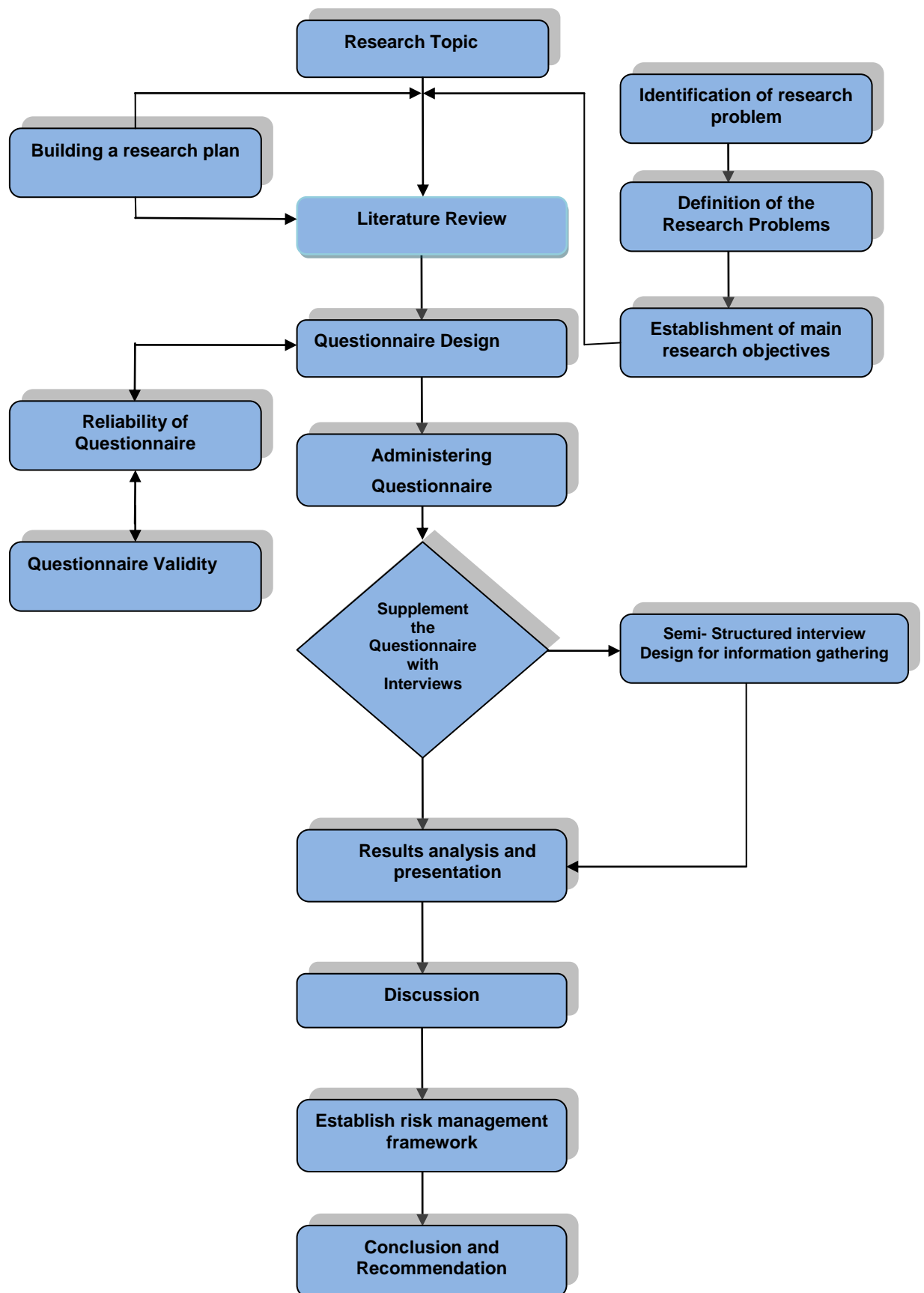


Figure 24: Research methodology framework

4.1 Research Philosophy

For a research to fulfill the core mandates of scientific research, it must be conducted within a research philosophy that highlights and includes all adopted methodologies which will aid in understanding and obtaining solutions of the research area (Saunders et al., 2012). This clearly means that in order for a researcher to completely understand his research area and provide solution, he must fully comprehend the philosophical dimension within which his research area lies (Thornhill, 2008).

Research Philosophy is simply defined as a researcher's beliefs, understanding, values and perception of reality and social constructs within the world that shape his research works (Esterby-Smith et al., 2008).

An application and understanding of the research (ontology, epistemology, and Axiology) philosophical dimensions will ensure the research will enable precise presentation and understanding of the research approach and design (Saunders et al., 2009).

4.1.1 Dimensions in Research Philosophy

Ontology is a type of research philosophy with a high bias towards social research philosophy and is aptly defined as the researcher's perception and views towards reality and how the researchers' perception and views are either influenced or non-dependent on other communal actors (Bahari, 2012). With this definition, Bryman and Bell (2007) argued that, ontology essentially supports in investigating the nature of reality with respect to a particular phenomenon.

The term epistemology in this context is a brand of philosophy which is interrelated with the nature and scope of knowledge (Creswell, 2012). It enquires about what type of knowledge is required, how the same can be gained and till which extent particular knowledge about the specific subject matter or discipline can be attained (Neergaard and Ulhoi, 2007). Epistemology states the knowledge that is true in every context and does not differ from situation to situation. Blaxter et al (2008) argued that the, concept of epistemology tends to find out the justification based on how we know what we know.

Axiology can be defined as ethics which guides a researcher in preserving, portraying and conveying his core values within his research while also ensuring conformance to scientific knowledge and principles (Easterby-Smith et al., 2008). It reveals a researchers value system in relation to his research and explores the role

a researcher's value system plays in fulfilling a research (Wahl, 2011). This branch of philosophy seeks to study the judgement of values (Saunders et al., 2009).

In summary Axiology seeks to understand the role played by the researcher in respect of his value system and how it lends credibility to the research findings (Pathirage et al., 2008).

Methodology in this scenario simply dwells on steps, procedures and process employed by a researcher in conducting his research including the research design and framework. Methodology involves application of logical principles and steps in undertaking a scientifically inclined research (Mackenzie and Knipe, 2006). Methodology therefore is the research approach and process the researcher undertook to conduct his inquiry. This could be through theory testing (deductive) or through theory generation (inductive) (Saunders et al., 2012).

A clear understanding of research philosophy enables a researcher in undertaking his research design, research approach but also providing solutions to the research questions.

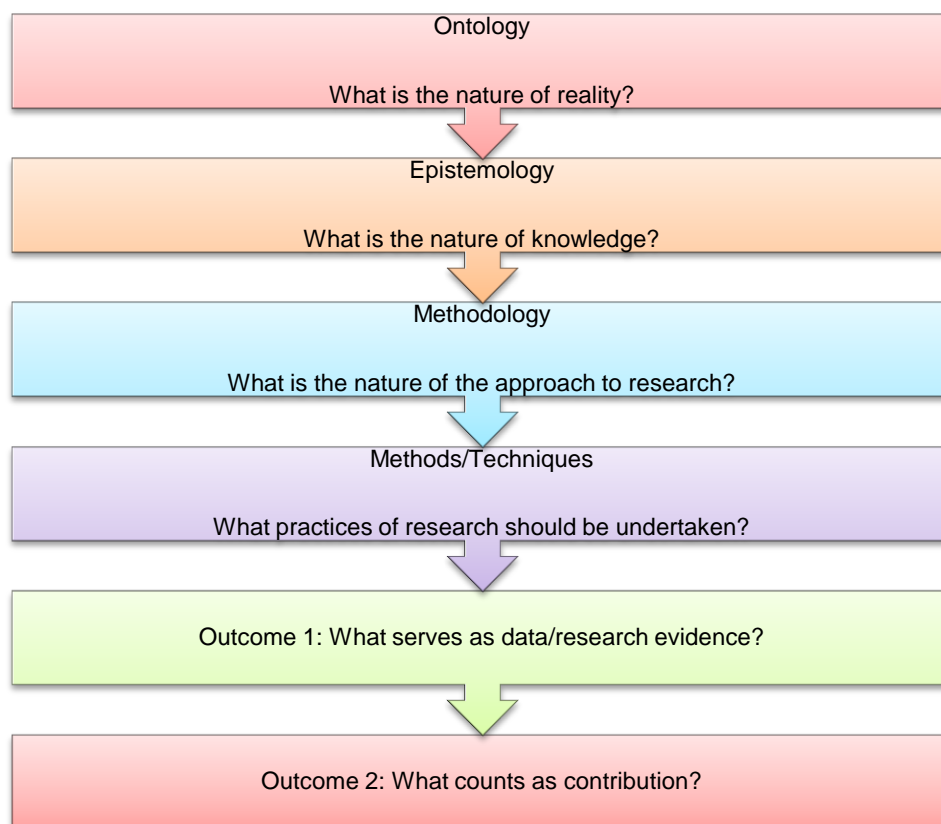


Figure 25: Building block for research philosophy
(Source: Beech, 2005)

4.1.2 Justification of Dimension in Research Philosophy

Methodology was adopted in this research work as it involved application of logical proven scientific steps and process which includes theory testing (deductive). The research methodology involves testing different theories and models involved with risk management which will enable the researcher to develop the right model for a risk management framework for the power sector in Nigeria based on the analysis and results (quantitative and qualitative) of the survey.

4.1.3 Types of Research Philosophies (Paradigm)

In defining a research paradigm, a paradigm can be defined as a basic belief or scientific knowledge and practice that exist as a result of general acceptable philosophies of people about nature of the world (Collis and Hussey, 2014). Research Paradigm is defined as scientifically proven generic models and structures which are globally approved in aiding researchers to undertake their research work (Kuhn, 2012).

Collis and Hussey (2003) postulated that research paradigm can exist in three different levels namely

- ✓ Philosophical level concerned with researchers beliefs
- ✓ Social level which acts as guidelines to the researcher in conducting his research work and
- ✓ Technical level which enables the researcher to select the best methods and techniques that will seek solutions to the research questions.

Due to the increase in knowledge and drastic changes in beliefs, perceptions and philosophies, there has been a rapid change in research paradigms. The ability of a researcher to have a clear understanding of research paradigms and philosophies will determine the quality, validity and reliability of the research work (Mendibil, 2003).

In contrast, Saunders et al (2003) and Bryman and Bell (2007) identified three research paradigm from an epistemological perspective, which are positivism, interpretivism and realism.

4.1.4 Positivism

Positivism is a research paradigm which operates on the principle that a researchers opinions and beliefs on social reality does not matter but that any information used in a research must be objective and be based on scientific prove and findings (Hellbone and Priest, 2009).

The positivist paradigm seeks to undertake research by application of experimental and survey methodology using deductive reasoning approach. The use of deductive approach process within the positivism paradigm is to ensure that scientific theories are fully employed by the researcher in analyzing social phenomenon and reality (Oates, 2006).

This entails the researcher adhering to scientific norms and theories in other to expound or any social reality on construct (Weber, 2004). Collis and Hussey (2014) argued that, in terms of positivism, generalizations are made based on quantifiable data (for example, through experiments and questionnaires) which have been analysed to find out about a particular phenomenon. This entails employing tools like sample size and sample error. The positivist paradigm enables the researcher to identify any inadequacy within a theory while also offering a valid scientific theory explanation towards an observed reality.

4.1.5 Interpretivism

Interpretivism is a subjective research paradigm in which a researchers beliefs, perception and outlook on reality is embedded within his research. The concept of Interpretivism means researchers views, bias and perception about his research focus area is fully integrated into his research (Wahyuni et al., 2012).

The Interpretivism research paradigm thereby respects the researcher's views and allows a subjective approach towards his research process through full interaction by the researcher with his research area (Yanow and Ybema, 2009).

In the Intepretivism paradigm there must be full interaction between the researcher and the research area and the research work outcome is fully dependent on this interaction.

One major drawback and critique of the interpretivism paradigm lies on the notion that there is high level of bias on the research outcome based on the researchers' views, opinions and interactions with the research area.

4.1.6 Realism

Bryman and Bell (2007) posit the philosophical angle of realism as a continuum that lies in between positivism and interpretivism from an epistemological perspective.

In other words, realism dwells on the concept of subjective reality (truth) and beliefs of human minds in existence if a particular phenomenon (Saunders et al., 2003). Direct realism (what an individual perceives, understands, see or hears) and critical realism (argues the experiences from particular phenomenon) are the two forms of approaches within the philosophical stance of realism (Saunders et al., 2009).

4.1.7 Rationale of Research Philosophy (Paradigm)

The aims of the present research surpass the conceptual differences between the two antithetical philosophies from an epistemological spectrum (positivism and interpretivism) and reconcile them in a third framework, called pragmatism (Feilzer, 2010). Similar research paradigms have been adopted when conducting a mixed research method within the field PRM as the current research seeks to explore the current status of RM practices using individual experiences attached to their organisations (through human behaviours) and project related activities as a means for understanding the particular phenomenon under investigation (Oyegoke, 2011).

Pragmatism is concerned with providing the soundest opportunities for answering research questions, the ones that entail the most favourable practical consequences. Such a middle position is advantageous in this context since it is more oriented towards generating desirable outcomes, in this case, improving risk management within the Nigerian power sector. By applying both quantitative and qualitative methods, not only can different insights on this subject area be obtained, but the results can also be merged into a comprehensive and conciliatory explanatory framework with valuable practical implications for project managers in the Nigerian power sector. This is why the present study consists of the collection and analysis of both quantitative and qualitative data on behalf of this segment of the population.

A positivist paradigm will be fully adopted within this research as it adopts the use of hypothesis testing and also its adoption of statistical methods and survey in obtaining research solutions to highlighted research questions. The positivist

paradigm use of statistical tools aids in eliminating issues bothering on reliability, validity and quality of research findings through the employment of various techniques such as sampling error (Leitch et al., 2009).

Another reason for adopting the positivist paradigm within this research is that it relies on thorough examination of facts and ensures there is a high level of consistency of presented facts. It also offers a detailed explanation of the observed social phenomenon through scientific prove and testing (Ates, 2008).

The rationale for adopting this philosophy of interpretivism in the study is to evaluate the effective findings for the research, so that the collected data can be detailed in both quantitative and qualitative form (Byrman and Bell, 2007). Another reason which justifies why this philosophy is applied as an appropriate tool in this study is that it provides more in-depth understanding of the problem and procedure under study through the respondents views in their natural context.

4.2 Research Approach

Research approach in general can be understood as a method and procedure through which particular a set of research is being carried out with a motive to obtain effective and desirable results from it (Byrman and Bell, 2007). Nunes and Al-Mamari (2008) argued that it essentially supports the researcher in conducting research in appropriately deviating from the initial aims and objectives. Moreover, it guides researcher in entailing continuous improvement in their research in order to attain effectual results at the ends.

Apart from this, research approach also enhances in focusing majorly upon the area of research and essentially aids in performing better enquiry process (Creswell, 2013). There are basically two types of research approach considered when conducting a research namely, inductive approach and deductive approach (Saunders et al., 2009).

4.2.1 Inductive Research

Inductive reasoning is a research approach usually associated with qualitative research and usually involves moving from specific observations to broader generalization or theories (Nunes and Al-Mamari, 2008). This method moves from particular situation to generalizations and hence results obtained from this practice can be applied in different context and scenario also. It can be stated that this

approach essentially supports in gaining fresh viewpoint for observing particular subject matter or discipline. It is usually referred to as “bottom up”.

It is argued that practice initiated from collection of data that is relevant to research aims and objectives. Furthermore, its evaluation is entailed with a motive to develop theories relevant to subject matter or discipline (Kuada, 2012). This approach is consulted with a mode of generating theories based on empirical findings, data and observations of a particular phenomenon under investigation (Collis and Hussey, 2014).

4.2.2 Deductive Research

This is an opposite approach to inductive approach. In this approach, generally particular set of theories are taken into account in order to contract the same towards more specific issues so that better practice can be implemented with this regard (Collis and Hussey, 2014). In this practice, a hypothesis or research objective is formulated by considering certain specific theories. It is also associated with positivism (Bryman and Bell, 2007). Furthermore, studies and enquiries upon this objective and hypothesis is continued in order to gain results from it. Under this, judgement on hypothesis is done and hence data are collected against the set hypothesis (Nunes and Al-Mamari, 2008). In general, it is a top to bottom research design in which research moves from general ideas to particular situations in order to gain better results against the subject matter.

4.2.3 Justification for Research Approach Adopted

The deductive approach will be adopted for this research because this research involves the study of various risk management models in order to be able to develop a model for the Nigerian power sector. The deductive approach starts with theories and these theories are tested using hypothesis (through quantitative data collection). The results of the hypothesis testing are observed and conclusion drawn from it. This makes this approach suited for this research as existing risk management models will be analysed and a hypothesis will be developed to test the proposed model for the Nigerian power sector prior to confirming its suitability for application.

The inductive approach in this case aided the researcher in understanding the nature of the issue at hand and semi- structured interviews were adopted to give a concise focal point on the context of study on risk management within the Nigerian

power sector, which on the other hand, generalist conclusions on the basis of the primary research findings were made.

4.3 Research Strategy

Newbury (1996) claim that a research is a means through which data is collected and analysed based on information contained or obtained from a theoretical work.

Research strategy is a universal means for the organised process of carrying out a research and incorporates all the processes adopted when collecting, analysing and in the interpretation of data (Cavana et al., 2001).

Different forms of research strategies exists for conducting a research which must be considered. They are correlation research, surveys, case studies, action research, ethnographic, historical and experimental research (Saunders et al., 2009).

4.3.1 Correlational Research

A correlation research is best described as a quantitative research methodology that undertakes comparison between two or more variables which are quantitative in nature aimed at establishing if there exists a relationship between the variables in order to correlate both variables together (Tuckman and Harper, 2012). (Jackson, 2014) defined it as the employment of statistical measures aimed at ascertaining the extent two variables are inter-related and how one variable could be used in undertaking prediction for the other variable. The variables being considered must be from the same subject group (Jackson, 2014). A correlation research method can either be in a positive or negative direction.

- ✓ A positive direction occurs when the relationship between both variables under observation tend towards the same direction while a
- ✓ Negative direction occurs when the relationship between both variables under observation move in opposite directions

4.3.2 Survey Research

Survey research presents the idea of sampling a representative population and of inference based on comparison among the groups (Sapsford, 2007). Saunders et al (2009) argued that surveys functions on the basis of statistical sampling with correspondences of either questionnaires or interviews.

4.3.3 Case Study Research

Case study involves obtaining accurate and precise information about an organization but undertaking the research within the organizations natural environment and settings without the researcher trying to influence any participants or set any form of boundary during the case study research (Hartley, 2004). The application of case study within a research is aimed at the researcher having in-depth understanding of the research subject area within its natural environment and not just aimed at the purpose of obtaining data alone. Case study research can be aptly applied to both a quantitative and qualitative research which enables the researcher to have a luxury of data acquisition (Oates, 2006).

Yin (2013) posits, two types of case study research and they are namely

- ✓ *Single Case Study Research:* This is when the researcher undertakes a study and understanding of a particular phenomenon within the natural setting of a single organization without conducting any comparison of the phenomenon under study in another organization.
- ✓ *Multiple Case Study Research:* Multiple case study research requires conducting an enquiry into a particular phenomenon by involving various organizations in order for in-depth comparison and study of the research outcomes within the various organizations. The use of multiple case study researches is aimed at achieving high level of validity and reliability of research data (Oates, 2006).

4.3.4 Justification for Research Strategy Adopted

Angus and Katano (1953) reveal that the survey strategy provides the easiest means employed to extract information from respondents through the use of questionnaires. Case study methods have also been adopted through Semi structured interviews and focus groups on a research topic for data analysis purposes providing an in-depth knowledge on the research. Both methods enable the researcher make a very informed judgement as it has the ability for broad coverage and wide application on the subject matter under investigation.

According to Wimmer and Dominick (2006), the strategy for adopting survey falls under two groups: questionnaires and Interviews.

Table 16: Pros and Cons of Surveys

Advantages	Disadvantages
<p>Aids in conducting investigation into phenomenon within realistic</p> <p>Saves cost when compared to the amount of information obtainable from it</p> <p>Allows examination of various variables at same time</p> <p>Simplifies data collection</p> <p>Geographical location does not hinder data collection</p>	<p>Causality is very difficult to establish</p> <p>Questionnaire structuring can aid research manipulation through bias answers</p> <p>Population sampling can lead to inclusion of wrong respondents</p> <p>Time factor and return rate is making survey more difficult to undertake</p> <p>A survey may not provide required in-depth answer but only show patterns and standards</p>

(Source: Wimmer and Dominick, 2006)

The survey method was adopted for this research because it encourages a more in-depth data collection for making comparison, description, numerical analysis and explanations of the research topic (Fowler, 2008). The use of questionnaire was applied within this research with the option of conducting interviews as supplementary evidence and justification with the aim

However, in this study, the researcher adopted survey strategy in order to test the hypothesis and analyse the results on the basis of if the level of implementing Risk management will improve the rate of success of projects specific to the power sector or not. Another view was to critically understand an in-depth-overview and provide solution to the existing glitches of projects in adopting the concept of risk management and thus evaluating the critical impact of RM in the Nigerian power sector. Through this method, the reviews and opinions of experts, consultants, managers of Power plant projects were analysed (Blaxter et al, 2008).

As far as the current research stands, survey methods (questionnaires) and interview (semi- structured) strategies are entailed by researcher in order to gain apparent and substantial amount of information for respondents (Saunders et al., 2009). This essentially provided a more substantial amount of information based on the particular phenomenon investigated by the researcher (Bryman and Bell, 2007).

Such an approach would then facilitate an overview of the state of risk management in Nigeria, one that would serve as an important indicator of the project managers' knowledge of and beliefs regarding the practice of risk management. The

derivation of meaningful quantitative data was also believed to represent an important first step for a further investigation of causal relationships between risk management-related variables, as well as a basis for the exploration of qualitative phenomena.

4.4 Research Design

The application of clear thoughts and common sense is needed for research project as this leads to a proper articulation of the whole research process. It is important to also develop a framework prior to commencing the research to provide proper guidance on the research process. According to Jackson (2014), research design is crucial element of research methodology which essentially supports in gaining better understanding and discretion of the subject matter through which proper analysis can be entailed. It is a methodical examination that certainly offers logical understanding (Jackson, 2014). Research design has also been revealed by Thomas et al., (2015) as the technique and procedure adopted in carrying out a research and provides the basis for data collection.

Research design aids researchers in determining that the data and information which is collected for the purpose of analysis is best suited for the research and it essentially provides answers to the research questions in desirable ways (Johnson and Clark, 2006). By entailing appropriate research design, reduction in the probability of wrong interpretations is attained and also it boosts the overall authenticity of the research (Saunders et al., 2007).

There are various kinds of research design and these are highlighted below:

4.4.1 Exploratory Research

This is usually the first step in a multipart research project and is typically designed to gain an understanding of a research problem as well as understanding the variables and challenges related to the identified research problem (Robson, 2002). However, this type of research is limited in scope and is therefore rarely applied alone (McNabb, 2008). He further reveals that exploratory research helps the researcher to gain a thorough understanding about the research problem and also assists the researcher to highlight all other factors relating to the research problem.

Singh and Mangat (2013) suggested that the exploratory research is best conducted for research involving problems which have not been clearly and specifically defined.

4.4.2 Descriptive Research

This is a research which aims at explaining the classification or status of the nucleus of a study (Thomas et al., 2015). They further posit that the common tools adopted in a descriptive study include the use of interviews, questionnaires, case studies, narrative surveys and correlational studies.

Kuada (2012) adds that descriptive research provides a deeper understanding of the research topic and how the particular phenomenon under investigation will be attained by utilizing empirical methods.

4.4.3 Justification for Research Design Adopted

The exploratory and descriptive research designs were applied for the purpose of this study. The exploratory design is usually the first step in a research design. The exploratory design was adopted to enable the researcher gain an understanding on the concept of risk management and risk management models. This design also helped the research identify the key critical factors involved in risk management. After the exploratory design, the descriptive research was applied.

The descriptive method was chosen because it provides a rich source of information and also allows for an in-depth investigation and rich analysis of all variables and elements highlighted within the research topic. The descriptive method also entails the use of primary and secondary data sources, questionnaires, interviews and case studies as tools for collecting data.

4.4.4 Time Horizon

This is the time frame that is consumed while conducting a research and obtaining of results against the determined aims. Time horizon for research is usually of two sorts, i.e. cross sectional and longitudinal (Saunders et al., 2009).

In cross sectional time horizon, research is taken in to account with a motive to answer prevailing questions and address the existing problems at a fixed time frame (Yin, 1998). Under this technique, strategies like case study, survey etc. is incorporated majorly. Apart from this, when research is conducted and data are being collected for an extended period of time in order to best meet with the ultimate requirements of the research nature, then it lies under longitudinal time frame (Bell,

2005). However, in this context, strategies like action research, archival research, experiment, grounded theory, etc. are utilized majorly (Bell, 2010). Considering the nature of current research, cross sectional time horizon are taken into account in order to identify the actual role of risk management model on the success of any projects.

4.4.5 Justification of Time Horizon Adopted

The use of cross sectional time frame enables a researcher to adequately manage risk by set time frames and time lines. Also this research has a completion timeline by which the researcher has to abide by.

4.6 Research Type

Crowther and Lancaster (2009) reveal that the research type provides the basis upon which various decisions such as data collection methods, data analysis tools and presentation of results are taken. They further claim that there are two types of research and these are the qualitative research and the quantitative research.

4.6.1 Qualitative Research

According to Kouritzin et al (2009), qualitative research is hinged on the idea and understanding that knowledge is established by humans and research is a tool applied in understanding and making sense of the environment based on historical, contemporary and social outlook and perspectives. There is also an agreement that both the descriptive and explanatory designs are both elements involved in qualitative research.

Thomas (2003) and Miles and Huberman (1994) asserts that qualitative research methods include an explanation of the characteristics of people and events without a comparison of the terms of measurements and/or amounts. Denzin and Lincoln (1994) stated that qualitative research adopts a multi method analytical model which aims at the inclusion of detailed explanation approach towards its subject area of research.

Denzin and Lincoln (1994) further stated that qualitative research also involves conducting in-depth study and collection of various types of experimental materials aimed at full explanation of the research problems and questions.

4.6.2 Quantitative Research

Quantitative research is a research which entails that numerical data is collected and is appropriate when theories and hypothesis are being tested (Muijs, 2011). King et al (1994) posit that quantitative research employs the use of numbers and statistical technique which is fully based on numerical measurements of exact happenings. Quantitative research aims at obtaining measurement and conducting analysis of data which can be easily understood and reproduced by other researchers.

Hoy (2009) adds that for this type of research, data collection methods are distinct from that of formal one. Under this, methods like structured interview, survey, index figure etc., are taken into account in order to collect data in much desirable manner and also to gain better results from it. Apart from this, for analysis, various tools and techniques are utilized such as graphical methods, regressions, correlation, statistical methods and others in order to gain better understanding from it.

4.6.3 Justification for Research Method Adopted

Both the qualitative and quantitative methods were adopted for this research. Both methods used together are regarded as the mixed method. According to Johnson et al (2007), the mixed research method has a separate identity from both the qualitative and quantitative methods since it is a fusion of both methods. .

The qualitative method forms the foundation for this research. Secondary data from Literature review helped provide an insight into research works already existing in the area of risk management and semi- structured interviews conducted, while the quantitative method was employed to analyse the questionnaires collected.

4.7 Types of Data and Data Collection Methods

The collection and presentation of data is a very important part of a research as it is fundamental to the outcome of the research as this helps to elucidate the research topic. Data collection and presentation is vital to the research process if the outcome of a research is to be considered valid. They consist of two types of data sources and these are the primary data source and the secondary data source.

4.7.1 Primary Data

Primary data can be described as data obtained in its original state by the researcher. This means it is a data which before it was obtained did not exist therefore it was generated by the researcher. Different methods are typically employed for collecting primary data and these include interviews, surveys, case studies, observation and questionnaires (Singh and Mangat, 2013). Freise (2012) adds that primary data helps to accumulate quantitative data which aids in providing answers to the research questions.

Primary data exists in various forms some of which are highlighted below:

i. Questionnaires

A questionnaire generally involve the use of multiple choice questions and uses the Likert scale rating so that respondents can be able to provide the most appropriate answers posed by the question (Bell, 2005). The questions usually asked through a questionnaire are meant to help the researcher ascertain the level of experience of the respondent and his understanding of the research subject and this in turn helps the researcher make an informed decision during the data analysis stage. Table 17 provides the pros and cons of adopting questionnaires.

Table 17: Advantages and disadvantages of questionnaires

Advantages	Disadvantage
Data analyses is very easy	Response rate is usually low
Questionnaires are very familiar to Organization employees and management	High rate of bias arising from questionnaire structuring and respondents who have bias to the subject matter
Relatively cheap to undertake and conduct even over a large sample population	Some questions may be ignored by the respondents
Distribution is relatively easy and simple	Questionnaires sometimes come across as being impersonal
Respondents are familiar with questionnaire tools and design	Cannot be effectively applied to investigate a complex subject
Easy for respondents to complete	Questionnaire design can serve as hindrance to the respondents as a highly confusing design will lead to respondents confusion
Allows for information to be collected and obtained in a standard and decent way	
They can be analysed easily	

(Source: Evalued, 2008)

4.7.1.1 Structure of the Questionnaire

It was imperative to develop a questionnaire suited to providing answers to the research questions and for this reason a questionnaire was developed for the purpose of the research and the questions were grouped into five (5) sections.

- ❖ *Part A* of the questionnaire focused on the respondents, their type of organisational structure as well as their years of experience. The questions asked in this section helps highlight the relevance of the respondents to providing answers to the research topic.
- ❖ *Part B* of the questionnaire emphasised on risk management system within an organisation. This was aimed at seeking the views of the respondents regarding risk management and its practice within their respective organisations.
- ❖ *Part C* focused on risk identification and risk planning. This section highlights the importance of risk identification and risk planning to the risk management process and aimed to ascertain the level of understanding of the respondents regarding both concepts.
- ❖ *Part D* elucidates risk assessment and risk analysis concepts. This is an important stage of the risk management process and it is important to understand the views and opinions of the respondents as regarding the concept of risk analysis and risk assessment as this would help in the development of a risk model suited for Nigeria.
- ❖ The focus of *Part E* of the questionnaire was on risk response and risk control techniques within an organisation. Risk response and risk control are fundamental to the success or otherwise of the risk management process.

ii. *Semi Structured Interviews*

Creswell (2013) reveal that semi structured interviews are conducted with the view to gain more predefined information about the research subject. He adds further that semi structured interviews helps to elucidate the research topic. Saunders et al. (2007) adds that with the aid of semi structured interviews better insights into the research is gained and more precise data collection is guaranteed.

Our emphasis has so far been on the more quantifiable aspects of the present research, and in particular on the way the present methodological framework has been designed to ensure a sound response to the research questions of interest. However, the qualitative component of the study has had a methodological development of its own. This is parallel to the quantitative one and guided by different assumptions, a different scope and based on a different understanding of measurement and analysis. The discussion section will nevertheless seek to reunite the two components into a uniform framework, underpinned by numerical results with qualitative clarifications.

As earlier indicated (See section 4.3.4) the rationale for adopting the semi-structured interview for the research, was to provide more rigour based on the research objectives (See Section 1. 5), through the means of open- ended questions in order to triangulate as a result of the interviews conducted, an iterative analysis was carried out through its process to meet the criteria of accuracy, providing meaning to the research and understanding the responses of the respondents related to the research questions. It has been stated that qualitative study enables researcher in grasping and exploring an in-depth overview in understanding and highlighting the grey areas based on the prevalent issues and the level of implementation of risk management within the context power projects in Nigeria (Blaxter et al., 2006).The results of the study have the ability to inform, express and identify the risks that are attached within the projects initiated in the power sector of Nigeria.

iii. *Pilot Surveys*

Pilot surveys are employed prior to administering the final version of either the research questionnaire or the semi structured interview (Creswell, 2013) and Saunders et al (2009) argued that it helps to increase the validity and reliability rate of the research. With this practice, better formulation of interview questions and

questionnaires have been attained which essentially supported in gaining data of interest in a tailored manner in context of the research (Blaxter et al., 2006).

A pilot survey was carried out for the purpose of this research and pretested with five individuals involved in the power sector in Nigeria, however only project managers, senior management staffs and consultants were considered for the pilot survey this is because according to Bell (2005) it is usually top management who are tasked with the responsibilities for the implementation of policies such as risk management in most organisations.

The rationale behind using the pilot study is to address the logical issues which are linked with the study as it is done on those samples which are essential to the reliability and validity of the research outcome (Crowther and Lancaster, 2009).

Primary data for this research was collected by means of the pilot study. Questionnaires and semi structured interviews.

4.7.2 Secondary Data

Secondary data are data which are primarily obtained from a primary data source by reading and analyzing a documented experiences and observations of other researches (Gufrery and Loewy, 2010). Saunders et al (2009) adds that secondary data exists in different forms including existing literature, journals, internet sources, magazines, bibliographies, blogs, and social networks etc.

The secondary data sources for this research work which formed the basis of the literature review includes journals, books, web articles, blogs, magazines and bibliographies. The secondary data helped elucidate work already existing in the area of risk management, it also helped form the background on which the primary data was collected as it (secondary data) helped in providing a direction as regards some grey areas on risk management as it affects projects in the Nigerian power sector.

4.7.3 Justification for Data Source Adopted

For the purpose of the research, combinations of both primary and secondary data sources have been utilized. Speziale et al (2011) advocates that triangulation (the fusion of both primary and secondary collection method) can improve the consistency and rationality of collected data because both methods are complementary to each other.

According to Denzin (1989) triangulation helps to eliminate any bias which emancipates as a result of obtaining data from a single source.

The secondary data collected formed the basis for the literature review and this helped in better understanding risk management and its implications on projects in the Nigerian power sector.

4.8 Sampling

Särndal et al (1992) argues that a survey involves analyzing a limited set of elements which is called the finite population. Survey is undertaken to give a deeper understanding about the finite population under consideration and this is only achievable through the use of sampling. Gy (1992) adds that sampling is therefore a simple mass reduction.

According to Collis and Hussey (2014), in order to attain more credibility, sampling process plays a crucial role in any research as it essentially supports in saving time by choosing most desirable respondent for collecting data.

Gy (1992) contends that sampling plays a very important role in a research because it is very tedious to analyse the whole of a lot whose composition is to be determined. To analyse such a mass of material would be expensive and time consuming and therefore the use of a representative sample is encouraged. He adds that a representative sample is a sample that has both the characteristics of accuracy or unbiasedness (qualitative approach) and the characteristics of reproducibility (quantitative approach).

However at the time of selecting a particular set of sample it is essentially required that the researcher must select the most appropriate one so that they can gain variety of data (Bell, 2005). This essentially supports in enhancing the overall validity of data and also boosts the efficiency of results derived from it (Crowther and Lancaster, 2012).

Saunders et al (2009) contends that there are two types of sampling techniques i.e. probabilistic and non-probabilistic methods.

Under non-probabilistic method of sampling, a methodology of arbitrary selection is entailed in order to select the sample from whole a perspective. In other words, it is based on who the research views as the most appropriate sample suited to the research. It is also known as judgemental sampling (Saunders et al., 2009).

In context of this practice, every participants of the population possess an equal chance of being selected in the sample of any specific research.

In order to implement this concept, first of all, the universe or population was determined by considering the research aim upon which enquirer wants to investigate (McBurney and White, 2009). Afterwards, a desirable amount of sample size is determined so that reliability can be obtained from the data that will be gained from the set sample size. Selecting the size of sample is solely depends upon the nature and scope of research topics. Further, determined number of respondents were selected from the universe on the basis of different methods such as simple random sampling, stratified sampling, cluster sampling, systematic sampling etc. in order to gain desirable amount of data upon which analysis will be incorporated and findings can be drawn (Gobo, 2004).

4.8.1 Procedure for Quantitative Component (Questionnaire Survey)

In line with the research objectives, a questionnaire was created, the purpose of which was to generate quantitative data on behalf of a relevant sample of respondents.

The questionnaire was elaborated in a straightforward way to assess the extent to which risk management practices are employed at various stages of the subsequent process.

Five distinct sections were created, inquiring into five different dimensions of the respondents' professional practice. The first of them (Part A) focuses on the respondents' background, namely years of experience and type of organisational structure.

The aim of the section is to capture the profile of the respondents and, with it, the relevance of their responses. The other four sections directly address risk management. The first one of the four (Part B) assesses general aspects related to risk management and its use within the respondents' organisations. The latter three deals with different dimensions of risk management, as applied by respondents, namely risk identification and risk planning (Part C), risk assessment and risk analysis (Part D) and risk response and risk control (Part E).

4.8.2 Target and Sample Population (Questionnaire Survey)

The respondents of interest for this study have been found to be professionals engaged in the power sector in Nigeria who were directly involved in the promotion and exertion of risk management in their organisational environment. Therefore, a purposive sample of project managers, consultants and senior managers has been selected as respondents to the questionnaire.

A combination of snowball and convenience sampling techniques was employed in order to reach potential respondents. At first, an initial pool of respondents was selected from a group of researcher's acquaintances. They were in turn requested to refer their own acquaintances who matched the desired respondent profile, based on the research specifics (Cochran, 2007).

Respondents were personally contacted and times for the completion of face-to-face questionnaires were set. Upon encountering the interviewer, respondents were given instructions for the completion of the questionnaire and were allowed enough time to answer the questions. The respondents had their response papers collected immediately after marking their responses.

The initial sample included a total of 170 respondents, self-selected from the 250 people contacted. From the 170, 41 withdrew from the study after submitting the questionnaire.

Out of the 129 people who agreed to participate, 14 respondents had their questionnaires eliminated from the study, as it was later discovered that they had not been filled in suitably (either they were only partially completed or multiple answers had been given to items where only one answer was required).

A total of 115 valid questionnaires were therefore acquired; the data corresponding to these questionnaires was coded and uploaded into statistics software (SPSS) with a view to carrying out the analysis process.

4.8.3 Procedure for Qualitative Component

The interviewees were met individually in a private space and assured of the confidentiality of the information they were to provide and of their right to withdraw from the study at any moment.

Their written consent for participation was requested prior to the conduction of the interview itself. The goals, scope and structure of the interview were then

introduced to the participants; the interviewer assured them that they would have the opportunity to ask for clarification at any time during the interview.

Based on the development of the interview and the respondents' feedback concerning their understanding of the content, further explanations were sometimes provided to the interviewees so as to facilitate understanding.

The participants were encouraged to develop their answers and the formulation of yes/no questions was avoided to encourage as detailed responses as possible (See Appendix B).

Some of the interviews lasted around 30-60 minutes and were recorded for later transcription (See Appendix B). Moreover, the interviewer took field notes during the administration of the interviews, producing further meaningful input for data interpretation.

4.8.4 Target and Sample Population (Interviews)

To begin with, it has been assumed that a more in-depth clarification of the topic of risk management practice in the Nigerian power sector needs to supplement the rather scattered image formed by the quantitative results and provide an explanatory framework with which to enrich scientific understanding.

A purposive sample of project managers was sought from among this target population, and a convenience/snowball sampling-based group of respondents was selected. The respondents had to match the same eligibility criteria that was used for the questionnaire, namely to be directly involved, within the Nigerian power sector, in organisational risk management.

An initial pool of potential respondents, all involved in the Nigerian power sector and occupying management positions, was formed (separate from the one destined for the quantitative analysis). They were contacted, informed of the study's aim and invited to participate. Regardless of their response, they were requested to recommend other potential participants. The ones who agreed to participate were incorporated into the study. A total of 45 respondents agreed to take part in this section of the study and were therefore included (See Appendix B).

This is why the interview has been deemed suitable as an instrument to complement the questionnaire and allow for extensive detailing of the managers' contact with risk management (Berg et al., 2004).

Therefore, a set of semi-structured interview questions were developed, which was perceived as a trade-off between the precision and straightforwardness of structured interviews and yet allowed for a rich provision of information on behalf of interviewees. In fact, the semi-structured format of the interview was designed to offer a 'safe' foundation for discussion, capturing essential information but at the same time implying the freedom to develop one's answers and offer clarifications, examples or analogies.

The choice of the interview content itself was guided by the same assumptions as those underpinning the construction of the questionnaire: The idea was to allow respondents to detail their experience with each of the dimensions of risk management practice, without implying that the discussion should be restricted to the first-hand scope of the questions.

The interview structure which was designed in form of a risk management process is as follows: The first six questions address the general and risk management-related background of the respondent; the next section, comprising three questions, deals with risk identification; risk assessment is a section refers to the analysis and evaluation of risk and is composed of three other questions; risk response is assessed by two other questions, followed by a section of three final questions dealing with risk communication and consult.

The total of 17 questions is thus meant to favour a 360-degree incursion into the respondents' experience with risk management, by pointing to all of the main relevant factors (Steinke, 2004).

4.9 Data Analysis

Data Analysis is one of the most significant phases of a research as it investigates and analyses the data which is accessed from both primary and secondary source of data collection. It aids assistance to the researcher on how to analyse the collected data in a critical manner with the aim of generating some effective results (Gast and Ledford, 2009).

Nevertheless, Myers (2009) and Silverman (2005) argue that no particular data analysis approach is better than the other as every research is unique with their individual research problems especially when using computer aided software (CAQDAS- computer assisted qualitative data analysis) which have their various limitations.

4.9.1 Qualitative Data Analysis

The study of Beer and Foran (2000) highlights a seven-step methodology for analysing qualitative data. The first step entails the designing of lists and creating of groups. The likely list of interviewees is developed and the participants defined. The second step is concerned with undertaken editing and eliminating all information that are not related by any means to the research topic thereby allowing for only relevant information which are related to the research topic to be included.

The third step is concerned with grouping and categorizing all information in accordance to their headings.

The fourth step requires the researcher to gather and identify all variables and any related information which is relevant and critical to the research questions and main research problem. This step involves conducting an effective analysis of all data and information collected in other to determine if the match and in accordance to the criteria needed for the data and information to be included in the study.

The fifth step is information obtained through interview method by application of semi-structured questions.

The sixth step of this methodology relies on the way and manner data is structured and described. This stage enables the researcher to adequately define, describe and structure his analysis in other to develop a clear analytical description that will be essential to the study findings. The last step is concerned with text structure description which forms the framework of composite and textural structures.

Program development and evaluation (2003) similarly identified a five (5) step methodology for analysing qualitative data. These steps are briefly explained below:

i. Understanding the Data

This entails understanding the data collected in order to identify its relevance to the research topic. It is important to consider the quality of the data before proceeding with the actual analysis. This step is very important to the research outcome as it is pivotal to the data analysis process.

The data collected for this research was tailored towards helping to provide questions posed by the research topic.

ii. Focus the Analysis

This stage entails focusing the analysis by reviewing the purpose of the evaluation by identifying a few key questions the research hopes to answers. Focusing the analysis also helps to understand how individuals responded to each question. This process is often employed in open ended questions. Data is organised according to the questions asked and the answers provided by the respondents.

iii. Categorize Information

This process is also referred to as data coding and is the most important stage in qualitative data analysis. This entails identifying themes or patterns and organising them into clear groups. It also entails providing a descriptive label for each created group.

iv. Identify Patterns and Connections Within and Between Categories

As the data is categorized, patterns and connections will emerge and become obvious and it becomes important at this stage to assess the relative importance of each identified pattern to the analysis. It becomes imperative to ask how the collected data relate to each other and at this stage a matrix or table is developed to highlight the relationships across one or more category.

v. Interpretation

This is the phase where meaning and significance is attached to the collected data. The decision on how to present the data is also made at this stage.

4.9.2 Quantitative Data Analysis

Abeyasekera (2000) reveals that quantitative data analysis provides a very convenient means of making meaningful inferences from a considerable body of qualitative data because it presents the opportunity to separate a large number of confusing factors which often obstruct the main qualitative findings.

Program development and evaluation (1996) reveal some simple techniques for analysing quantitative data which are termed descriptive analysis as they are useful in aiding towards the description of raw data. These methods include

numerical counts or frequencies, percentages, measures of central tendency, measures of variability.

The analysis of the quantitative data had sought to provide numerical answers to the main research questions of the study, to which research hypotheses correspond. A broad descriptive analysis has therefore been generated by means of the software program SPSS and will be detailed in the next chapter. This analysis has contributed, beyond confirming/infirming the several hypotheses outlined, to understanding the various degrees to which Nigerian project managers practice risk management in terms of processes, as well as different behaviours associated with this practice.

Given that there is a scarcity of data regarding the specifics of risk management practice in Nigeria, as well as the fact that organisational structures in the Nigerian business sector do not always follow systematic patterns, as it has been shown in the review section, it has been difficult to formulate precise hypotheses regarding how risk management occurs in the power sector.

This is why a descriptive analysis of survey data has been preferred as a first-hand approach to clarifying, in an exploratory manner, how Nigerian project managers relate to this field.

4.9.3 Justification of Data Analysis Method Adopted

The steps explained above by Program development and evaluation for qualitative data analysis was adopted for this research work. The steps are easy to comprehend and present an easy means of understanding and categorizing the data obtained. Coffey and Atkinson (1996) stated that the use of CAQDAS software narrows down the data analysis which gives rise to lack of proper interaction and examination of the research problem under investigation by the researcher.

Nevertheless, Tuckett (2005) and Boyatzis (1998) argue that the use of thematic analysis is more explicit as this approach encourages the researcher to interact directly with the data by hand as it provides flexibility, relatively easy and quick to learn, could be used to summarize certain characteristics of large data, can be used to highlight and distinguish similarities and differences across the data and moreover can be used as an interpretative phenomenological analysis (IPA) (Holloway and Todres, 2003).

The interpretation of the data was done by means of charts and graphs. The use of charts and graphs present a simple and easy way of presenting qualitative data in a quantitative form and helped to present at a glance the data being analysed.

For more advanced quantitative analysis, the statistical package for the social science software (SPSS) was employed through inferential statistics (Pearson correlation, chi-square test, t-test and ANOVA). This software has the ability to analyse data and present them in different outputs. This makes it possible to carry out different tests on the same data and compare the results thus helping to guarantee the reliability and generalization of the research.

4.10 Reliability and Validity

4.10.1 Reliability

In order to attain the most desirable results against the aim of analysing the role of risk management model over the success of Nigerian power sector, due attention is offered towards the validity and reliability of data. Collis and Hussey (2014) describe the aspect of reliability in the research onion as the degree to which multiple source have been acknowledged by various persons over a certain period with precise results. This essentially supports in attaining substantial results along with effective development of risk management framework for this sector. In order to gain the reliability of data, various efforts are incorporated in this regard (Golafshani, 2003).

Secondary data are collected from authentic source only and also focus is given to associations who have published that in order to enhance the reliability of data. Moreover, emphasis is given to collect information which is highly related with the subject matter of risk management model in order to gain deep insight of it and also to develop sound framework from it.

Moreover efforts are also incorporated in case of primary data also so that validate results can be attained from it. In this regard, appropriate methods for data collection are entailed along with proper implementation of sampling techniques so that better results can be gained (Johnson and Clark, 2006).

4.10.2 Validity

On the other hand, in accordance with Collis and Hussey (2014) who argued that, validity refers to the extent at which the multiple sources of precise findings portrays the actual picture of what they claim it to be with respect to the particular phenomenon.

The experience of the respondents who were employed at the highest position of organizations or were involved in monitoring the projects related to the power sector was used to gather general information related to the success and failure of power projects, then evaluation related to risk was conducted (Golafshani, 2003).

On the basis of experience of the respondents the researcher tried to find out the risk that had the most impeding impact on the success of a project and what are the solutions for controlling the particular type of risk identified by the respondents on their project performances. With the approach, reliability and validity are adopted within the present research.

Furthermore, credibility is also ensured in this research by making healthy relations with respondent so that trustworthy and exact information regarding the subject matter can be attained. With this, better formulation of risk management model for Nigerian power sector was attained.

There are several types of validity that can be discussed as far as ensuring the soundness of the results is concerned. Construct validity has been supported by the questionnaire's straightforward design which incorporates six relevant processes of risk management, therefore covering widespread conceptualisations of risk management applied in canonical business settings (Miller, 1992).

As in the case of construct validity, criterion validity has been ensured by designing the items in such a way that they represent significant predictors of the variables of interest. They capture the various aspects that are predictive of risk management use.

Finally, the aspect validity of the instrument has also contributed to creating a coherent image of the use of risk management, as the items of the test are formulated in such a way that the scope and goals of the measurement are accessible to the respondents and thus the instrument is credible.

4.11 Measurement Scale

To ensure the validity and reliability of the research, it is important to adopt a suitable scale upon which the responses of the respondents will be based; the reliability of the chosen scale should also be ascertained.

Likert scale is an attitudinal scale which measures the views of respondents based on some predetermined parameters (Boone and Boone, 2012). This scale is easy to analyse and over the years have been extensively employed in quantitative research process.

The Five (5) Likert scale is adopted for this research and the views/opinions were assessed according to the following system from table 18:

Table 18: Likert Scale

Description	Likert Value
Strongly agree	5
Agree	4
Neither agree not disagree	3
Disagree	2
Strongly disagree	1

4.11.1 Reliability of Scale

According to Pallant (2010), the scale chosen for a research should be reliable in other to guarantee the reliability of the analysis. It therefore becomes very important to check for the scale reliability prior to carrying out the actual analysis. She further contends that the Cronbach alpa coefficient is one of the most commonly used indicator to ascertain the internal consistency of a scale. A reliable scale should ideally have a Cronbach alpha above 0.7

Table 19: Reliability scale

Case Processing Summary			
		N	%
Cases	Valid	47	40.9
	Excluded ^a	68	59.1
	Total	115	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.813	.907	34

The Cronbach alpha value of 0.813 suggests that the scale used is consistent and thus suitable for analysis.

4.12 Ethical Consideration

For accomplishing any study it is essential that it should be completed with full ethical aspects and consideration. A substantial amount of caution has been taken while analyzing the data and to conclude the valid findings and results for the study (Bernard, 2011).

All the findings, results and conclusion of the study are detailed without any form of bias and misleading effect and they are exposed after proper analysis and investigation of the information. In the context of the present research all the ethical aspects are followed in the report.

i. Debriefing

It is one of the significant ethical concerns as informing all the respondents about the nature and reason for the research and why their information is essential. All the respondents such as senior managers, project managers, consultants and other respondents have been informed about the details of this study and why their viewpoints are necessary for completion of the study in effective and authentic way (Kimmel, 2009).

All the respondents were informed with relevant information of the topic that is analysing the contribution of risk management on a project success and the proposed contribution to what the research has to offer on the long run within their organisations.

ii. Permission

Upon carrying out the debriefing process, the participants' consent for the data they had provided to be used was obtained. A consent form was filled in by each of the participants and a self-addressed stamp was included (Bernard, 2011).

This was to ensure and formalise their approval at the same time as testifying to the genuineness of their responses.

iii. Privacy and Confidentiality

The respondents' permission was obtained on the basis of having guaranteed that the data they were to provide would be used strictly for scientific purposes and in line with the goals and scope of the study. The anonymity of the respondents was maintained through the assignment of a code to each of them for the survey responses.

iv. Plagiarism

As a distinct principle that refers not only to the soundness of data collection and analysis, but that of the study as a whole, with its theoretical underpinnings, results and conclusions, the authenticity of information otherwise marked as being the intellectual property of other peer researchers has been a cornerstone of the present research.

All of the secondary data on which this study is based that is not the result of the researcher's own inferences, as well as other external information that contributed to shaping the conclusions of the study, has been acknowledged and cited accordingly throughout the study.

4.13. Chapter summary

The present chapter has delved into the specifics of the underlying methodological process of the present study, offering a comprehensive picture of the various aspects involved in designing and carrying out the present study and their relation to the conceptual framework proposed in the introductory section.

It has been established that the choice of a mixed methods research approach is well justified by the pragmatic framework into which this study fits. Considering the value of the study, beyond the pursuit of a strictly theoretical understanding of risk management in the Nigerian power sector, and for bettering subsequent practices, a mixed methods research was deemed to be the most suitable.

Furthermore, moving away from strictly positivist or interpretivist understandings of risk management, the study was designed to focus on conceptualisations favouring pragmatic outputs. The anticipated quantitative and qualitative results were assumed to be two sides of the same coin, supporting and reinforcing each other or, on the contrary, contradicting each other, in which case a newer, conciliatory and more nuanced framework was to be developed.

Nevertheless, the quantitative results of the study will be exposed as a general foundation for the more nuanced and subjective experience of Nigerian managers with risk management practice, confirming it with the aid of quantifiable evidence. At the same time, the formulation of qualitative results is to cast light onto the phenomena that underpin and explain quantitative results.

This is why both quantitative and qualitative research methods have been used: the survey method as a quantitative and interviews as a qualitative dimension. For the quantitative part, data collection has relied on the survey method, namely on the administration of questionnaires to 115 participants (professionals engaged in the power sector in Nigeria). This way, a comprehensive inquiry into risk management practices has been performed among respondents of relevance for the field (directly involved in risk management within the Nigerian power sector).

Their responses have been analysed descriptively and inferentially, as it will be illustrated in the following chapter. What is more, the quantitative results are to be complemented by a qualitative analysis. For this part, data collection has relied on the use of semi-structured interviews with 45 respondents (See Appendix B)

pertaining to the same target population. Here, a panel of questions has explored all dimensions of risk management, as understood and applied by the respondents. Based on their answers, a comprehensive thematic analysis has been carried out. The qualitative outputs of the analysis are exposed in Chapter 5, followed by the elaboration of an explanatory framework as a distinct dimension of the present research. The framework is based on a methodology of its own (revolving around two case studies, treated comparatively) and will be discussed in depth throughout Chapter 6.

Table 20: Summary of Research

S/N	Description	Research Technique Adopted
1.	Research Philosophy	Pragmatism
2.	Research Methodology	Interview-Based and Survey Research
3.	Research Approach	Deductive and Inductive
4.	Research Design	Exploratory and Descriptive
5.	Research Type	Mixed (Qualitative and Quantitative)
6.	Type of Data Collected	Primary and Secondary
7.	Sampling Method	Purposive Sampling

CHAPTER 5– DATA PRESENTATION, ANALYSIS AND OBSERVATION

SECTION I: QUANTITATIVE ANALYSIS

5.0 Introduction

The data obtained from the primary research will be analysed and an overview of the results obtained will be presented. This chapter will comprise two sections, one for the quantitative and the other for the qualitative research. Both studies are designed to collect primary data regarding the management of risk in the power companies in Nigeria.

5.1. The Quantitative Component

5.1.1 Target and Sampling Population

The sample population used for the quantitative research has been selected from the employees of several Nigerian companies that are part of the power industry, or are involved in projects that are related to the power sector in the country. The employees targeted for this research comprise professionals that have a direct role in managing the risk for the projects their companies are involved in, and included project managers, senior managers and internal consultants for risk management. The sample individuals were selected so that they were able to provide the most useful information for the topic of the research at hand.

In applying the questionnaire a significant pool of respondents were contacted, initially by approaching some representatives of each company, that were then asked to provide further recommendations for people that comply with the characteristics of the research target population.

All recommendations were contacted and explained the purpose and the objectives of the research, and they were also given information regarding the questionnaire they would have to respond to. These information's were provided again to the individuals who agreed to participate in the study, right before completing the questionnaire, along with instructions for answering the questions in the survey.

5.1.2 Questionnaire Structure and Analysis

The survey consisting of six major sections was designed to collect data regarding the implementation of risk management procedures within the investigated companies. The questionnaire comprised a total of 45 close ended questions most of which required the evaluation of a statement on a five point Likert scale, ranging from strongly disagree to strongly agree (See appendix 2).

The final three parts of the questionnaire also contain filter questions, which are used in the beginning of each section to make sure that the respondents meet some specific requirements (Malhotra and Birks, 2007).

Particularly for this research, the filter questions (Questions C3, D1 and E2) are used in order to select the respondents whose companies carry out particular risk management activities, because the remaining questions of the section are related to the implementation of that activity within the investigated organisation.

Thus, in the analysis of the survey, all questions following the filter question comprised a lower number of respondents than the entire sample, corresponding to the individuals who passed the filter test.

The following table below presents general information regarding the questionnaires.

Table 21: Questionnaire analysis

Description	Number	Percentage
Questionnaire administered	170	100%
Questionnaire returned	129	75.88%
Valid response	115	67.64%
Invalid response	14	8.23%

5.1.3 Descriptive analysis of the sample population

Question 1: Type of company/organisation

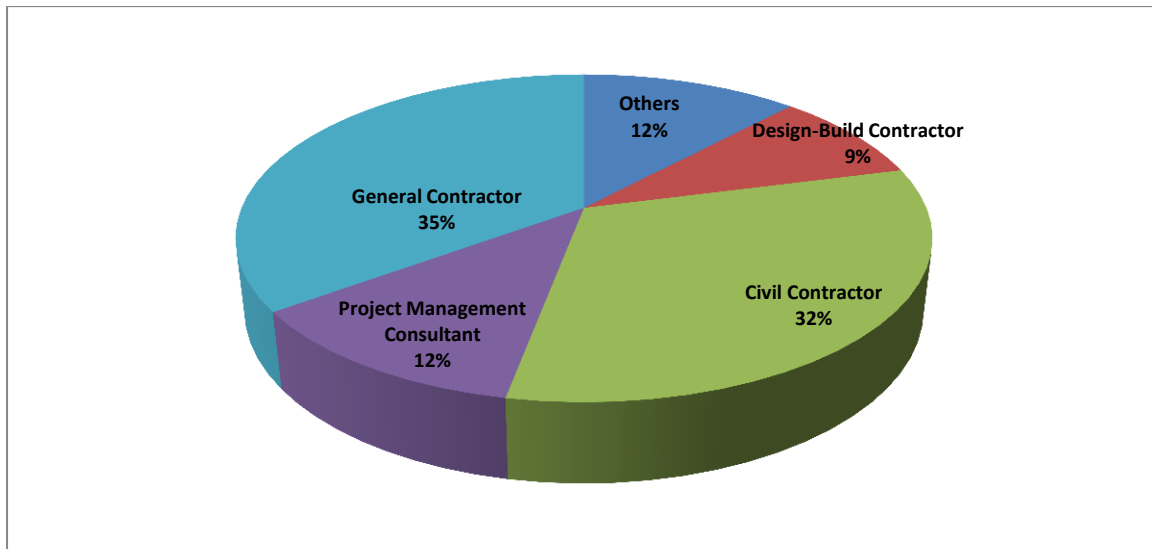


Figure 26: Respondents profession within an organisation

As is evident from the chart above in figure 26 most of the respondents work for either general contractors (35%) or for civil contractors (32%), while 12% are employees of project management consultancy companies and 9% of design-build contractors. The remaining 12% work for other small private construction companies that are contracted within large industrial project.

Question 2: What type of project is your organisation typically involved in?

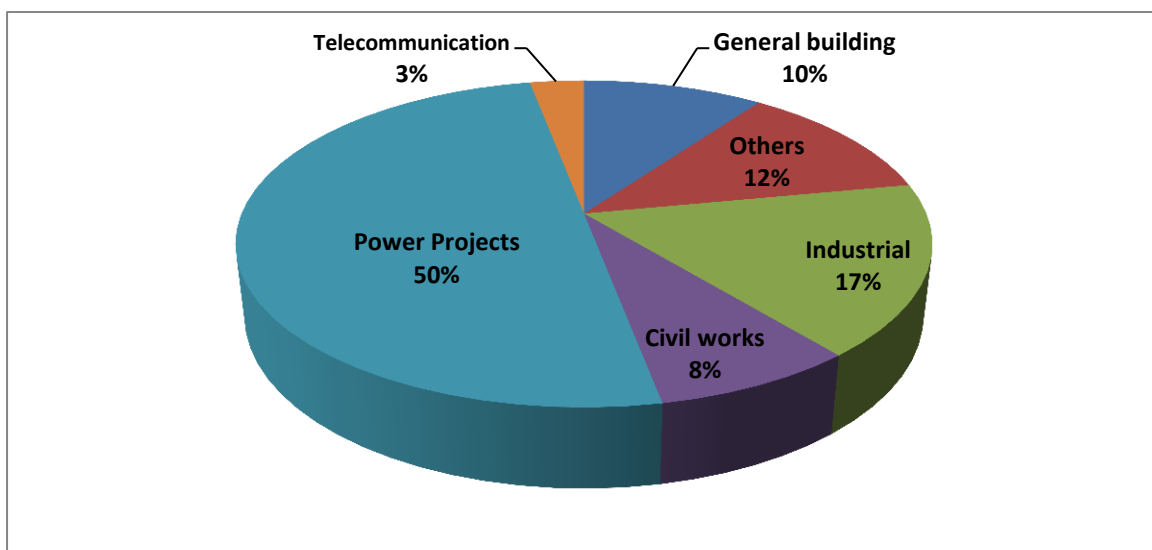


Figure 27: Organisational work preference of respondents

From figure 27, regarding the projects in which the respondents' organisations are involved, the majority (50%) work for companies involved in power related projects. Furthermore, 17% of respondents come from organisations involved in industrial projects, 10% from general building, 8% from civil works, 3% from telecommunication, and 12% of respondents work for organisations that carry out other types of project.

Question 3: Number of employees in organisation

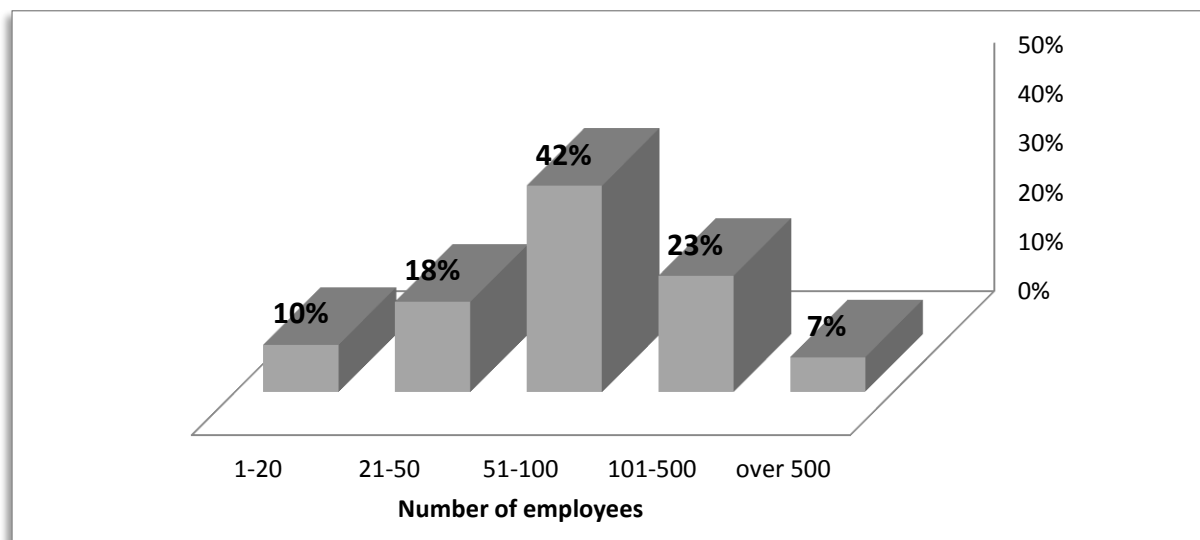


Figure 28: Employee size within the organisation

The chart from figure 28 above shows the size of the company for which the respondents work, based on the number of employees. Thus, the largest population of respondents (42%) work for organisations that employ between 51 and 100 people, 23% work for companies with 101-500 employees and 18% in companies with 21-50 employees, while only 7% are employed in organisations with over 500 employees and 10% in companies with fewer than 20 people.

In Nigeria SMEs are considered to be companies that have total costs (including working capital and excluding cost of land) between 10 million and 300 million Naira, and/or a workforce of between 11 and 200 employees, and/or a turnover of below 20 million Naira per year (Oniovosa, 2013). Consequently, most of the companies for which the survey respondents work can be included in the SME category.

Question 4: What best describes your role/position in your organisation?

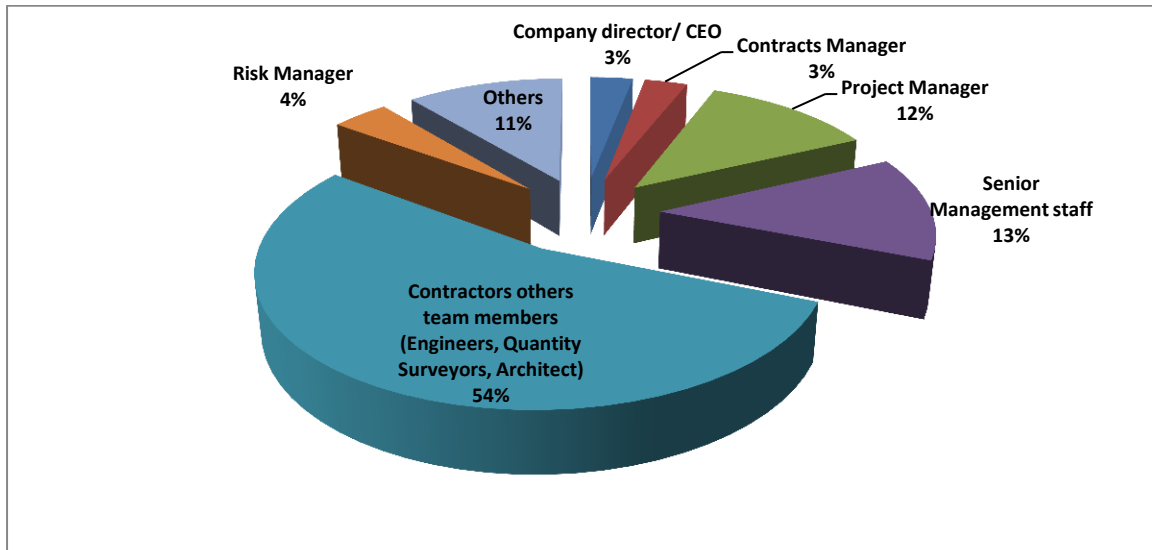


Figure 29: Respondents Job function within an organisation

With regards to job functions and the roles of respondents within their companies, it can be noticed from the above chart in figure 29 that top management respondents (which include senior management, project managers, contract managers, CEOs, and risk managers) stood at 35%, while mid-level, low-level and organisation consultants and contractors represent 65% of respondents.

Obtaining a wide range of respondents that vary from top management to middle level and low level positions helps the researcher assess the level of risk management planning and implementation within the organisation, and eliminate bias or favouritism that may arise from questioning only a particular level within the organisation.

Question 5: Years in Experience in the Power Sector

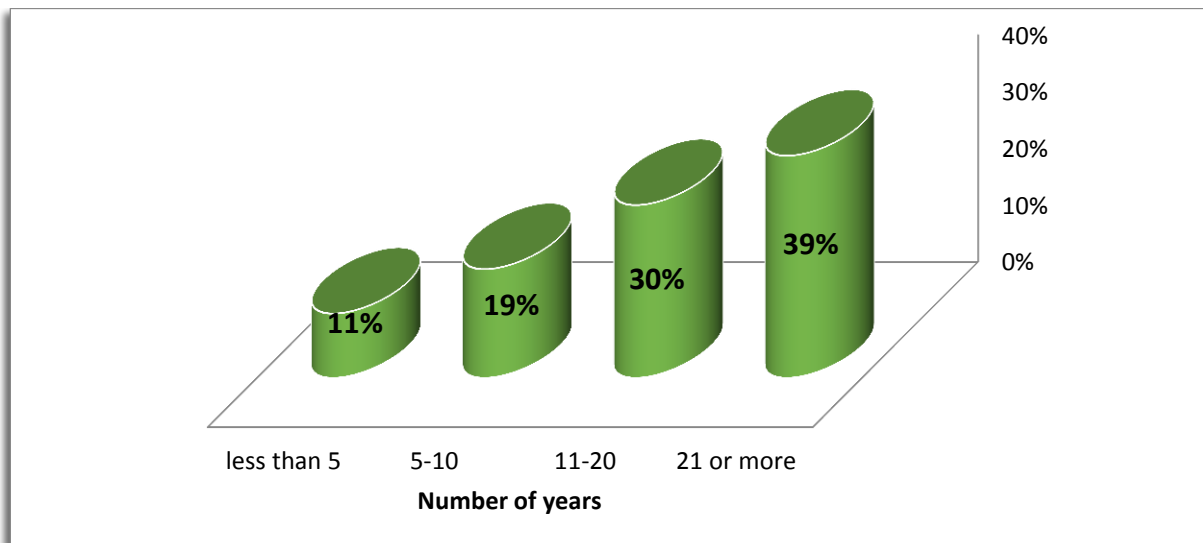


Figure 30: Respondents years of experience in power

From the graph above in figure 30, the working experience in the power sector for the participants in the study is significant for the respondents as 39% have worked in the field for over 20 years, and 30% have 11-20 years of experience. Less than one third of the interviewees have worked in the power sector for less than 10 years.

Question 6: Years of experience in risk management

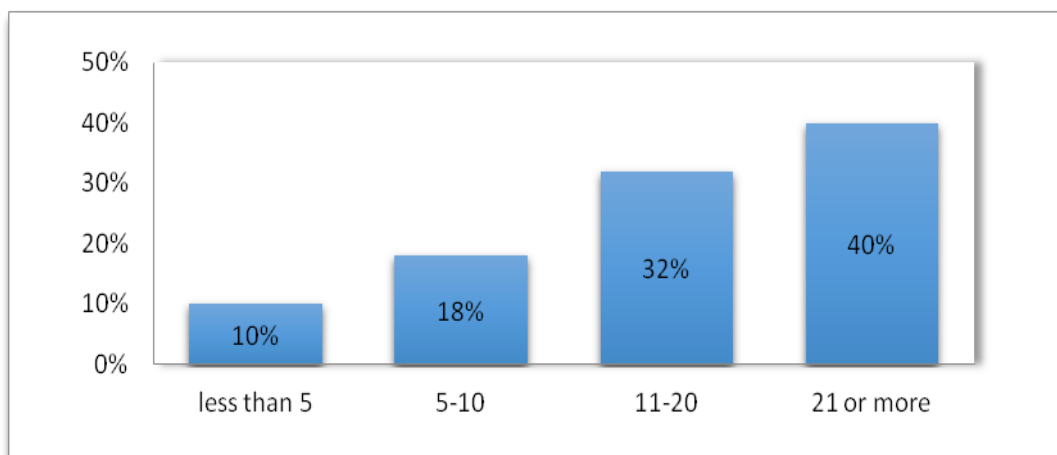


Figure 31: Respondents years of experience in risk management

Question 6 is designed to record the level of risk management experience the respondents have acquired during their work experience from the graph above in figure 31. The response rate shows that the majority of respondents have a

significant amount of experience in risk management, with 40% of the individuals participating in the survey having over 21 years of experience and 32% having between 11 and 20 years. Furthermore, 18% of respondents have dealt with risk management issues for about 5 to 10 years whereas only 10% have less than 5 years' experience of risk management.

By comparing the results for the fifth and the sixth question it can be noticed that most of the respondents have approximately the same experience both in risk management and within the power sector, as it results from the crosstabulation data in table 22 below.

This means that their work experience is associated with risk management in the power sector mainly, and only some of the subjects have gained experience in risk management in other fields and then moved to the power sector.

Table 22: Cross-tabulation of RM in power sector and RM experience of respondents

Experience in the power sector * Experience in risk management Crosstabulation						
Number of employees		Experience in risk management				Total
		less than 5 years	5-10 years	11-20 years	21 or more years	
Experience in the power sector	less than 5 years	12	1	0	0	13
	5-10 years	0	19	3	0	22
	11-20 years	0	0	32	3	35
	21 or more years	0	0	2	43	45
Total		12	20	37	46	115

Question 7: How did you gain knowledge on risk management?

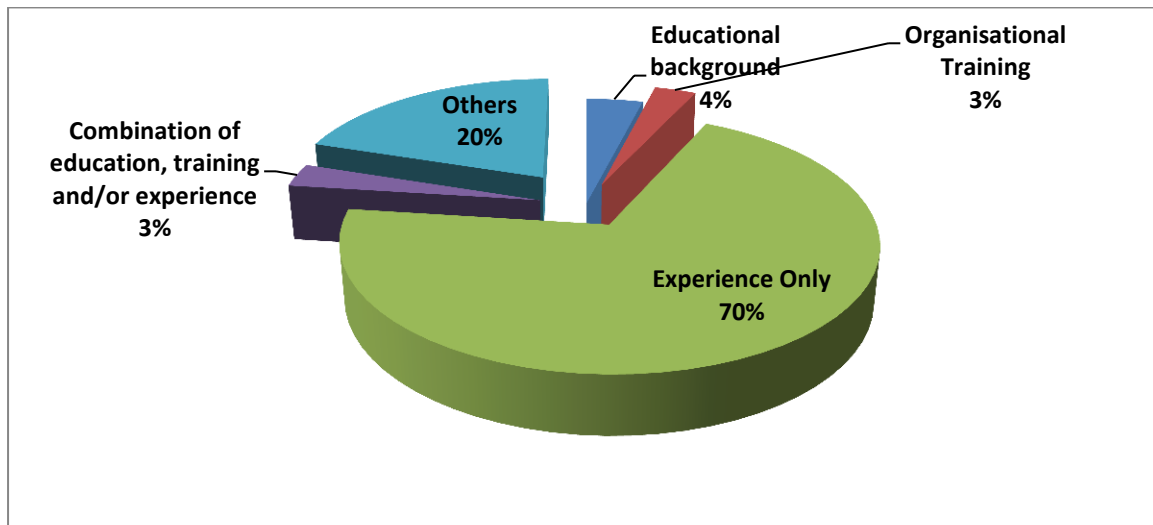


Figure 32: Respondents knowledge on risk management

With regards to the source of knowledge on risk management from figure 32, most of the respondents (70%) believe that they have obtained it through individual work experience, while only 3% consider that they have gained risk management knowledge through training, 4% from education, and 3% from a combination of education, training and experience. Furthermore, 20% consider that their knowledge on risk management has been obtained from sources other than education, training or experience. Such sources of knowledge could include the participation in non-organisational training or self-development activities.

These results suggest that most of the companies investigated, lack in carrying out risk management trainings and courses for their employees. This is an issue that should be addressed by the organisations because theoretical instruction for employees, especially in high stakes fields such as the power industry, can significantly contribute to improving the effectiveness or personnel activities, as well as increase the efficiency of the risk management process.

5.1.4 Descriptive analysis of risk management within the organisation

Section B

In this section some of the most representative questions will be discussed in order to better understand how risk is assessed and managed within Nigerian power companies.

Question 1: Risk management is a basic element of strategic management

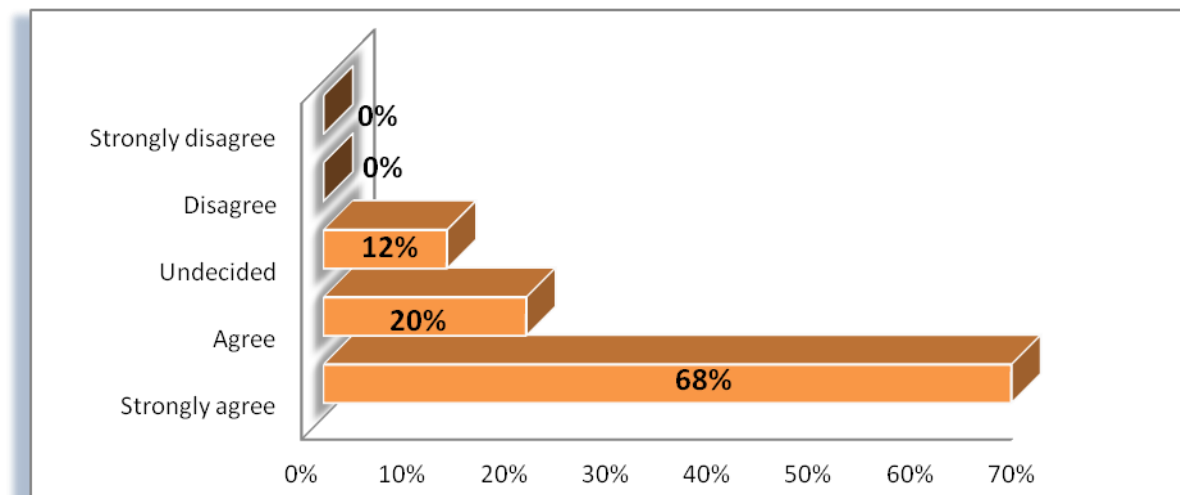


Figure 33: Organisations integration and understanding of RM

From the graph above in figure 33, when trying to identify whether organisations integrate risk management into their strategic management plan, the respondents' answers confirm a high level of integration. As it can be seen from the chart above, 68% of them strongly agree and 20% agree that risk management is a basic element of the company's strategic management programme. The other 12% were undecided about the answer to this question. An important aspect that must be mentioned is that none of the respondents considered risk management to not be a part of the organisation's strategic plan.

Question 2: Risk management plan is always used in your organisation

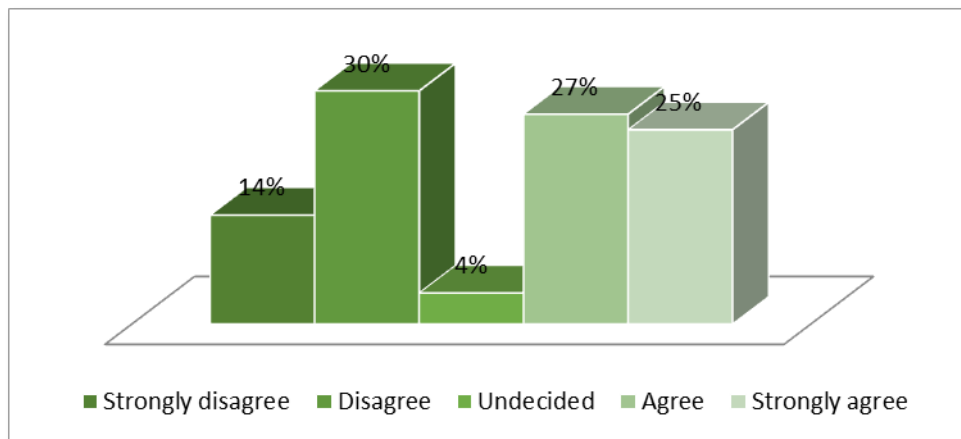


Figure 34: Respondents knowledge on risk management

With regards to whether risk management planning is carried out within organisations, the responses are somewhat divided. From the chart in figure 34, it can be noticed that approximately 52% agree or strongly agree whereas 44% disagree or strongly disagree with the statement.

Table 23: Cross-tabulation of RM planning in organisation by employees between 1-100 and over 100

		Number of employees				
		1-100		Over 100		Total
		Number	Percentage	Number	Percentage	
Risk planning is used in the company	Strongly disagreed	12	15%	3	9%	15
	Disagreed	27	34%	7	20%	34
	Undecided	4	5%	1	3%	5
	Agreed	20	25%	11	31%	31
	Strongly agreed	17	21%	13	37%	30
Total		80	100%	35	100%	115

From table 23, some differences can be observed between the companies with less than 100 employees compared to those with over 100 employees. Thus, there is in general a mixed perception regarding the use of risk planning within the organisation. In the case of large companies, over two thirds of the respondents agree (31%) or strongly agree (37%) that risk planning is used extensively in their organisations whereas approximately only one third disagree (20%) or strongly disagree (9%) with the fact that risk planning is used in their organisations.

By comparison, for smaller sized companies, almost half of the respondents (49%) consider that risk planning is not carried out in their organisations and only 46% agree or strongly agree that it is.

Question 3: Risk identification is the first phase of the risk management process

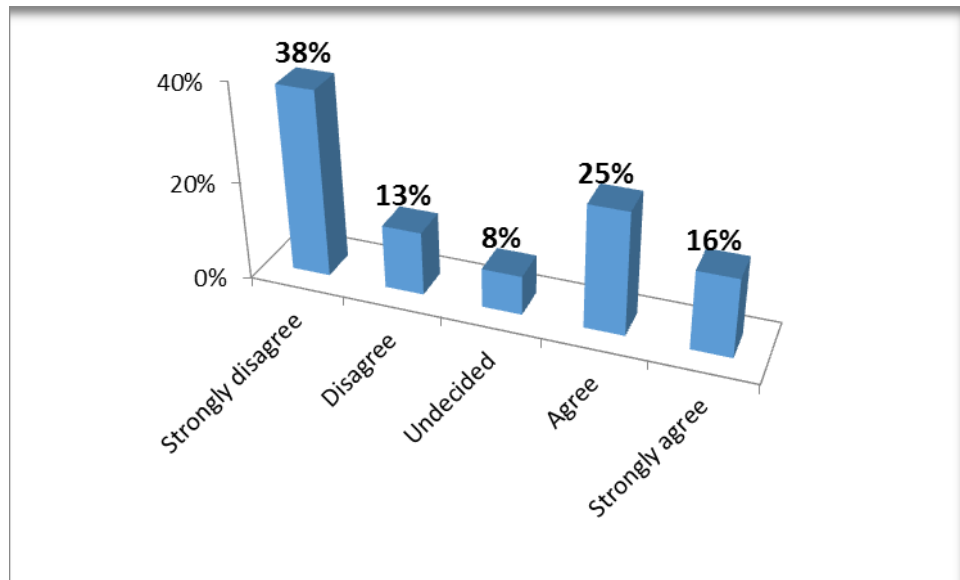


Figure 35: Respondents knowledge on risk management

From the chart above in figure 35, similar to the previous question, the opinions regarding the identification of risks in the management process are also divided. Of those asked, 41% of the respondents agree and strongly agree that their companies carry out risk identification actions in the risk management process, whereas 51% disagree and strongly disagree with the statement.

Thus, despite the fact that most authors consider risk identification as one of the major elements of an effective risk management (Perry and Hayes, 1985; Carter et al., 1994; Kliem and Ludin, 1997; Shaw et al, 2012) the Nigerian companies investigated display limited implementation of identification procedures in the management of risks.

Table 24: Cross-tabulation of respondents experience in RM with Less than 10 years and more than 10 years

		Years of experience in risk management				Total
		Less than 10 years		More than 10 years		
		Number	Percentage	Number	Percentage	
Risk identification	Strongly disagreed	13	41%	31	37%	44
	Disagreed	4	13%	11	13%	15
	Undecided	3	9%	6	7%	9
	Agreed	9	28%	20	24%	29
	Strongly agreed	3	9%	15	18%	18
Total		32	100%	83	100%	115

From the above table 24, the answers to this question were also analysed in relation to the respondents' experience in risk management to observe if any differences may occur in the perceptions of respondents with more risk experience, compared to those with less experience.

The results however, do not show significant differences between the responses of the professionals with less than ten years of experience compared to those with over ten years of experience. Therefore, there is a similar appreciation of the risk identification procedures adopted by the organisation for both risk experience categories.

Question 4: Risk management system is one of the main parts of your organisation's management and typically linked to the organisational structure

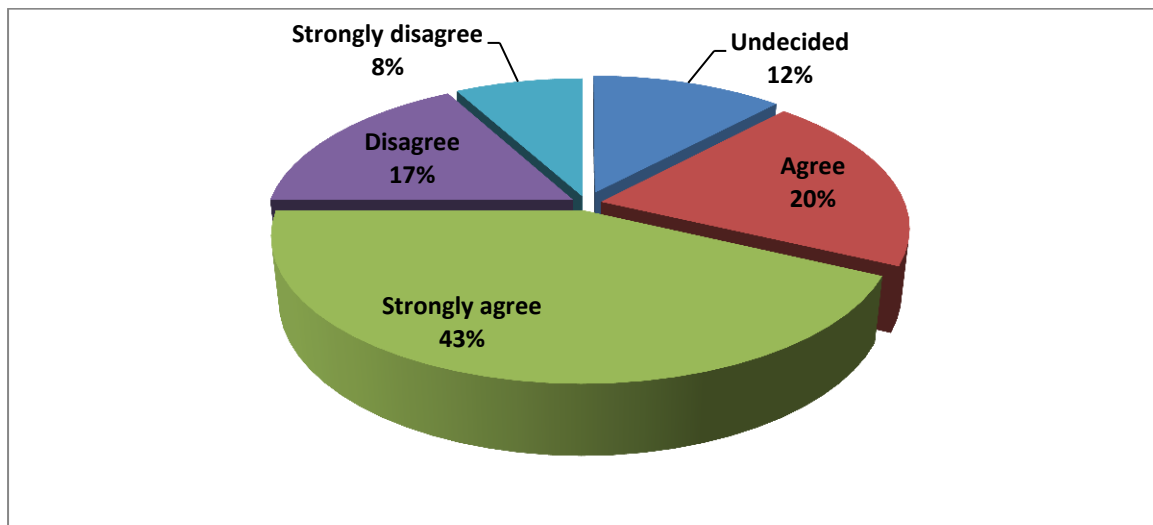


Figure 36: Risk management within an organisational culture

From figure 36, when asked about the connection between risk management and the company's organisational structure, the majority of respondents strongly agreed (43%) or agreed (20%) that risk management is an important aspect of company's management and is connected to the organisational structure. Only 25% of the respondents disagreed or strongly disagreed with the statement, whereas 12% declared themselves undecided.

Question 5: Your organisation considers risk management to be of high importance in the project management process

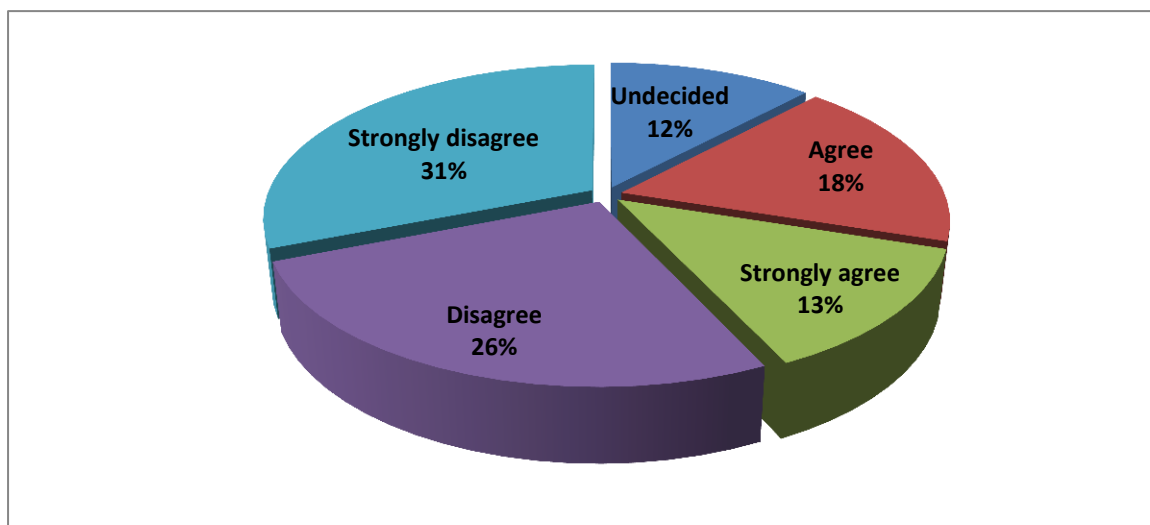


Figure 37: Essential benefits of risk management

From the chart above in figure 37, although risk management appears to be rather important in organisational management, its role for project management seems to be less crucial as 57% of respondents strongly disagree and disagree that their company perceives risk management to be of high importance for project management. Furthermore, only 31% agree and strongly agree with this statement, whereas 12% are undecided.

Table 25: Cross-tabulation of the importance of RM between respondents engaged of non-power projects and power projects

		Type of projects				Total
		Non-power		Power		
		Number	Percentage	Number	Percentage	
Risk management is of high importance in the project management process	Strongly disagreed	21	37%	15	26%	36
	Disagreed	14	25%	16	28%	30
	Undecided	5	9%	9	16%	14
	Agreed	10	18%	11	19%	21
	Strongly agreed	7	12%	7	12%	14
Total		57	100%	58	100%	115

From table 25, when analysing the importance of risk management within projects in relation to the type of projects the company is involved in, no important differences can be noticed.

However, in the case of companies involved in non-power related projects (which in this case include general building, civil works, industrial projects, telecommunication and other small construction projects) there is a high percentage of respondents (62%) who consider risk management not to have a high importance on the project management process, whereas only 30% consider it does.

By comparison, 54% of the respondents working for companies involved in power projects do not agree and 31% agree that risk management is important for project management, whereas 16% are undecided.

Question 6: There is a shared language and definition of risk within your organisation

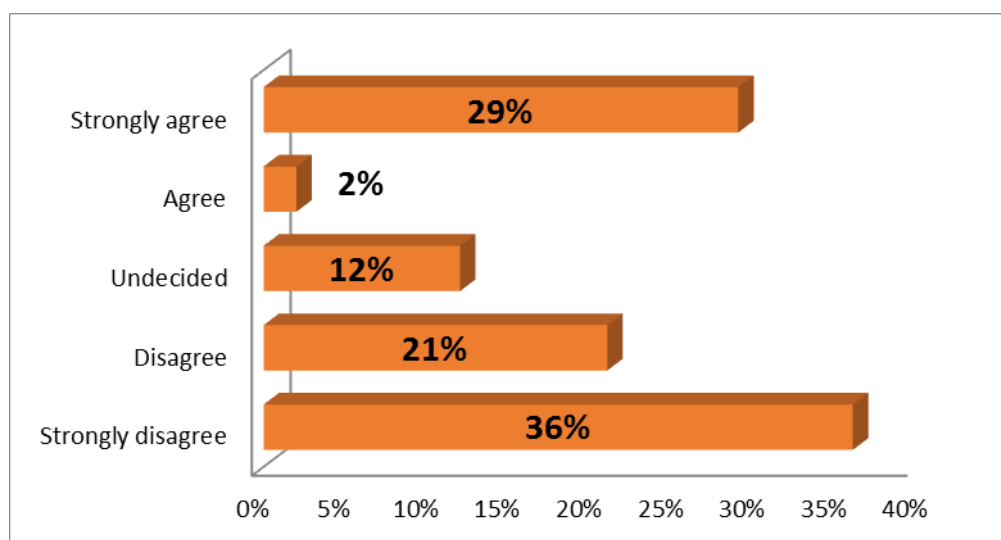


Figure 38: Shared language and understanding of risk management

From figure 38 above, one issue that arises from analysing the answers to this question is the lack of a common interpretation of risk at organisational level, as 57% of the respondents disagree and strongly disagree with the question's statement, whereas only 31% consider that a common ground does exist when addressing the topic of risk management within the company.

Table 26: Cross-tabulation of respondents experience in RM with Less than 10 years and more than 10 years

		Years of experience in risk management				Total
		Less than 10 years		More than 10 years		
		Number	Percentage	Number	Percentage	
Common ground for risk management terminology	Strongly disagreed	12	38%	30	36%	42
	Disagreed	6	19%	18	22%	24
	Undecided	4	13%	10	12%	14
	Agreed	0	0%	2	2%	2
	Strongly agreed	10	31%	23	28%	33
Total		32	100%	83	100%	115

In understanding table 26 above, although differences may be expected when discussing the existence of a common terminology for risk management within organisations in relation to the risk experience of respondents, in the case of this research, no major differences can be found.

Thus by analysing the results of the current research, a general agreement regarding the lack of a shared language and definition of risk management can be observed. More than half of both experienced respondents (57%) and of less experienced respondents (58%) disagree or strongly disagree with the fact that a generally accepted theoretical framework of risk management exists in the business practice.

Furthermore, less than one third of both categories consider there to be a shared language and definition of risk management.

Question 7: There is a designated risk management team within your organisation

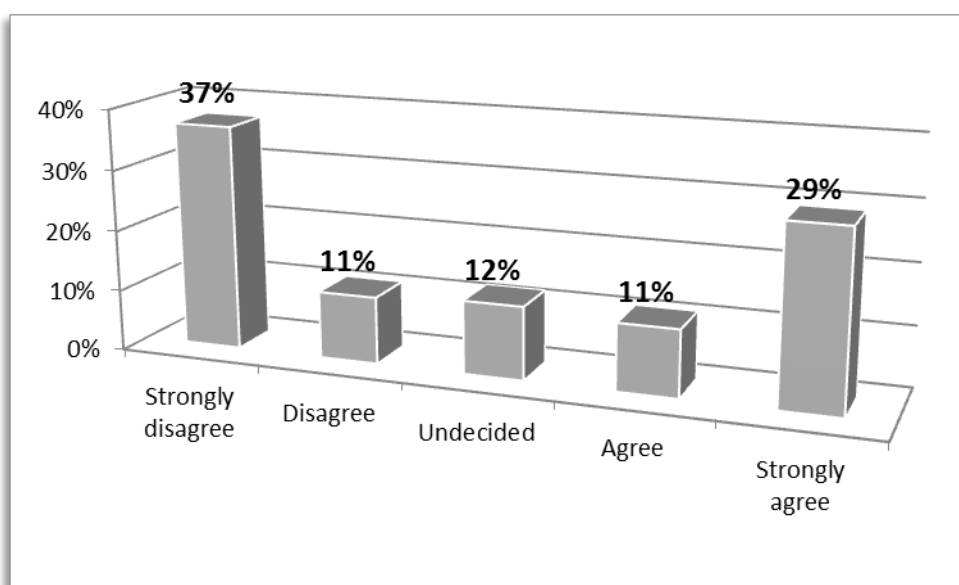


Figure 39: Designated risk management team

Furthermore, although risk management from that chart above in figure 39, is perceived to be important for organisational management the results show a somewhat contradictory situation regarding the implementation of specific structures to deal with risk issues within companies. Of those asked, 48% of respondents think that there is no specific structure to address risk issues within their organisations, whereas 40% agree and strongly agree that their company has a risk management team.

Table 27: Cross-tabulation of a designated RM team in organisation by employees between 1-100 and over 100

		Number of employees				
		1-100		Over 100		Total
		Number	Percentage	Number	Percentage	
There is a risk management team within the organisation	Strongly disagreed	37	46%	5	14%	42
	Disagreed	9	11%	3	9%	12
	Undecided	10	13%	4	11%	14
	Agreed	10	13%	4	11%	14
	Strongly agreed	14	18%	19	54%	33
Total		80	100%	35	100%	115

Thus, the proportion of respondents in table 27 who acknowledged the existence of a specific risk management team within the company is much higher for

larger organisations than in the case of smaller organisations. Thus, almost two thirds of interviewed professionals from companies with over 100 employees agree (11%) or strongly agree (54%) that a specific risk team exists within their organisation, whereas only 9% disagree and 14% strongly disagree with that statement.

By comparison, in an organisation with less than 100 employees, 57% consider there to be no risk management-tasked team within their company and only 31% believe that such teams exist. This situation is obvious as it is much more likely for a larger organisation to have a designated risk department compared to companies of a smaller nature.

Question 8: Risk register is always used in your organisation

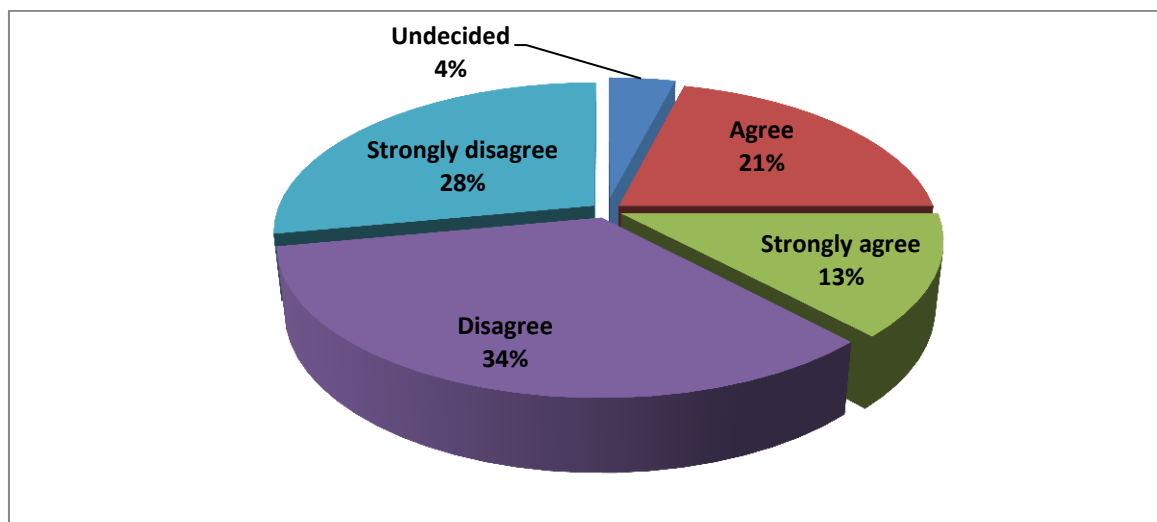


Figure 40: implementation of risk register in an organisation

Williams (1994) considers that risk register supports the integration of risk management, whereas Patterson and Neailey (2002) believe that it is essential in managing risk within a project. However, from the chart above in figure 40, the respondents' opinions suggest that in the sampled companies from the Nigerian power sector, risk register has a reduced importance, as 62% of interviewees state there is limited maintenance of such records within their organisation. Furthermore, only 34% agree and strongly agree that the organisations they work for use registering procedures in the management of risk.

Table 28: Cross-tabulation of the implementation of risk register between respondents engaged in non-power projects and power projects

		Types of projects				
		Non-power		Power		Total
		Number	Percentage	Number	Percentage	
Risk register is always used in your organisation	Strongly disagreed	14	25%	18	31%	32
	Disagreed	17	30%	22	38%	39
	Undecided	2	4%	3	5%	5
	Agreed	15	26%	9	16%	24
	Strongly agreed	9	16%	6	10%	15
Total		57	100%	58	100%	115

When analysing the use of risk registers comparatively in relation to the types of projects the companies are involved in from table 28, it can be noticed that while more than half of the respondents in both categories do not believe their companies have implemented risk registering procedures, these seem to be more frequently used within non-power projects compared to power projects. Thus, 42% of the respondents working for companies implementing non-power projects agree or strongly agree that their organisations always use risk register procedures, whereas in the case of companies involved in power projects, only 26% of respondents believe their organisations use such instruments.

Overall, from the responses received from the representatives of Nigerian companies within this section of the survey, it can be noticed that despite the high risks the power related projects generally involve, there is still limited interest from an important part of the investigated companies for the implementation of adequate risk management procedures.

This is all in the context of a rather extensive experience of the respondents both in the power sector and in the risk management field, so the companies can benefit of their expertise.

This reduced use of risk management within the Nigerian companies may be due to the limited development of the economic environment, and thus the companies are rather interested in minimising the costs and maximising the profits, therefore showing little regard for cost generating activities such as risk management.

In addition, the experience of the respondents, despite the fact that it appears to be extensive, may not be as good as expected. This is mainly due to the fact that more than two thirds of the interviewed subjects gained their risk management knowledge from work experience and not from education or trainings (in accordance to their answers from question 7, section 1 of the survey) where the quality and quantity of knowledge transferred can be significantly higher.

Section C

The third part of the questionnaire comprised questions regarding the identification and planning phase.

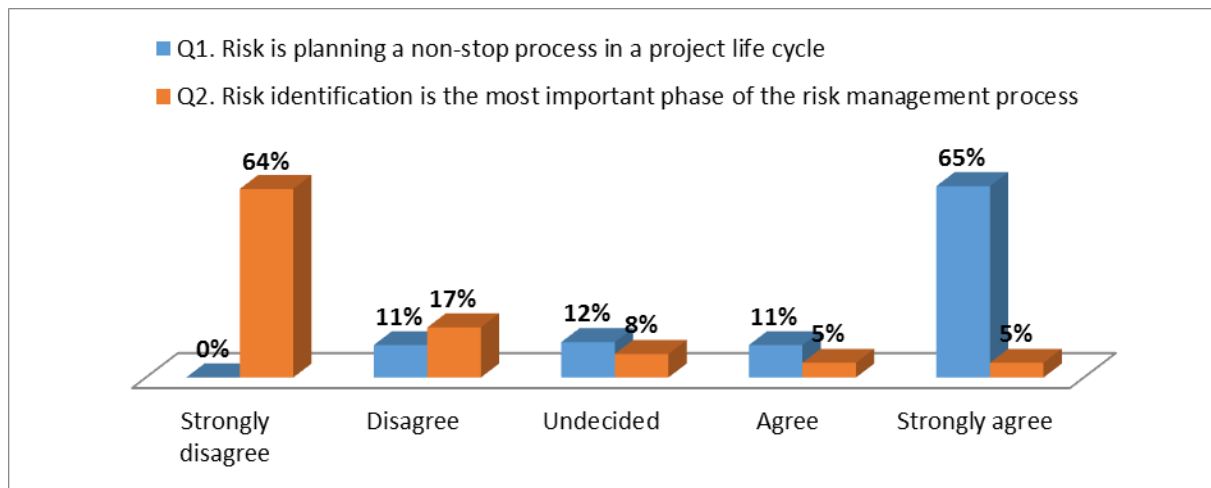


Figure 41: Importance of RM planning and identification on PLC

The chart above from figure 41 details the responses of the first two questions in the section. Regarding the respondents perception of whether risk planning is a continuous process in the project life cycles, a large majority of the respondents strongly agreed (65%) and agreed (11%) with this statement, whereas only 11% considered risk planning to not be a continuous process, and 12% of interviewees were undecided.

Furthermore, when asked about the importance of risk identification as a phase in risk management, 64% of respondents strongly disagreed and 17% disagreed with the fact that risk identification should be an important phase of the risk management process, and only 10% agreed with this statement. Unclear answers to this question were witnessed in 8% of respondents.

Question 3: Risk planning is carried out prior to initiating any project within your organisation

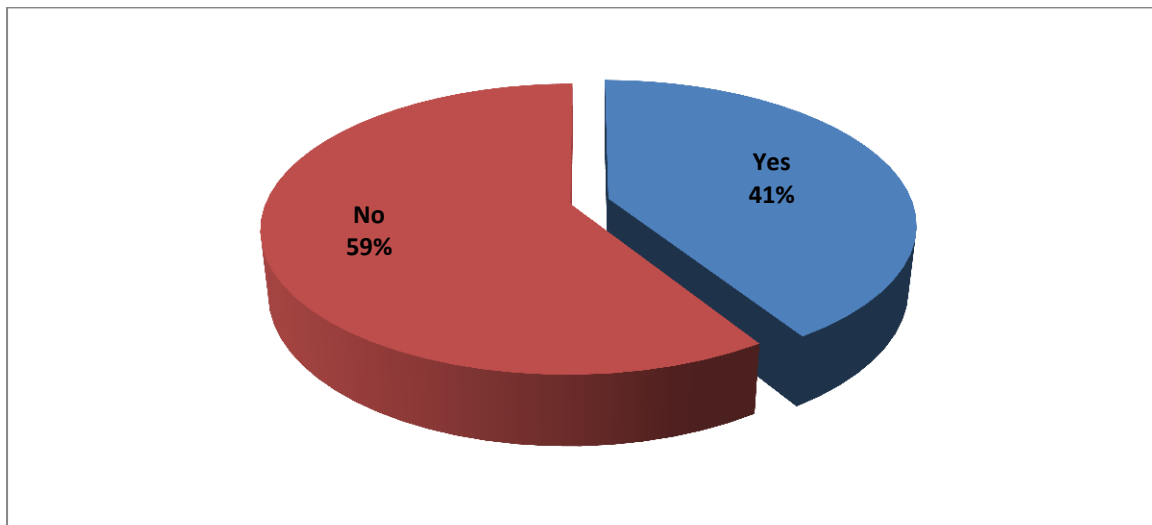


Figure 42: Importance of RM planning before project initiation

This question in figure 42 above, attempts to identify how risk planning is implemented within the investigated companies. Thus when asked whether their organisation carries out a risk planning stage previous to the implementation of a new project, 59% of the respondents answered *NO*, while only 41% believed the company they work for performs a risk planning analysis.

Table 29: Cross-tabulation of RM Planning prior to initiating an organisations project

		Risk planning is carried out prior to initiating any project				Total
		Yes		No		
		Number	Percentage	Number	Percentage	
Type of project	General building	4	33%	8	67%	12
	Civil works	5	56%	4	44%	9
	Industrial projects	5	28%	13	72%	18
	Power Projects	27	47%	31	53%	58
	Telecommunication	4	100%	0	0%	4
	Others	2	14%	12	86%	14
Total		47	41%	68	59%	115

When analysing the implementation of risk planning within organisation in relation to the types of projects the companies are involved in, the results show some important distinctions from table 29. Only 33% of respondents that work for

companies involved in general building projects think that risk planning is carried out before the beginning of any project, whereas 67% disagree with this.

A similar situation can be noticed in the case of organisations involved in industrial projects, where 28% of respondents consider risk planning to be done prior to the initiation of projects. For the smaller construction companies, only 14% of respondents acknowledge the implementation of risk planning activities before project implementation.

Furthermore, for civil works projects, 56% of the respondents employed in companies that carry out such projects believe risk planning is done prior to initiating the project. For power projects, the situation is balanced, as according to respondents, opinions risk planning is done before project implementation in 47% of situations. A special case is that of telecommunication projects, where the respondents' answers show that risk planning is always carried out prior to the implementation of any project.

Due to the fact that this question was used as a filter in the survey, the answers for the remaining questions of the third section comprise only 47 valid cases, which correspond to the total number of individuals that answered yes.

Table 30: Designated RM team tasked with planning and identification with feedback loops

	Question 4. There is a dedicated team assigned the task for planning and identifying risks within your organisation	Question 5. Feedback loops are always ensured
Strongly disagree	0%	0%
Disagree	0%	0%
Undecided	0%	0%
Agree	45%	45%
Strongly agree	55%	55%
Total	100%	100%

From table 30 above which displays the response percentages for the following two survey questions, which are aimed at assessing whether a dedicated team was tasked with the planning and identification of risks within the company, and if a feedback loop system is implemented to facilitate the evaluation and control of risk management.

The results show that all 47 respondents agreed (45%) or strongly agreed (55%) with the existence within their company of a dedicated team to deal with the planning activities of risk management.

Similar percentages were obtained when the respondents were asked about the implementation of feedback loops through which the planned responses for risk occurrences are initiated, monitored and measured for success. Again all of the respondents agreed with the existence of such instruments.

Question 6: Risk planning and identification is time consuming and it is best to tackle risks as they occur rather than expend time and resources to the planning exercise

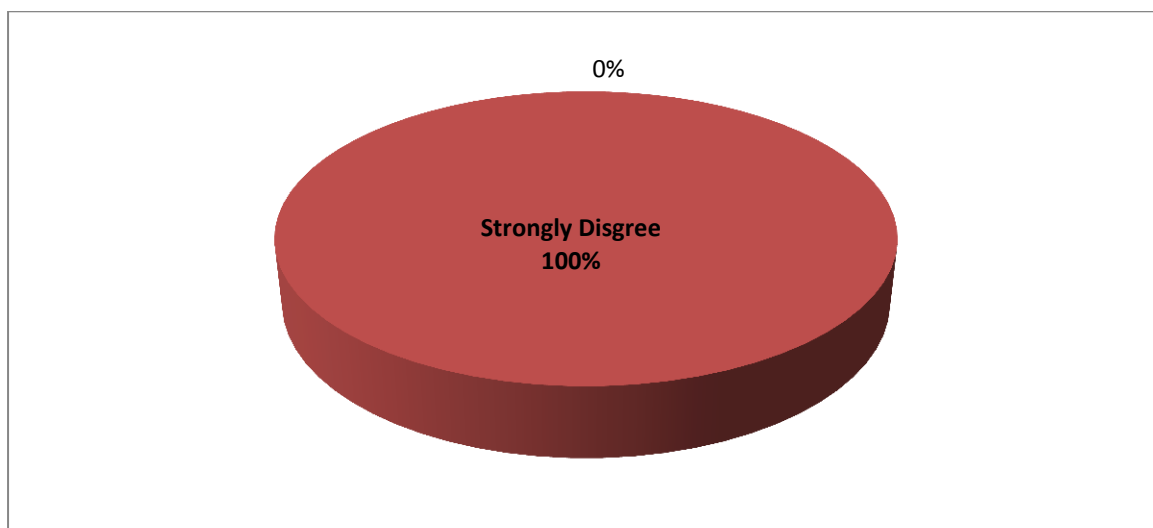


Figure 43: Importance of RM planning and identification during project initiation

In view of the question from figure 43, all 47 respondents (100%) strongly disagreed that an approach of tackling risks as they occur is appropriate and that risk planning is a superfluous activity. The responses to this question support the results of the first question within this section of the survey, which attached a high level of importance to risk planning in the risk management process (See Figure 41).

Question 7: It is better to perform risk planning at the project level rather than on the corporate level

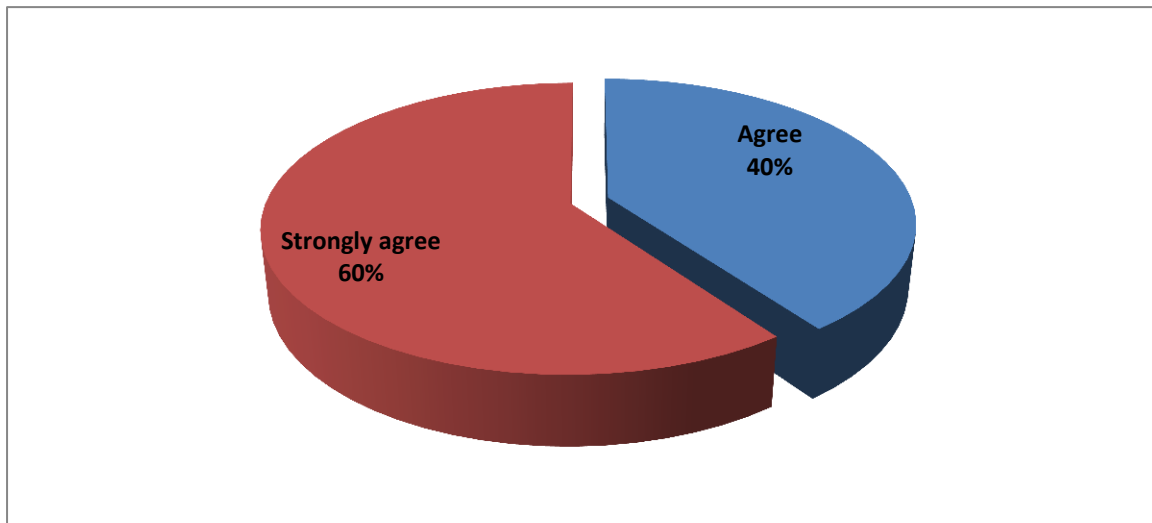


Figure 44: Performing RM planning at project level rather than corporate level

In addition, from the chart in figure 44, the interviewed professionals consider it to be more appropriate to carry out risk planning activities at the project level rather than at the corporate level. Therefore, 40% of respondents agreed and 60% strongly agreed with the content of this statement.

The project centred, which centres around risk management rather than a corporate orientation, suggests that risk management has not yet been fully integrated within the organisational structure and culture of the Nigerian power companies.

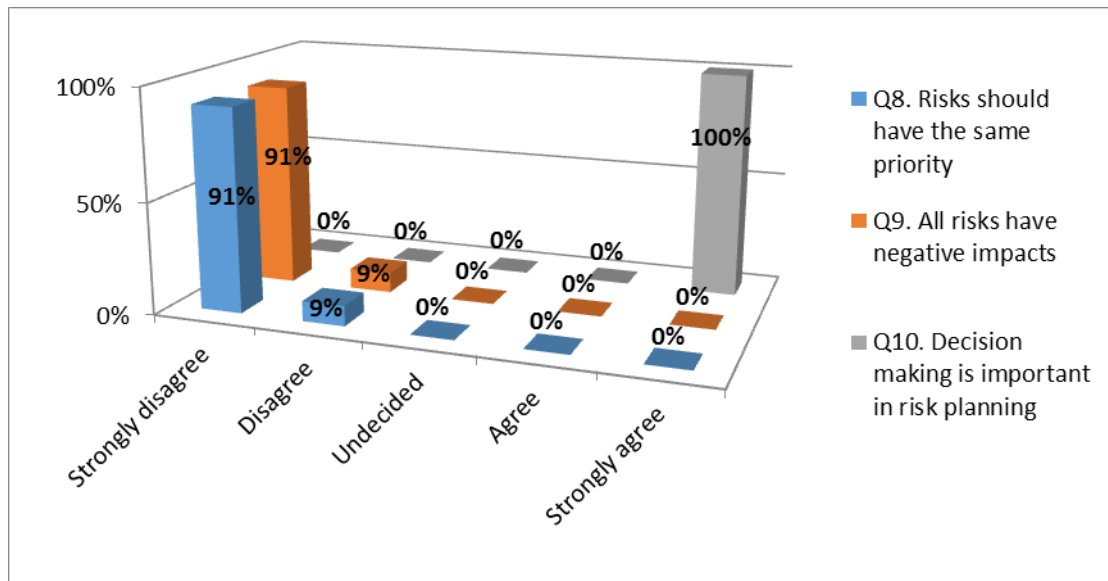


Figure 45: The priority of risk its impacts and the importance of decision making on a project

From the chart above in figure 45, with regards to the prioritisation of risks, the majority of respondents strongly disagreed (91%) and disagreed (9%) with the statement that all risks should have the same priority. Thus, it is an acknowledged fact that there is a level of importance attached to all identified risks, as the occurrence of some of these risks may affect the organisation worse than others.

Similarly, when questioned about the negative impact of the identified risks, all respondents disagreed (9%) and strongly disagreed (91%) that all risks have a negative impact at the project level. This suggests that respondents are aware that the early identification of risks can lead to a limitation of their negative impact as preventive and corrective measures can be taken to reduce their negative outcome.

Finally, all respondents (100%) strongly agreed with the high importance that decision-making has in the planning and identification stage of risk management. The role of decision-making in risk planning is clearly seen to be very important as risk planning enables effective decision-making.

When analysing the answers offered by respondents for this section of the survey, there are no major differences in opinions with regards to the investigated aspects. The answers were clearly clustered to one end of the evaluation scale, or in other words all respondents either agreed or disagreed with the statements. As no mixed opinions could be extracted from the investigated sample population, it can be

inferred that there is a common understanding at a practical level of how the planning and identification of risks is and should be managed within organisations.

However, it can be noticed a certain degree of reluctance to the actual implementation of risk planning and identification procedures within the investigated companies among the reasons invoked being the significant time involved by these activities (according to the responses to question 6 of this section- Figure 43) and also the fact that the respondents do not perceive this stage as having a great importance in the management of risks (as noticed from the responses to the second question of this section- Figure 41).

What is obvious though from the responses provided to this section of the survey, is that at the theoretical level there is a quite good understanding of how planning and identification should be carried out as the large majority of respondents acknowledge the fact that these stages are more effective if planned at the project level rather than at corporate level (Q7), they understand that not all risks should have the same priority (Q8), nor they are all negative (Q9), and also they agree that decision making is crucial in the risk management activities (Q10).

Section D

The fourth section of the survey concentrated on evaluating how risk is assessed and analysed within organisation.

Question 1: Does your organisation perform risk assessment/ risk analysis?

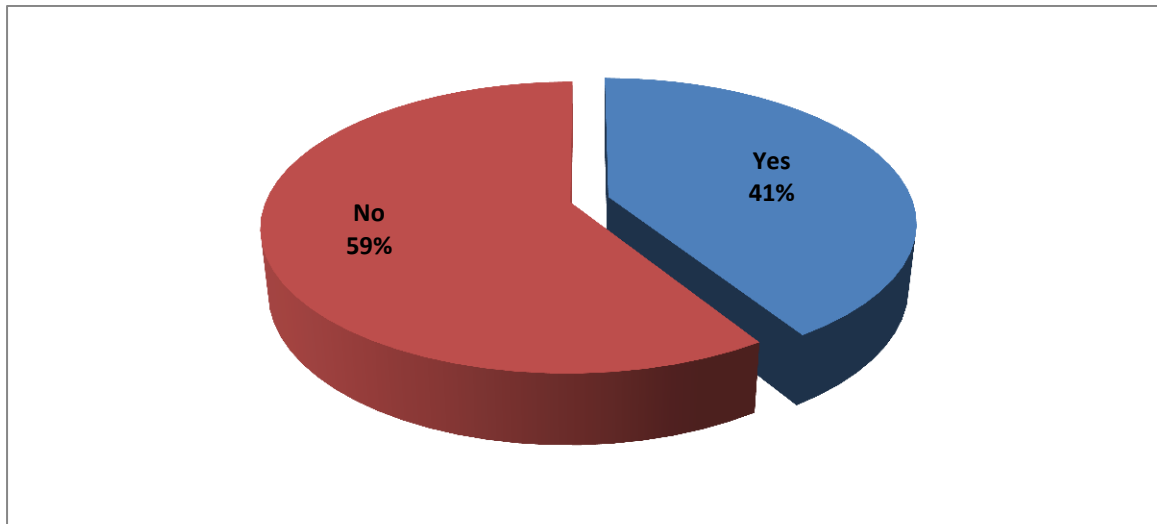


Figure 46: Performing risk assessment/analysis in an organisation

From the chart above in figure 46, then again the first question of the section was again a filter question that separated the respondents whose organisations carried out risk assessments and analysis actions, from those who did not.

The remaining questions in this section of the questionnaire refer to how risk assessment and analysis is implemented at organisational level.

Again, only 41% of the respondents asked stated that risk assessment and analysis activities are carried out within their companies.

Question 2: There is a dedicated team within your organisation tasked with performing risk assessment

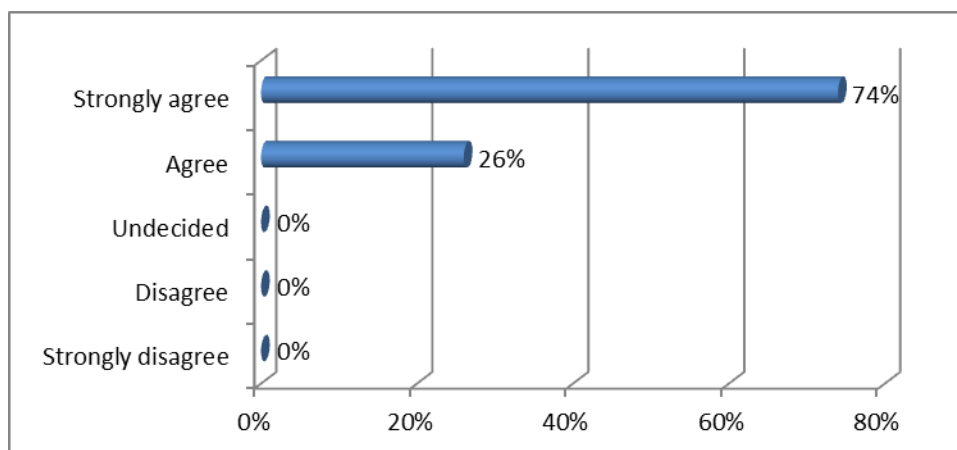


Figure 47: Designated team tasked for risk assessment

Furthermore, from the graph above in figure 47, all respondents whose companies perform risk assessments either agreed (26%) or strongly agreed (74%) that there is a dedicated team that carries out these tasks. So, when risk assessments are performed within organisations it is most likely accomplished by a specific team.

Question 3: Risk assessment in your organisation is a reactive measure (it is carried out when the risk occurs)

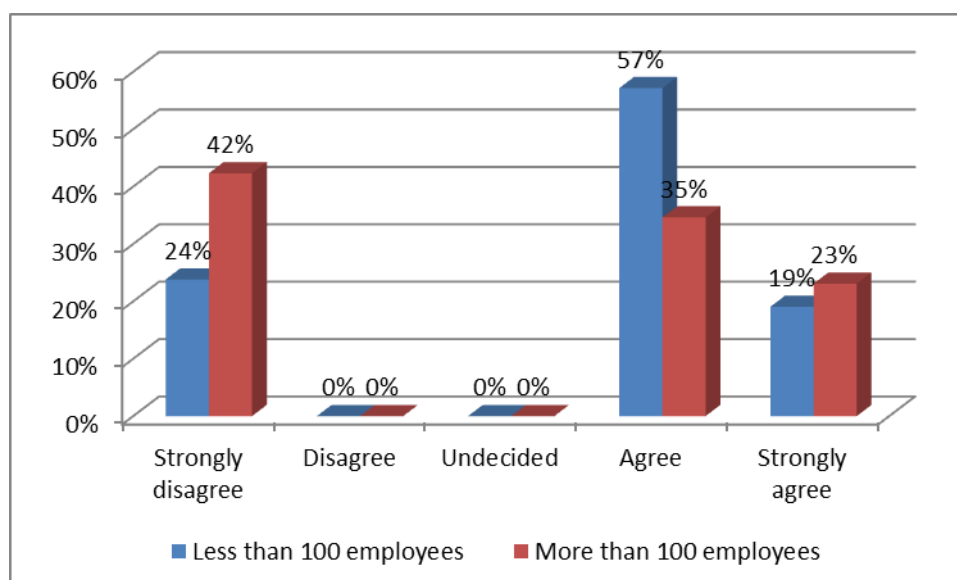


Figure 48: Risk assessment is a reactive measure

The results from figure 48 show some differences exist in the answers regarding the use of risk assessments as a reactive measure. These vary between

the responses of employees from smaller companies compared with those larger companies.

Thus, according to the chart above in figure 48, in the case of organisations with over 100 employees, 42% of respondents strongly disagree that risk assessment is done only when the risk occurs, while 58% either agree or strongly agree that risk assessment is carried out as a reactive measure.

For those organisations with under 100 employees, only 24% of respondents strongly disagree that risk assessments are only done when the risk occurs, while 58% either agree or strongly agree with the fact that risk assessments are carried out as a reactive measure. From these results it can be observed that the investigated companies tend to be more reactive than proactive with regards to the assessment of risk.

Results of questions 4 and 5 are detailed below

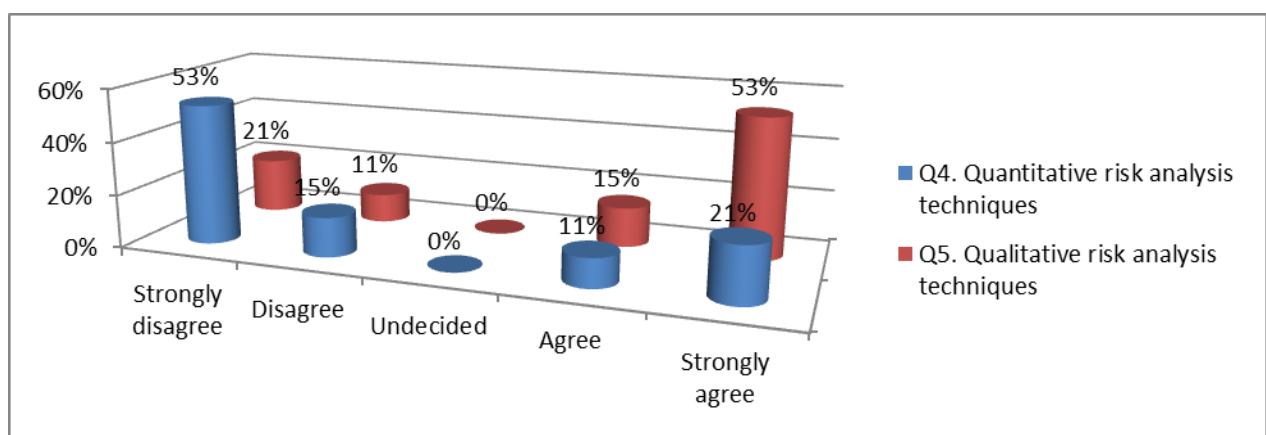


Figure 49: Organisational Preferences between quantitative or qualitative risk techniques for risk assessment

From figure 49, there appears to be a preference for qualitative measures in risk analysis techniques used within organisations as 53% of respondents strongly agreed and 15% agreed that their organisation analyses risks exclusively based on qualitative techniques. Furthermore, 21% of respondents strongly agreed and 11% agreed that risk is analysed by means of quantitative methods within their companies.

Table 31: Organisational Preferences for risk assessment and techniques on a project

	Strongly disagree	Disagree	Undecided	Agree	Strongly agree	Total
Q6. Risk probability and impact assessment is an integral part of the risk analysis process	0%	0%	0%	21%	79%	100%
Q7. Quantifying and analyzing risk in a systematic way is a new process (less than 5 years) within your organization	79%	0%	0%	21%	0%	100%
Q8. In the less 5 years, project risk analysis has been carried out in ALL the projects your organization have been involved in	0%	25%	0%	32%	43%	100%
Q9. Risk categorization is NOT an important part of risk assessment process	74%	26%	0%	0%	0%	100%

According to respondents' opinions from table 31, 21% agree and 79% strongly agree with this statement that they all perceive risk assessment to be a part of the analytical process of risk management.

Furthermore, the systematic risk analysis is not a new activity for the majority of the Nigerian power sector companies, as 79% of the respondents disagreed to the question that asked whether it was only implemented within the last five years. However, 21% of respondents do believe that this is a new process within their company.

In addition, it appears that risk analysis is an important part of risk management. According to the majority of respondents, 32% agree and 43% strongly agree that it has been a systematic part of all their company's projects within the last five years, whereas only 25% consider that risk analysis has only been completed for some projects.

The importance of risk categorisation within the risk assessment stage was also evaluated. The results show that all respondents (100%) either disagree or strongly disagree that risk categorisation is not an important part of risk assessment.

Thus, it is obvious that all inquired professionals acknowledge the important role of risk categorisation within the assessment stage also and consequently for the entire management of risk.

Question 10: Risk analysis is a tedious process that is best avoided if possible

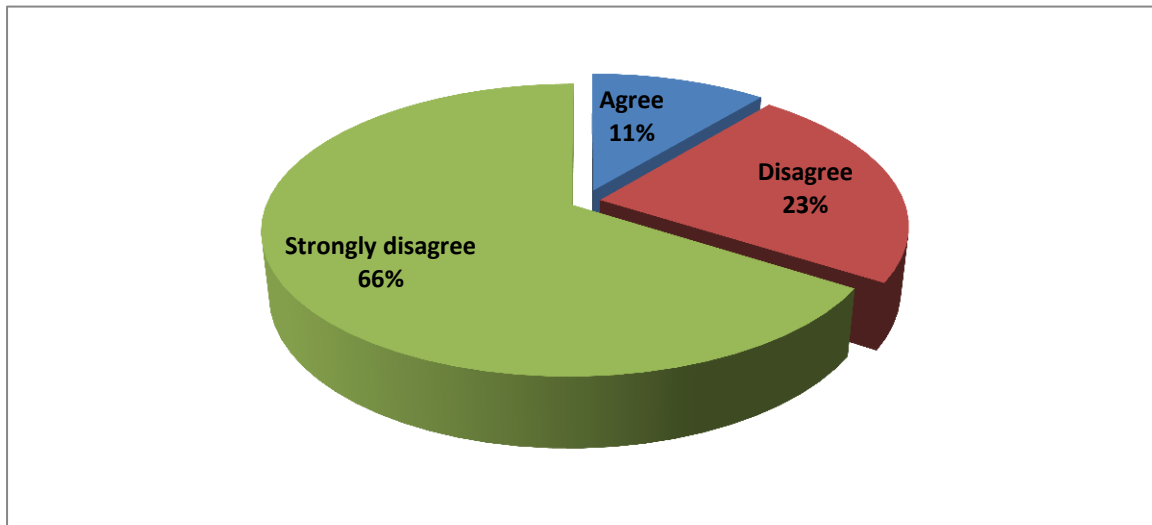


Figure 50: Respondents attitude towards risk assessment/ analysis

The final question of this section from figure 50 was aimed at assessing the respondents' attitude towards risk analysis. The results show that the majority of interviewees (89%) do not perceive risk analysis as a tedious process, which means that the organisation they are a part of would rather undertake risk analysis than embark on a project without risk analysis.

There is however also a small portion of respondents (11%) who believe that risk analysis should be avoided due to its complexity.

Part E: Risk Response and Risk Control

The fifth section of the questionnaire is designed to identify the risk response and control activities that are undertaken by organisation.

Question 1: Risk response is initiated ONLY after the risk is quantified

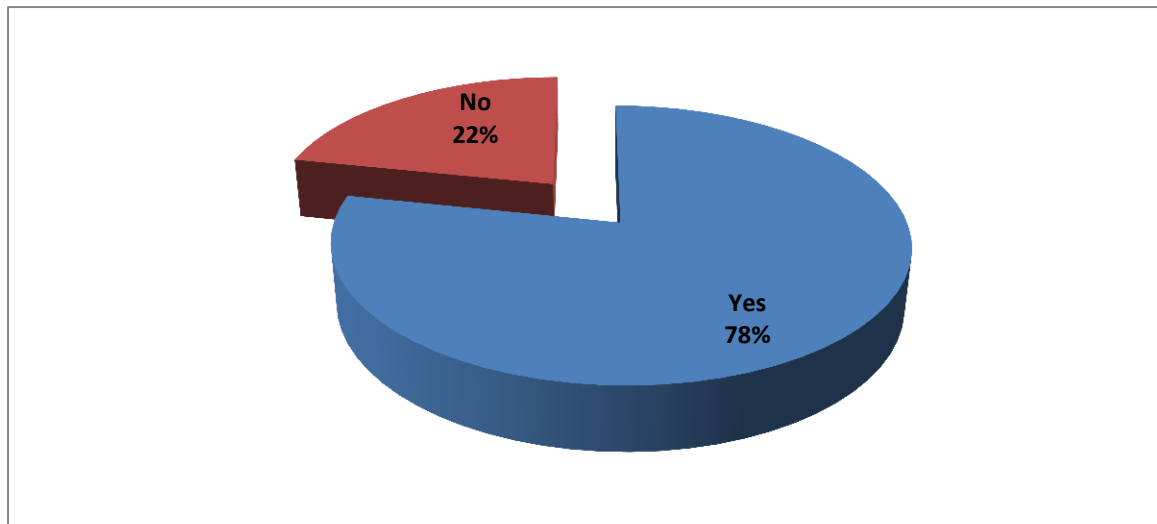


Figure 51: Organisations approach to risk response

According to the opinion of the majority of respondents (78%) from the chart in figure 51, the organisations analysed only embark on risk response after risk is quantified. This shows that an organisation responds to risk according to the risk classification and categorisation.

Question 2: There is a dedicated team within your organisation tasked with implementing risk response strategies

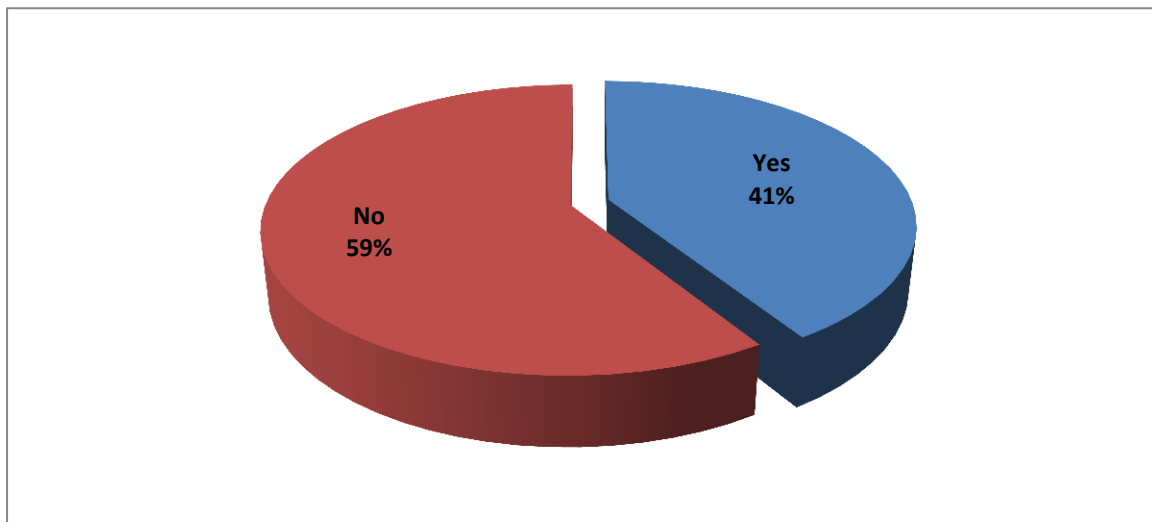


Figure 52: Designated RM team tasked with risk response

The chart above in Figure 52 shows some similarity to the previous two sections of the survey (See Figure 42 and 46), this is again a filter question used to separate the organisations that have a specific team managing risk response strategies from those who do not.

As the results show, 59% of respondents state that there is no designated risk control and response team within the organisation. For the next questions in this section the sample size consisted of 47 respondents (the ones who answered yes to this question).

Question 3: Risk avoidance is a form of risk response technique

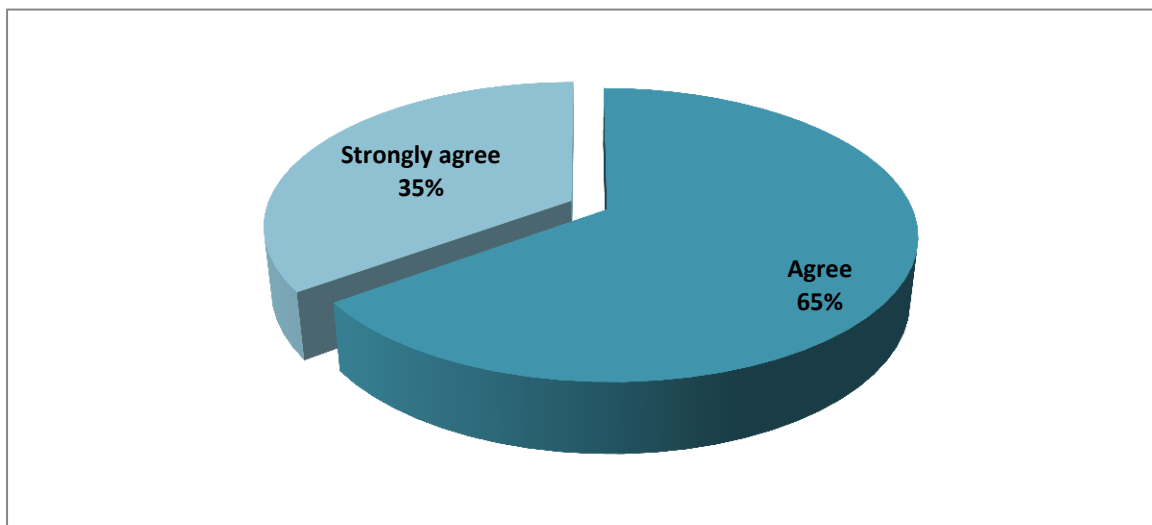


Figure 53: preference for risk avoidance technique

From the chart above in figure 53, when considering the participants' perception of risk avoidance as a risk response technique, all the respondents' either agree (65%) or strongly agree (35%) that their companies use avoidance as a measure to respond to risks occurrence

Question 4: If an identified risk severely impacts the objectives of a project and measures required to mitigate such risks are not cost effective the organization must modify its aims and objectives instead of implementing risk control measures

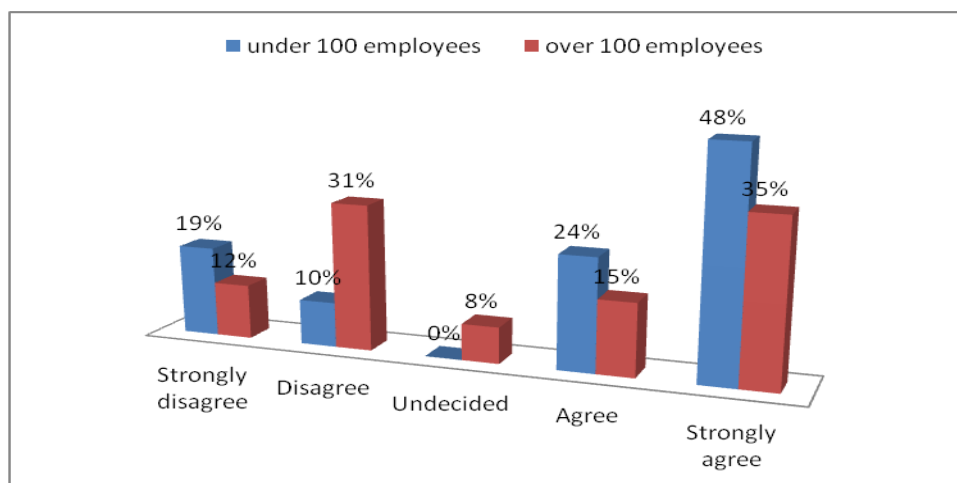


Figure 54: Risk control measures on cost effectiveness on a project

By analysing the answers to this question from figure 54, it shows that the respondents working for smaller sized companies tend to agree more with the fact

that a modification of objectives is preferable to the implementation of costly risk control measures.

Thus, 71% of the respondents from companies with less than 100 employees agree or strongly agree with this statement, while only 29% disagree. This is compared with 50% of participants from larger organisations agreeing and strongly agreeing, with 42% disagreeing.

This situation is most likely due to the increased importance that costs have on smaller companies whose resources are more restrictive compared to those of larger companies.

Question 5: It is better for an organization to terminate a project if there are no risk response measures for an identified project risk

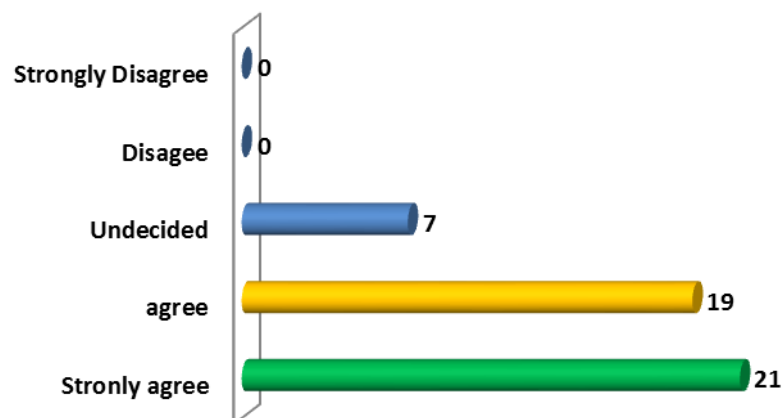


Figure 55: Organisational measures taken for risk response on a project

According to the respondents' answers from figure 55, if response measures are not identified for all risks associated with a project, the project cannot continue. The large majority of respondents (40 out of 47 – approximately 85%) agreed with this statement, while only 15% were undecided. None of the respondents disagreed with the termination of the project.

Question 6: Risk retention is usually the last step in the risk response process and is usually employed when the identified risk cannot be transferred or avoided

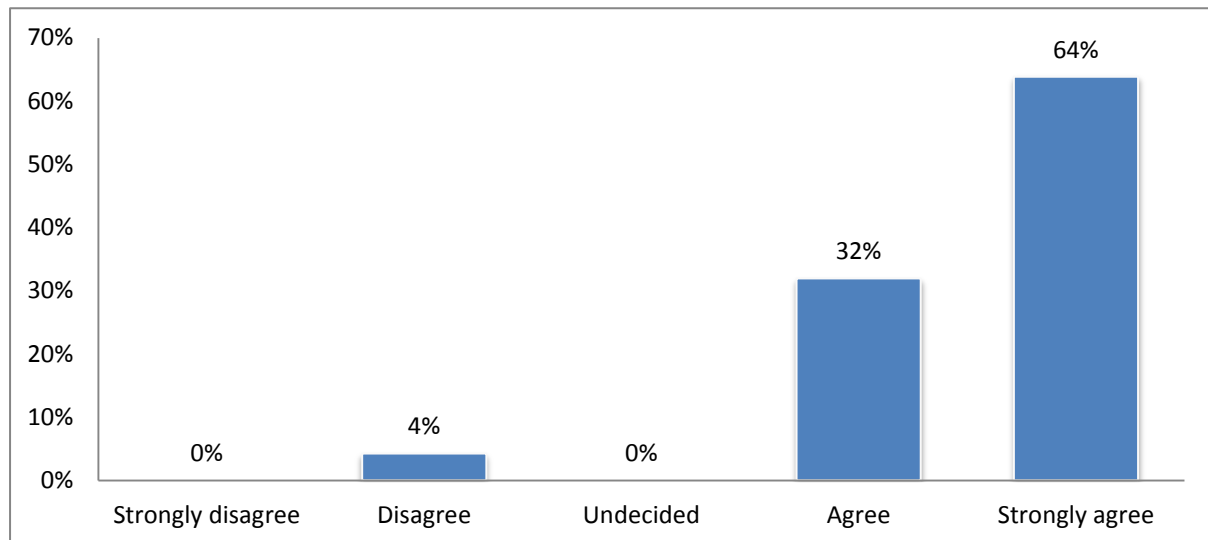


Figure 56: Preference for risk retention

From the chart above in figure 56, with regards to respondents opinion about the role of risk retention in the risk response process, almost all of them agree and strongly agree (96%) with the fact that risk retention is generally employed when risk transfer or avoidance are no longer options, which are the final steps in the response process..

Question 7: Monitoring and review are part of the risk control process

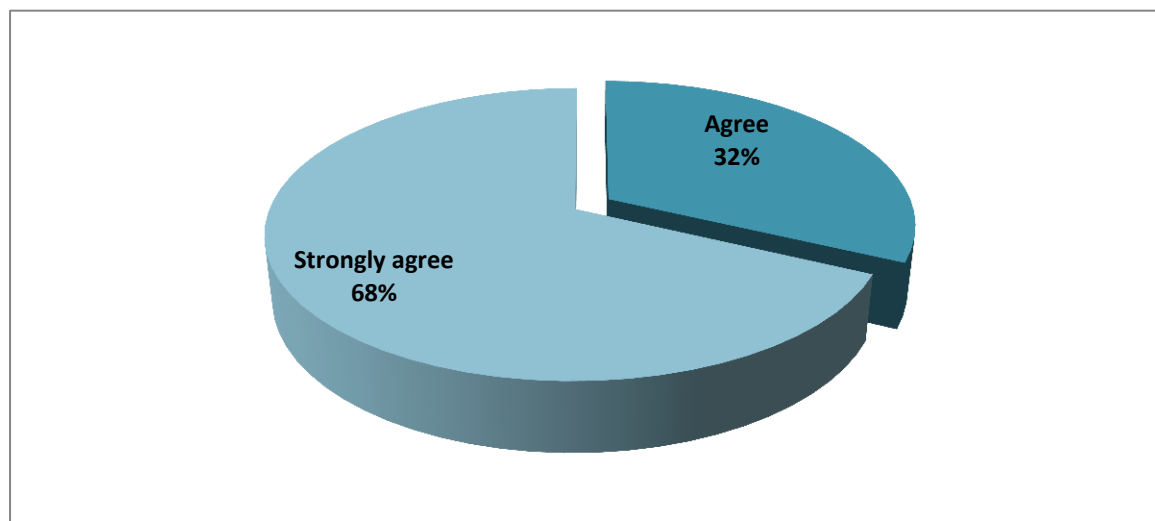


Figure 57: Risk monitoring and review control activities

Again from the chart in figure 57, all respondents have the same opinion when it comes to monitoring and reviewing being part of the risk control activities. Of those

asked, 32% of them agree and 68% strongly agree with the fact that their organisations implement monitoring and review activities as part of its risk control process

Question 8: ALL risks associated with a project can be controlled

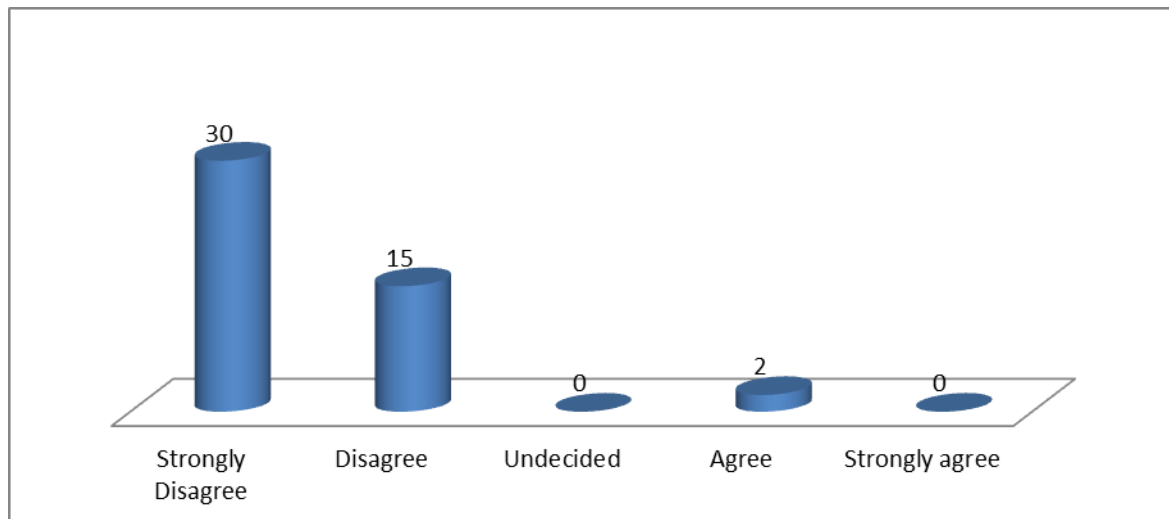


Figure 58: Organisational preferences towards risk associated within a project

The approach an organisation adopts towards risk determines how effective it can control risk and hazards (Chen et al., 2012). In accordance to the response rates for this question in figure 58, the majority of interviewees (45 out of 47, about 96%) acknowledge the fact that not all risks can be controlled. This is rather obvious, as there are often unexpected risks occurring within projects.

Question 9: Risk transfer/risk sharing usually leads to mistrust between the parties sharing the risk

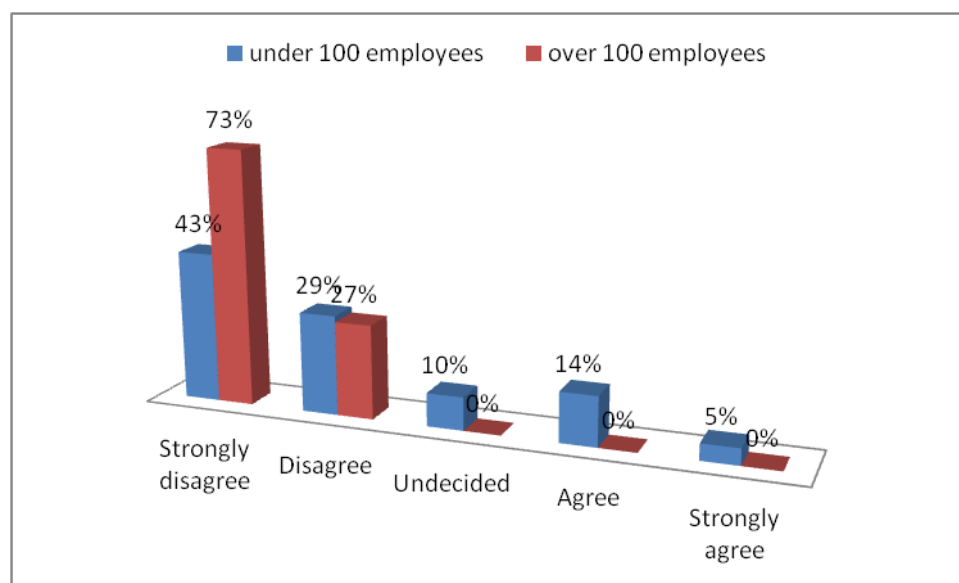


Figure 59: Preference for risk transfer tasked business partners/ third parties

This question in figure 59, seeks to find out if the risk transfer process is conducted with trust and high business confidence. The responses show that the majority of respondents, in both large and small companies, do not perceive risk sharing as a source of mistrust among business partners.

However, all respondents agreeing with the fact that risk sharing can lead to a lack of confidence in business partners belong to companies with less than 100 employees. Trust issues among partners sharing project risks are more likely to appear in smaller sized companies. This may be due to the fact that risks can be perceived as more important when limited resources are involved.

Question 10: Some risks are positive and can present opportunities for growth

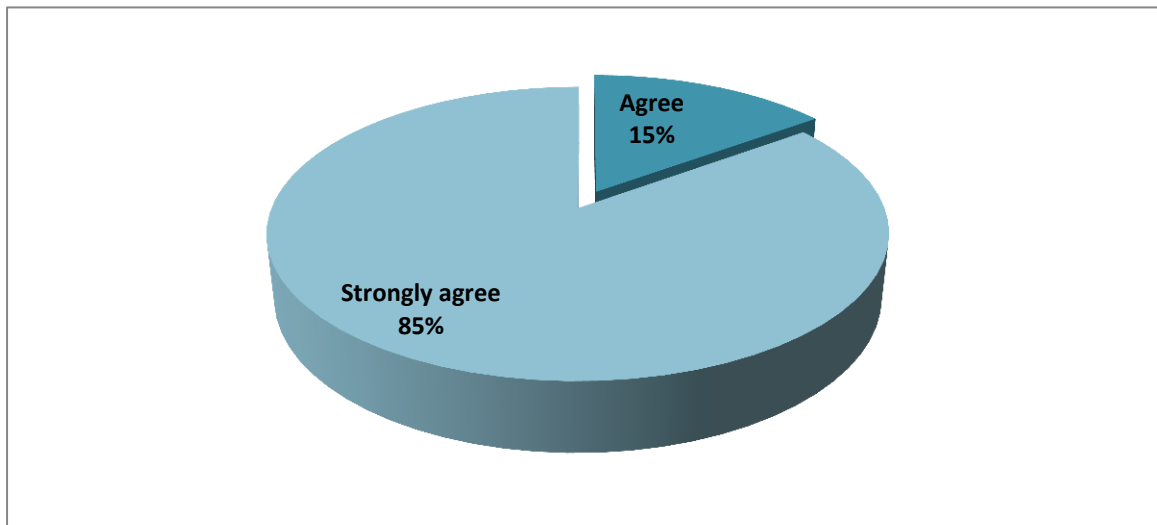


Figure 60: Risk leading to positive outcomes if managed properly

This question refers to the fact that if risks are well managed, they can be effectively used to achieve the project goals and objectives of an organisation. In answer to this question, all respondents agreed with the fact that some risks may turn into opportunities for the organisation.

5.2 Inferential analysis

The following section of the data analysis chapter investigates the relations between different variables included in the research survey. Inferential statistics is used to gain a deeper understanding of the relations between variables in order to interpret the results of the research. Table 32 below shows when to use a particular statistical test.

Table 32: Statistical decision of inferential test

Statistical Analyses	Independent variable		Dependent variable		Question answered by statistic
	# of IVs	Data type	# of DVs	Type of data	
Correlation	1	Dichotomous or continuous	1	Continuous	What is the level of strength and direction (i.e., +, -) are the independent variables and dependent variables related? Do two variables covary?
Chi- square	1	Categorical	1	Categorical	Do differences exist between groups?
t-test	1	Dichotomous	1	Continuous	Do differences exist between 2 groups on one dependent variable?
ANOVA	1+	Categorical	1	Continuous	Do differences exist between 2 or more groups on one dependent variable?

Source: Malhotra and Birks (2007)

5.2.1 Correlation analysis

Verifying the existence by chance alone of a relationship/ association between different variables is called significance testing and correlation coefficients are used to measure the relationship between two variables (Saunders, et al., 2012).

There are two basic categories of statistical significance tests: parametric and non-parametric. Non-parametric tests are generally employed when the available data is not normally distributed, thus they are most often used for categorical variables (ordinal variables- than have 2 or more categories in a logical order. i.e.

How many persons got a fail, a pass, a merit or distinction in a class test), whereas parametric tests are carried out for numerical data (continuous variables- the difference between 5 and 7 is equivalent to the difference between 11 and 13, given that the entities have a distinct score), for this reason being considered more powerful (Field, 2009).

The second section of the survey addresses the issue of risk management in general, whereas the next sections are aimed at assessing the characteristics of the main stages of risk management: planning, analysis and control.

5.2.2 Justification for correlation analysis

In order to identify any potential relations between the risks aspects investigated in second section of the survey, a correlation analysis was carried out. The Pearsons' product-moment correlation was chosen due to the nature of the investigated variables in the current research.

However, due to the nature of the variables analysed the correlation coefficient, Spearman's rank order correlation has not been applied because they are categorical and are non- parametric (only used when the data has violated the parametric assumptions) and are less powerful (greater chances of type II error) which means that is generally employed when the variables investigated are non-metrical (Malhotra and Birks, 2007), that is if they are measured on a categorical or ordinal level, but it can also be used for continuous variables, if the assumptions required by Pearson's correlation are not met (Lund and Lund, 2013).

In a Pearson's correlation analysis the variables must be measured on continuous intervals or on ratio scales.

Type II errors – *occurs when we believed that there is no effect in the population, when in reality, there is (Field, 2005).*

The results of the analysis are displayed in the table 33 below (important results are marked with bold):

Table 33: Correlation analysis for part B of the Questionnaire

Correlations (between RISK MANAGEMENT SYSTEM WITHIN AN ORGANISATION)									
		b1	b2	b3	b4	b5	b6	b7	b8
b1	Pearson Correlation	1	.181	-.110	.035	-.093	-.006	.140	.020
	Sig. (2-tailed)		.053	.240	.714	.323	.953	.136	.833
	N	115	115	115	115	115	115	115	115
b2	Pearson Correlation	.181	1	.205 [*]	-.029	.101	.020	.391^{**}	.041
	Sig. (2-tailed)	.053		.028	.761	.284	.834	.000	.667
	N	115	115	115	115	115	115	115	115
b3	Pearson Correlation	-.110	.205 [*]	1	-.235 [*]	-.177	.060	.076	-.052
	Sig. (2-tailed)	.240	.028		.012	.059	.523	.423	.581
	N	115	115	115	115	115	115	115	115
b4	Pearson Correlation	.035	-.029	-.235 [*]	1	.173	-.020	.135	.127
	Sig. (2-tailed)	.714	.761	.012		.064	.834	.151	.175
	N	115	115	115	115	115	115	115	115
b5	Pearson Correlation	-.093	.101	-.177	.173	1	-.062	-.012	-.064
	Sig. (2-tailed)	.323	.284	.059	.064		.512	.895	.498
	N	115	115	115	115	115	115	115	115
b6	Pearson Correlation	-.006	.020	.060	-.020	-.062	1	-.153	.015
	Sig. (2-tailed)	.953	.834	.523	.834	.512		.103	.876
	N	115	115	115	115	115	115	115	115
b7	Pearson Correlation	.140	.391^{**}	.076	.135	-.012	-.153	1	.026
	Sig. (2-tailed)	.136	.000	.423	.151	.895	.103		.780
	N	115	115	115	115	115	115	115	115
b8	Pearson Correlation	.020	.041	-.052	.127	-.064	.015	.026	1
	Sig. (2-tailed)	.833	.667	.581	.175	.498	.876	.780	
	N	115	115	115	115	115	115	115	115
*. Correlation is significant at the 0.05 level (2-tailed).									
**. Correlation is significant at the 0.01 level (2-tailed).									

By analysing the data from table 33 (which contains correlation results between the answers of section B), some correlations appear to exist. The first of these is between the second (b2) and the third (b3) question of section B, which refers to the fact that risk planning, is always used within organisation and the first stage of risk management employed is the identification. The correlation is positive and low (0.205) which means that the more risk management is implemented and perfected within a company the identification is increasingly acknowledged as a first stage of

this process. This can be interpreted, because if a certain process is used intensively in a company, more knowledge is gained about it and a better understanding of its stages and components. Thus it become obvious that if risk management is more intensively used in a company the decision makers will have more knowledge about risk management stages, the identification being the first stage without which the others would have no point.

Hypothesis 4: There is a positive dependant connection between the performance of Nigerian companies and the risk assessment practices implemented at organisational level

Furthermore, another correlation could be observed between the (b2) second and the seventh (b7) questions from section B (0.391). Thus a low but positive connection exists between the intensive implementation of risk management and the existence of a designated team within the organisation, tasked with managing the specific activities involved by this process.

This is somewhat obvious because, if a specific process is more intensively and frequently used in an organisation, the complexity of its activities increases, thus requiring specialised personnel to manage those tasks.

The third correlation observed is between the fact that risk identification is acknowledged as the first step of risk management (b3) and the fact that risk management is an important part of organisational management (b4). This can again be explained by the fact that more intense use of a process paired with an increased importance given to that process, leads to a better understanding of its components and stages.

Thus, it is obvious that an increased importance of risk management in a company should generate a better understanding of how this process should be implemented, the identification being the first and one of the most important stages in the management of risks.

5.2.3 Chi square test

Another non-parametric analysis that could be carried out in order to investigate the relationships between two variables is the Chi square test. Chi square is used to determine “whether a systematic association exists between the two variables” (Malhotra and Birks, 2007).

The Chi square test is most often used when the variables investigated are nominal or dichotomous, and there are at least two groups for each variable, but it can also be used for ordinal variables (Lund and Lund, 2013). They further posit that the downfall of Chi square is that it cannot make a difference between dependent and independent variables, nor it informs on the strength of the association between the variables, its only role being to provide a basis for rejecting the null hypothesis of no association.

According to Puri (2002) and Pallant (2010), for a hypothesis to be valid the following criteria must be fulfilled:

- The expected value in each cell must be greater than 5 (>5)
- The expected value in majority of the cases being analysed (at least 80%) must be greater than 5 (>5).

5.2.3.1 Chi-square analysis of hypothesis

To test the validity of the hypotheses, two independent variables were chosen. The number of independent variables chosen was to ensure that the analysis is valid. If the hypothesis cannot be validated it therefore means that there is a need to implement a risk model in Nigeria to promote the practice and implementation of risk management.

5.2.4 Justification of Variables for Hypothesis Testing

The independent variables chosen to test the validity of the hypotheses and thus help to establish a clear need for the research are:

1. *Type of organisation of the respondents*
2. *Position of the respondents within their organisation*

It is important to know how the type of organisation of the respondents affects the practice and implementation of risk management.

Seven (7) dependant variables were chosen with each dependent variable representing a key aspect/phase of the risk management process within an organisation. The dependent variables are:

1. *Risk Management plan is always used in your organization*
2. *Risk Register is always used in your organization*
3. *There is a designated 'Risk Management' team within your organization*
4. *Risk planning is carried out prior to initiating any project within your organization*
5. *Your organization performs risk assessment/risk analysis*
6. *There is a dedicated team within your organization tasked with performing risk assessment*
7. *There is a dedicated team within your organization tasked with implementing risk response strategies*

Table 34: Hypothesis testing parameters

Hypothesis	Independent variable (A variable thought to be the cause of some effect)	Dependent variable (A variable that is affected by changes due to an independent variable)
Hypothesis 1 There is a discrepancy between organisations that consider risk planning an important prerequisite for the commencement of most projects	<ul style="list-style-type: none"> • Type of organisation of the respondents • Position of the respondents within their organisation 	<ul style="list-style-type: none"> • Risk Management plan is always used in your organization • Risk Register is always used in your organization • Risk planning is carried out prior to initiating any project within your organisation
Hypothesis 2 There is a discrepancy between organisations that perform risk assessment an important prerequisite for the commencement of most projects	<ul style="list-style-type: none"> • Type of organisation of the respondents • Position of the respondents within their organisation 	<ul style="list-style-type: none"> • Your organization performs risk assessment/risk analysis • There is a dedicated team within your organization tasked with performing risk assessment
Hypothesis 3 There are dedicated risk management teams tasked with the implementing risk management within various organizations involved in power projects in Nigeria	<ul style="list-style-type: none"> • Type of organisation of the respondents • Position of the respondents within their organisation 	<ul style="list-style-type: none"> • There is a designated 'Risk Management' team within your organization • There is a dedicated team within your organization tasked with performing risk assessment • There is a dedicated team within your organization tasked with implementing risk response strategies

Two variables were selected for this test, the size of the company and the implementation of planning in the management of risk (question B2) as some differences were noticed when carrying out the descriptive analysis. The results of the Chi square test are displayed in tables 35.

Table 35: Results of chi square test for Hypothesis 1

Company size * b2 Crosstabulation

Hypothesis 1: There is a discrepancy between organisations that consider risk planning an important prerequisite for the commencement of most projects			b2					Total
			1	2	3	4	5	
Compa ny size	Small (under 100 employees)	Count	12	27	4	20	17	80
		Expected Count	10.4	23.7	3.5	21.6	20.9	80.0
		% within Company size	15.0%	33.8%	5.0%	25.0%	21.3%	100.0%
		% within b2	80.0%	79.4%	80.0%	64.5%	56.7%	69.6%
		% of Total	10.4%	23.5%	3.5%	17.4%	14.8%	69.6%
	Large (over 100 employees)	Count	3	7	1	11	13	35
		Expected Count	4.6	10.3	1.5	9.4	9.1	35.0
		% within Company size	8.6%	20.0%	2.9%	31.4%	37.1%	100.0%
		% within b2	20.0%	20.6%	20.0%	35.5%	43.3%	30.4%
		% of Total	2.6%	6.1%	0.9%	9.6%	11.3%	30.4%
Total		Count	15	34	5	31	30	115
		Expected Count	15.0	34.0	5.0	31.0	30.0	115.0
		% within Company size	13.0%	29.6%	4.3%	27.0%	26.1%	100.0%
		% within b2	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	13.0%	29.6%	4.3%	27.0%	26.1%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.316 ^a	4	.256
Likelihood Ratio	5.367	4	.252
Linear-by-Linear Association	4.887	1	.027
N of Valid Cases	115		

a. 3 cells (30.0%) have expected count less than 5. The minimum expected count is 1.52.

Interpreting the output

Hypothesis 1: There is a discrepancy between organisations that consider risk planning an important prerequisite for the commencement of most projects

The null hypothesis for this analysis was that there is no association between company size and the use of risk management planning by the companies. The expected results were then compared with the observed results in order to find out if sufficient evidence was available to reject the null hypothesis.

Despite the fact that the data in the crosstabulation table (See Table 23) suggest that an association might exist (observed values are larger than expected values for small companies and smaller than expected values for large companies, and vice-versa), there is not sufficient evidence to support this assumption as 30% of the expected count cell have values less than 5. Also the likelihood ratio reveals that there was only a 5.367% of this hypothesis being true.

However, because this is a criterion that Chi square test must meet in order for its results to be valid, it can be stated that the null hypothesis can be neither accepted nor rejected due to a lack of evidence, as the Chi square test in this situation is not appropriate.

Another Chi square test was carried out between the company size and the existence of a risk management team within the company. Just like in the previous case, the variables were selected due to the fact that during the descriptive analysis some differences were observed between the small and large companies in what regards the use of designated risk management teams. The results of the Chi square are displayed in table 36.

Table 36: Results of chi square test for Hypothesis 3

Company size * b7 Crosstabulation

Hypothesis 3: There are dedicated risk management teams tasked with the implementing risk management within various organizations involved in power projects in Nigeria			b7					Total
			1	2	3	4	5	
Company size	Small (under 100 employees)	Count	37	9	10	10	14	80
		Expected Count	29.2	8.3	9.7	9.7	23.0	80.0
		% within Company size	46.3%	11.3%	12.5%	12.5%	17.5%	100.0 %
		% within b7	88.1%	75.0%	71.4%	71.4%	42.4%	69.6%
		% of Total	32.2%	7.8%	8.7%	8.7%	12.2%	69.6%
	Large (over 100 employees)	Count	5	3	4	4	19	35
		Expected Count	12.8	3.7	4.3	4.3	10.0	35.0
		% within Company size	14.3%	8.6%	11.4%	11.4%	54.3%	100.0 %
		% within b7	11.9%	25.0%	28.6%	28.6%	57.6%	30.4%
		% of Total	4.3%	2.6%	3.5%	3.5%	16.5%	30.4%
Total		Count	42	12	14	14	33	115
		Expected Count	42.0	12.0	14.0	14.0	33.0	115.0
		% within Company size	36.5%	10.4%	12.2%	12.2%	28.7%	100.0 %
		% within b7	100.0%	100.0%	100.0%	100.0%	100.0%	100.0 %
		% of Total	36.5%	10.4%	12.2%	12.2%	28.7%	100.0 %

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	18.506 ^a	4	.001
Likelihood Ratio	18.687	4	.001
Linear-by-Linear Association	16.589	1	.000
N of Valid Cases	115		

a. 3 cells (30.0%) have expected count less than 5. The minimum expected count is 3.65.

Interpreting the output

Hypothesis 3: *There are dedicated risk management teams tasked with the implementing risk management within various organizations involved in power projects in Nigeria*

In this case, the null hypothesis is that there is no association between company size and the existence of risk management designated teams within the company. Similar to the previous case (See Table 27), the data from the observed count and the expected count suggests that some association may exist between the two variables.

However from table 36, due to the fact that three cells (30%) were found to have expected counts less than 5 one of the requirements of Chi square test is not met, and thus the test does not provide sufficient evidence for accepting or rejecting the null hypothesis. Consequently, in this case either Chi square cannot be considered an appropriate test.

Due to the fact that the sample size can be considered rather small, when divided into categories based on the responses to the survey questions it becomes likely that expected counts less than five would appear frequently if Chi square test was employed.

According to Malhotra and Birks (2007) the Chi square test should not be used when the actual of expected count in any of the cells is less than 5. A good rule of thumb would be to have at least 10 observations in any of the cells to ensure the fitness of the Chi square analysis (Malhotra and Birks, 2007).

However, because inconsistent results can be expected for the use of Chi square for other variable pairs in this study, another type of analysis will be carry out to assess the relationship between company size and different aspects of risk management implementation within the investigated Nigerian companies, namely the independent samples t test, which in this case may prove to be more appropriate.

5.3 Impact of company size on the implementation of risk management in Nigerian companies – Independent samples t-test

Furthermore, the impact of company size was investigated in relation to the variables used in this section of the survey, through the use of an independent sample t test. This analysis compares the means of two groups, in relation to a specific grouping variable (based on some variable of interest). In the case of this study, an assumption can be made that the respondents perceptions regarding risk management may differ depending on the size of the company they work for.

Decision criterion rule

The t test is a statistical method which compares means of two samples for finding out whether the two means are statistically significantly similar to each other or not. It compares the values of two means and determines the difference between the paired values of the samples. While comparing the two means, it takes into account the deviation in the values and come up with a single output known as t-value. T-value tells about the size of the difference between the means of values of two samples (Motulsky, 2013). The independent variable must consist of only two groups (e.g. male/female, undergraduate/graduate).

As part from the t-test, Levene's test for Equality of Variances is first computed; this test has two indicators (F value and the significance). A **Sig. value greater than 0.05** indicates that the two conditions **have a similar variability** (the results in the first category do not vary consistently from the scores in the other condition). The F is the variance ratio between the two groups.

The t-value is the indicator for the difference in mean; it will be positive if the first mean (small company size group) is larger than the second (large company size group), and negative if it is smaller.

The degrees of freedom represent the minimum number of coordinates necessary that specify the state of a system, without violating any constraint of it. It is usually $N-1$, where N represents the number of samples (in our case, $115-1$).

The Significance level of the result (Sig.) indicates the statistical significance of the t-value result (if **Sig (2- tailed) is greater (>) than 0.05, there is not a statistically significant difference between the means** of the two groups). **However, if**

the Value of sig. (2- tailed) is less (<) than 0.05, it is considered that there is a statistical significant difference between the means of the two groups.

The labelling of the groups has been consequently respected for all the questions, therefore, the direction of the bias of the mean will be provided by the sign of the t-value, e.g., if the t-value is positive, we will deduct that the first declared group (with the large-size companies) has a larger mean than the small size companies.

The results of the t-test are displayed in table below.

Table 37: Results of Independent Sample Test

Independent Samples Test								
		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
b1	Equal variances assumed	4.329	.040	1.307	114	.194	.186	.142
	Equal variances not assumed			1.383	74.385	.171	.186	.134
b2	Equal variances assumed	1.317	.254	2.250	114	.026	.648	.288
	Equal variances not assumed			2.280	66.955	.026	.648	.284
b3	Equal variances assumed	1.099	.297	-.962	114	.338	-.305	.317
	Equal variances not assumed			-.978	67.422	.332	-.305	.312
b4	Equal variances assumed	1.131	.290	-.038	114	.970	-.011	.280
	Equal variances not assumed			-.040	70.395	.968	-.011	.270
b5	Equal variances assumed	.367	.546	-.124	114	.901	-.036	.287
	Equal variances not assumed			-.123	63.356	.902	-.036	.290
b6	Equal variances assumed	.758	.386	-1.331	114	.186	-.445	.334
	Equal variances not assumed			-1.349	67.094	.182	-.445	.329
b7	Equal variances assumed	.707	.402	4.387	114	.000	1.391	.317
	Equal variances not assumed			4.452	67.182	.000	1.391	.312
b8	Equal variances assumed	.179	.673	-1.300	114	.196	-.373	.287
	Equal variances not assumed			-1.262	60.741	.212	-.373	.296

In the above table 37, the statistically significant differences were highlighted (corresponding to questions b2 and b7, which have a Sig. value less than 0.05, which turns out to be 0.026 and 0.000). The two questions that were influenced by the size of the company where the respondent was employed are those referring to

the fact that risk management is always used within the organization and that a specific risk management team exists within the company.

In these two cases, the respondents employed in larger companies (over 100 employees) agreed more with the fact that risk management is always used in their organisation compared to those employed in companies with less than 100 employees.

This means that risk management is employed more intensively in larger organisations, which is expected due to the fact that the projects they are involved in are often more complex and thus more risky than in the case of smaller companies. This further leads to the fact that specific risk management teams are more frequently developed in large companies compared to small one, as the respondents answers suggest.

Further on, the responses for the filter questions in the other three sections of the survey were investigated in relation to company size, the results being displayed in the below table.

Table 38: Results of Independent Test for Filter Questions

Independent Samples Test								
		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
c3	Equal variances assumed	.014	.905	5.351	114	.000	-.480	.090
	Equal variances not assumed			5.348	64.821	.000	-.480	.090
d1	Equal variances assumed	.014	.905	5.351	114	.000	-.480	.090
	Equal variances not assumed			5.348	64.821	.000	-.480	.090
e2	Equal variances assumed	.014	.905	5.351	114	.000	-.480	.090
	Equal variances not assumed			5.348	64.821	.000	-.480	.090

As it can be observed, the size of the organisation influenced the answers for all three questions. Thus, there were a significantly higher number of respondents employed in large companies that answered yes when asked about the

implementation of risk identification and planning as a first stage in risk management, compared to respondents coming from smaller companies (c3).

In accordance with the previous analyses, this is expected because, as already stated, large organisations are involved in more complex and riskier projects than the smaller ones. Therefore, risk management is carried out more extensively in such organisations, and a more careful attention is paid to the specific stages involved in this process.

Hypothesis 2: *There is a discrepancy between organisations that perform risk assessment an important prerequisite for the commencement of most projects in Nigeria (Small and Large organisations).*

Similarly, more respondents employed in larger organisations (with over 100 employees) answered yes when asked whether their organisation performs risk assessment and analysis activities, compared to those coming from smaller companies (with less than 100 employees) (d1).

Also, regarding the existence of dedicated risk response teams within organisation, more respondents from large companies answered yes to this question compared to those from smaller sizes organisations (e2).

The reason for this, as explained previously, is related to the complexity and the risk levels the different types of companies are involved in.

5.4 Impact of project type on the implementation of risk management procedures in Nigerian companies – ANOVA

ANOVA is generally used when investigating the differences between three or more groups of continuous dependent variables (Malhotra and Birks, 2007). It determines the difference between the groups but does not tell which is different.

Another aspect that may have an influence on the way risk management procedures are implemented within the Nigerian companies investigated is the type of projects they are involved in. The survey question recording this information comprised several response alternatives from which one referred to the power sector and the others to other fields of activity. Due to this fact, the responses were

recorded in a new dichotomous variable (an example could be gender-male or female) that comprised only two categories: power projects and non-power projects but then again this vary on the size of company. Thus, the test for this assumption using ANOVA cannot be applied.

Nevertheless, ANOVA gives results of identical results to a t-test which has already been done. However, from the results it can be inferred that there are no major differences regarding the way that risk management is implemented within the Nigerian companies from the power sector compared to the non-power sector. Thus, despite the fact that it may be argued that power projects may involve greater risks, thus an increased attention should be given to risk management, the actual findings from the empirical research suggest otherwise. In other words, power companies display the same interest for risk management as non-power companies, although the risks involved seem to be greater in the case of the former compared to the latter.

What can be noticed from the results of the previous analyses is that risk management is implemented differently in Nigerian companies, according to the perceptions of the respondents included in the sample. While risk management is generally employed in all organisations investigated, the attention and interest offered to this process vary among companies. One major factor influencing these variations is the company size.

5.5 Establishing the relationship and patterns between variables

The coefficients in the Pearson correlation regarding all the answers to the questions have led to the determination of the variables that act as model determinants.

Variables c1 and c2 are used for predicting the variable “contemplation”, which is independent; furthermore, using the composition of c3, d1 and e2, the independent variable “implementation of risk management measures” emerges.

Composite variables are useful for the purpose of merging the main correlates regarding company performance, turning them into uniform factors. This way, the variable “contemplation” represents a sum of knowledge regarding risk management

importance and the adjacent intentions to implement risk measures, as explained by Burke and Litwin (1992), who stated that organisational change is made available using collective action and intention. The construct is conveyed using items c1 and c2, for collective ability and motivation, respective.

The “implementation” variable can be translated into a sum of risk management steps (c3, d1 and e2), as well as with creating a special team for dealing with risk management, as indicated by the emergence of the most relevant correlates regarding organisational performance.

In section 6, the description of the framework created using these assumptions, together with all their implications and consequences.

‘Implementation’ = c3_d1_e2

‘Contemplation’ = _c1_c2

5.6 Synthesis of inferential results

With regards to the descriptive results, the majority of users agreed that risk transfer is performed with high trust in their companies; that risk indicators should be prioritized, although in practice, there are gaps and performing risk measures and analysis in the Nigerian companies is neglected, though the theoretical background and reception is positive, for both small and large companies.

Correlation results show there is a connection between the intensive implementation of risk management and the existence of a designated team within the organisation. The acknowledgement of the first step of risk management implies that risk management is an important part of organisational management.

An association that can be made between the correlation results and the independent samples t-test relates to questions b2 and b7. The most significant positive correlation is between these two variables and they also offer significant variances between their means (or in other words, they offer the most clearly biased answers for the two categories of responses). An increased knowledge about the benefits of the planning stage in risk management assessments was indicated by large size companies as large organisations are involved in more complex and

riskier projects than smaller ones. Enterprises with an increased number of employees tend to be more responsive when it comes to complex risk assessment procedures.

Although somewhat unexpected, due to the arguably higher risks that power projects involve, the results of the inferential analysis can be correlated with the other findings from this quantitative research.

Thus, the overall limited use of risk management procedures, as noticed from the descriptive analysis of the survey results, can be one of the reasons why no major differences were noticed among companies from different sectors. If risk management is implemented at a low level within companies the differences identified cannot be large either.

However, the fact that larger companies use risk management in a larger proportion than small companies is understandable when taking into consideration the complexity of the projects that large companies have to manage.

Moreover, the financial impact is much higher for larger organizations in case a risk occurs, due to the fact that the investments made are more significant compared to smaller companies.

Also, small companies must also take into consideration the costs involved by the implementation of risk management procedures which may often be too high for what such organizations may be able to afford. This, along with the fact that Nigeria is an emerging economy where there is significant development left to be achieved especially at an economical level, supports the fact that despite its importance, risk management remains a side objective for many of the companies within the country.

5.7 Summary of Findings

An analysis of the results obtained from the questionnaire survey reveals the presence of risk management practice in Nigeria. However, the procedures usually adopted for implementing risk management differs from the norm revealing a gap between what is obtainable and what is currently being practiced in Nigeria.

The quantitative results indicate reactive risk management practices, which are not in line with standard frameworks. For instance risk assessment was discovered to be a reactive measure in some of the organisations and this is not the norm as it is essential that risk assessment be carried out proactively as part of the risk planning exercise – as part of these, risk management is conceptualised as proactive, anticipatory and systematic. What is more, it is noticed from the quantitative results that many companies from among those that have been investigated do not have an assigned risk management team, which points to the fact that risk management is carried out informally and is ambiguously integrated into the general managerial practice in most organizations thereby limiting the ability of organizations to effectively undertake risk strategy planning and risk control.

This can only indicate that the ability to carry out risk assessment, planning, implementation and control is hindered. Without implying that risk management ought to be compartmentalised within an organisation, it can be argued, based on the results that indicate that there is a lack of full procurement of risk management activities, that there is not much openness towards formalising a risk management approach and that many companies lack a coherent vision in this respect.

There is a bias on behalf of companies against risk review, monitoring and control, as a sign of the fact that, albeit standard risk management measures might be formulated and implemented at times, roughly the second part of the process, having to do with adhering to an established course of action, is the one where deficit occurs. This is to indicate that there is little continuity in the risk management approach of Nigerian managers, likely due to the limited ability to estimate and anticipate a variety of risk factors acting interactively.

Also, it appears that few companies use risk registers as a form of recording past risk experiences, which is to indicate a lack of continuity impeding on avoiding and mitigating future risk.

While quantitative results are mainly indicative of the „what”-s of risk management in the Nigerian power sector, their qualitative counterparts can cast further light on the „why”-s of the process. The themes that have emerged from the qualitative analysis are to provide insight into the causal mechanisms that underfeed adequate risk management (See Section II- Qualitative analysis).

According to the themes that have emerged from the respondents' statements, risk management within the Nigerian power sector is dominated by interference on behalf of the state's vested interests (Theme 1), is characterised by limited knowledge and practice within the companies (Theme 2) and by a highly contextualised approach (Theme 3). At the same time, the need for innovation is acknowledged by managers and experts (Theme 4) and some measures asserting a more effective response to risk have already been undertaken by relevant organisational figures, which make for apparent proof of proactiveness (Theme 5).

All in all, risk management, as resulted from the survey responses and confirmed by the five themes, follows a continuum from powerlessness to proactiveness, which will be further exposed in the model introduced in Chapter 6.

Furthermore, the results reveal that a risk management implementation model needs to be developed to guide the implementation of risk management practice within the context of Nigerian power sector.

SECTION II: QUALITATIVE ANALYSIS

5.8 The Qualitative Component

Using thematic analysis, the transcripts of the interviews have been processed to look for underlying meaning. Prior to doing so, the following five steps were considered in the data analysis from the semi-structured interviews (Braun and Clarke, 2006).

- I. A total review and understanding the raw data from the interview excerpts from each respondent (Familiarization with data).
- II. The natural 'meaning Units' are extracted and clustered against each respondents feedback (Generating initial codes).
- III. Themes are identified and then assigned based on the meaning units (Searching for overarching themes).
- IV. Examining a link between the meaning units in relation to the research study under investigation (Review themes).
- V. Each of these identified themes are categorised and expressed in a descriptive statement (Producing the report).

Consequently, five themes regarding the experience of Nigerian project managers and consultants with risk management have emerged. These are: (1) concern regarding the interference of political factors, (2) a fragmented knowledge and practice, (3) an individualised approach to risk management, (4) the need for innovation and (5) signs of proactiveness.

In order to identify any patterns in relation to the data between the units and the themes, a thorough examination was carried out consistently with the raw data. Boyatzis (1998) and Tuckett (2005) have applied similar approaches listed among the five steps considered for the data analysis. All five of them will be detailed below. Nevertheless, not all information was important so concentration by the researcher was then considered on data that were of value in relation to the purpose of the research.

Following them, an example of each theme with tables and discussion of how they match the results will be presented in the next subsections.

5.8.1 Concern Regarding the Interference of Political Factors

Table 39: Example showing the evaluating and analysing the patterns between each themes and concepts

Questions: General Information regarding Risky situations faced by the organizations in the power sector		
Participant Response	Meaning unit & Initial coding	Themes
<p><i>Respondent # 10</i> identified risks such as <u>political and economic risks</u> that are faced by the organizations initiating projects in the power sector of Nigeria. He stated that involvement of government in the power sector is the major reason of <u>political risk</u> faced by the organizations in the power sector of Nigeria.</p> <p><i>Respondent #13</i> stated that some of the major risky problems faced by us include: <u>construction risks</u> faced with in the power sector of Nigeria, some of the security problems and <u>contractual risk</u> as there is a possibility that we are unable to deliver things on an accurate timing. <u>Political risk</u> is another issue.</p> <p><i>Respondent # 26</i> basically identified three kinds of major risk faced by the power sector. First one is the <u>political risk</u>. He said, due to <u>unstable political environment</u>, companies are not able to finish their projects on time. Another problem highlighted by him was <u>financial</u>. Due to lack of support from the government and financial institutions, power sector feels credit crunch. Final risk identified by him was timing risk. Due to poor financial health, companies are not able to complete their assignments on time.</p>	<p>Political inferences by the government</p> <p>Construction related issues leading to project delays and shortage of equipment</p> <p>Contractual risk due to invoice errors, low standards of orders</p> <p>Political risk from government as a monopoly</p> <p>Financial risk and low funding from the government leading to abandoned projects</p>	<p>Concerns regarding the inference of political factors</p> <p>Concerns regarding the inference of political factors</p>

The first theme identified throughout the respondents' answers referred to the underlying source of risk within projects in the Nigerian power sector, namely political factors (See Table 39). Although respondents talked about contractual, construction, financial, design, human resource and environmental risks, the underpinning of risk-induced situations faced by investors was deemed to refer to the political situation in Nigeria.

The theme was overarching of participants' responses, mentioned repeatedly throughout their speech and highly likely to occur whenever sources of risk were brought into discussion. Several respondents referred to how the general picture of Nigerian politics and the government's involvement in areas that do not further the durable development of the area, pose risks to projects in the power sector.

While they did not speak about the direct intervention of the state in the decisional mechanisms within the power sector, the respondents nevertheless tackled the negative influence that the instability of Nigerian politics has on the power sector. Under these conditions, many respondents stated that it is difficult to keep projects going within the power sector, since the unstable climate often causes interruptions. As one participant (Project Manager- PM) put it:

“Yes, we encounter all sorts of risk, risk is inevitable, especially in our country. Financial problems, clashes with the law system, technical difficulties, we have to anticipate them all. But we could handle all of these better if the state would support us. Or maybe we would not have to worry at all”.

A cornerstone factor of such discontinuities was represented, according to most respondents, by shortages in funding or interruptions within funding patterns. The project managers stated that they have met with considerable difficulties while trying to maintain the coherence of their projects since they felt they could not rely on governmental support. Many respondents mentioned the year 2008, when the lack of government funding caused significant damage to the efficiency of the operations and delays in bringing the projects to completion. For instance, one participant (Project Manager- PM) said that:

“It was very difficult to regain balance after 2008, which we could not anticipate. Then it was not a matter of protecting the bottom line anymore. It was about not going down [sic]”.

Some respondents attributed the lack of efficiency within the power sector and in particular within their organisations to the poor regulation performed by the Nigerian government, which can cause inconsistent practices. They referred to the reluctance on behalf of the government to generate a consistent regulatory framework and, for instance, provide a reliable contingency sum as this may create a foundation for inconvenient competition within the market.

This idea has been previously signalled in the literature, the inertia within the major economy branches in developing countries being often attributed to the vested interest of the state leaders, incompatible with the goal of long-term development (Dollar et al., 2005). One participant (Consultant- CS) pointed this out, mentioning that:

“Of course long-term development is not what they [the government] want. If they can get money from us, then we are a priority. If we want support from them to keep our projects going, then we aren't”.

All in all, the respondents illustrated how risk within their organisations often relates to factors of unreliability on behalf of the state, often correlated with an incompatible political agenda. The reduced transparency and commitment on behalf of the Nigerian state, as highlighted by a large number of respondents, appears to be one overarching factor of the sector's reduced efficiency.

5.8.2 Fragmented Knowledge and Practice

Table 40: Example showing the evaluating and analysing the patterns between each themes and concepts

Questions: Practical understanding of RM and Risk identification techniques		
Participant Response	Meaning unit & Initial coding	Themes
<p><i>Respondent # 9</i> also stated that “I am also <u>not aware of any risk management process</u> that is implemented in the organization and there is <u>no formal risk management practice</u> here although I believe we have the competency to act with our <u>experience based on the identified risk</u>” but I can tell you that there is <u>no particular risk management technique</u> we use to identify apart from <u>experience</u> as we embark on most projects as the <u>services we have are limited</u></p>	<p>Unawareness of the concept of RMP and practical identification techniques</p> <p>No formal RMP</p> <p>Limited resources leading to concept of experience only as a major source of technique</p>	<p>Fragmented Knowledge and practice</p>

From table 40 above, another theme identified from within the respondents' answers refers to the inconsistent practice in terms of risk management. Although risk management practice varied with the company on behalf of which the respondents were speaking, there were regularities across responses in terms of the coherence of practice, which pointed to the relative novelty and lack of consolidation of risk management as a formal process in Nigerian organisations.

A significant number of respondents were unaware of risk management as a concept and, moreover, stated that there are no risk management practices being carried out within their organisations. Others reported that they had heard about the concept, but would not be able to discuss it in an extensive manner. Some respondents were able to associate the idea of risk management to familiar

concepts, but not consistently and without tackling organisational implications. For instance, one respondent (Senior Engineer – SE) answered:

“The risk management process is based on assumptions and predictions related to the challenges that a person would face in the years to come”.

A significant number of respondents said that although they have a degree of knowledge about risk management, they are not aware of its application within their organisation.

This reinforces the idea of fragmented practice, as many respondents talked about how they were unsure, in spite of understanding how risk management needs to be applied, of whether the process would be compatible with the Nigerian climate. It can be argued that although there is some degree of declarative knowledge on behalf of managers, they find it difficult to implement it, given a traditional bias against such practices (Wright et al., 2005).

Some respondents, either stating that they were aware of the concept or denying any knowledge whatsoever, explained their lack of contact with the process by showing that the nature of the department where they operated did not allow for extensive familiarity. This indicates that risk management is perceived as a departmentalised process, in charge of certain figures within the organisation, and that there may sometimes not be a coherent, company-wide risk management strategy.

Such a compartmentalisation of the organisation is in particular captured by respondents who state that risk management is not only scarcely formalised, but also destined for the top management, who is in charge of making the most important decisions when it comes to preventing or dealing with risk. As one participant (Line Manager- LM) said:

“I am not very familiar with such practices, because I am a line manager and I take care of my part. Sometimes we have meetings and talk about how to plan our activity and yes, risk is mentioned. But I think ultimately it is our top manager that decides how it will be dealt with”.

Fragmented practice in terms of risk management is often attributed to a lack of funding. Many respondents state that shortage of financial resources makes it troublesome to consistently apply risk management throughout the organisation and, in particular, to ensure the training of personnel on this level. This is why risk

management is most often applied locally, if recognised as a formal process at all. Such patterns have previously been documented by scientific voices, which talk about how in developing economies, management processes are often symptomatic, instead of systematic and preventive (Austin, 2002).

One participant (Consultant- CS) referred to this and said that:

“It is difficult to give consultancy because many managers do not understand the purpose of trying to predict. They want to know right away 'okay, what to do next to have this solved'. But in my experience this does not go a long way”.

5.8.3 An Individualised Approach

Table 41: Example showing the evaluating and analysing the patterns between each themes and concepts

Questions: Risk assessment and cost effectiveness methods or procedures		
Participant Response	Meaning unit & Initial coding	Themes
<p><i>Respondent # 16...</i> “There are <u>no software tools</u> but the method used for assessing the risk is through <u>personal experiences and knowledge</u> as we are <u>bearing all the losses</u> on our own” ... Through these methods we are able to mitigate risk that is <u>political, contractual and environmental risk</u>. The method of assessing the risks depends on the budget <u>due to financial limitations</u> in order to initiate cost effectiveness”.</p>	No RM software tools but majorly individual experience and knowledge	An individualised approach
	Bearing loss	
	Political, contractual and environmental risk factors	
	assessments depends on financial constraint resulting to individual experience	
<p><i>Respondent # 36...</i> “<u>We do not rely on the RM software</u> as similar software can’t be implemented on different projects as all the projects have different characteristics” ... And so doing <u>we consider individual response for mitigating the ill effects of any kind of risk</u>. <u>Also the company relies on experience of its top level managers</u> as they are the best resources who can judge any kind of risk that may affect the performance of the project. We also make use of <u>checklist and brainstorming sessions</u> but this is merely done on the <u>basis of our experience</u> with past projects which sometimes could be cost effective <u>but no formal RM procedure</u>.</p>	No preference for software’s but majorly individual experience	An individualised approach
	Reliance on top level management individual experience as the best source	
	Checklist, brainstorming and merely on experience on past projects	
	No formal RM procedure	

From table 41, in close connection with the previous theme (Section 5.8.2), the preference for an individualised approach resulted in an overarching theme characterising the managers’ and consultants’ relationship with risk management. Many respondents appeared sceptical about using a generalised and uniform

approach to risk management, stating that within their organisation each situation is different and risk is addressed in line with its specifics.

The idea that risk management needs to be applied locally emerged as the basis of several interconnected factors that the respondents spoke about. The first one referred to the complexity of situations that the companies had to face on a regular basis. Many managers refuted the idea of using software, sceptical that it is possible for one singular solution to fit so many various and complex scenarios. Moreover, some of the participants also referred to consultants as outsiders that would not be accustomed to the company's situation to such a degree that they could propose adequate risk management-related courses of action.

In such a context, the optimal course of action in regards to risk management practices was considered to be one that is based on the insight of in-company experts.

The experience of employees appears to be an additional factor that justifies, according to most respondents, the preference for a local and individualised approach. The concept of experience was often mentioned within most responses when participants had to justify their organisational approach to risk management. One manager (Contracts Manager- CM) mentioned the fact that:

"We [his company] have been here for decades and we know what to expect. Of course, no two situations are the same, but our team of experts comes with the best solution every time."

Also consultants frequently spoke about their approach to each organisational situation. They are asked their input on a particular issue and that experience, as opposed to a pre-designed solution, provides the best insight into the context at hand. As for the in-company management of risk, many respondents were confident that extensive experience on behalf of local figures of reference made for adequate expertise in terms of risk management, although most often they were only able, be able to develop the exact procedures used as far as risk management is concerned to a small extent.

Most managers indicated decades of experience when asked about their background, which makes it likely, given the value of experience overarching this context, that it was them providing the individualised approach within their organisation. This interpretation would match findings by Wright (2005), who show that intensely patriarchal societies (such as Nigeria) are culturally biased towards

appreciating the experience of 'elders', who are considered more entitled to provide solutions to problems. Without delving into the disadvantages of such an approach, it can still be alleged that implicit assumptions of expertise that are not justified by a systematic outlook on risk can only be detrimental to organisational outcomes.

Another justification for an individualised approach was found to be cost reduction. The option for traditional tools and in-house procedures was often attributed to a cost minimisation potential. A tendency to target the reduction of short- and medium-term costs resulted from the responses of many participants, who stated that it is far more beneficial not to make use of external risk management support or to mobilise a great deal of financial resources for the sake of envisioning risky scenarios. Instead, a more economical and convenient strategy was found to progressively tackle risks as they were foreseen.

The approach is said to be typical of emerging economies, where the reduced financial resources make for a limited opportunity for extended prediction and hence for a vicious circle. Conversely, industries pertaining to better developed economies, are more likely possess the adequate infrastructure to develop consistent, long term strategies, including those on a risk management level (Austin, 2002). One participant (Senior Engineer- SE) mentioned that:

"When the country [Nigeria] becomes stronger, we will be able to plan better and stick with our plans too. But for now we have to work with what we have. Our company strives to find solutions as best as we can".

5.8.4 The Need for Innovation

Table 42: Example showing the evaluating and analysing the patterns between each themes and concepts

Questions: Action relating to risk response strategy regarding cost overruns, delays of project (time, cost and quality)		
Participant Response	Meaning unit & Initial coding	Themes
<p><i>Respondent # 21...</i> "there is only one thing that we can do is to <u>bear the cost and look for different positive options</u> so that risks can be identified and assessed properly" ... Apart from our <u>individual experience</u>, if we have a <u>technically skilled team responsible to handle this</u>, it could have saved us a whole lot but we face <u>challenges as a result of funding and work within the allocated budget</u> so some <u>risk are ignored and not responded to immediately</u>.</p>	<p>Bear the cost and look for positive options</p> <p>Individual experience</p> <p>Adhering for a technically skilled teams responsible</p> <p>Financial challenges leading to ignoring the aspects of dealing with potential risk factors</p>	<p>The need for Innovation</p>

While the participants talked about a preference for a more traditional and intuitive outlook on risk management within their organisations, most respondents also recognised the merits of advanced risk management strategies and some of them discussed how innovative practices would enhance the effectiveness of their projects.

The more widespread discourse among respondents, however, primarily addressed the material and moral risks associated with using outdated technology. Switching to a technologically sound infrastructure would therefore not only be a desirable benefit, but also imperative, given the safety risks posed by an obsolete infrastructure.

Nevertheless, the main problems related to upgrading existent technology were found to relate to the scarcity of financial resources and the inertia that results from it. The lack of resources on this level leads to poor efficiency, which limits the accumulation of financial gain and, in turn, limits the possibility for consistent innovation. Risk management was therefore found to operate on shaky

infrastructural premises, which makes it difficult for project managers to display a proactive attitude and gain strategic advantage.

This vicious circle was believed to affect more than the material scope of risk management. More subtle influences of obsolete practice were identified by respondents on a human resource level. Many interviewees spoke about the need to innovate risk management practices on a grassroots level and acknowledged the importance of including more consistent risk management resolutions on their companies' strategic agendas, convinced that updated practices on this level would bring them an incremental advantage.

However, they only generically addressed the benefits of such a course of action, stating, for instance, that "we feel it is indeed very important to have knowledge of risk assessment and management and that our company would benefit from our increased expertise". This openness towards – but lack of extensive knowledge about – risk management was an overarching characteristic of respondents' statements. Most of them stated that they are not aware of risk management training being performed within their organisation, but that they would be interested in expanding their knowledge on the topic by joining such training. At the same time, respondents expressed their scepticism that being informed about more updated risk management practices would fully serve them, as they realised that they would be somewhat incompatible with the current approach.

Finally, some respondents addressed the enclosed nature of the power management system as a whole, referring to how it is difficult for newer ideas to penetrate, on a risk management level as well, due to economic and political factors. One recurring idea was that it is not likely for young professionals, otherwise more receptive to implementing innovative ideas on a risk management level, to enter the field, due to political restrictions and unappealing remuneration. For instance, one participant (Senior Manager- SM) argued that:

"There are many talented young people in Nigeria, but they will never come where the difficulties are. They will choose to leave or manage otherwise, because this field is too hard to change and their aspirations are bigger."

5.8.5 Signs of Proactiveness

Table 43: Example showing the evaluating and analysing the patterns between each themes and concepts

Questions: Risk communication & consult regarding individual responsibility, importance of a formal RMP and its benefits risk management training within their respective organisations		
Participant Response	Meaning unit & Initial coding	Themes
<p><i>Respondent # 21</i> "...There is <u>no risk management training conducted</u> but a general meeting is conducted after every 3 months" ... The meeting provides <u>consultancy, planning teams</u> for different projects, <u>communicating with the teams and statutory bodies</u> are involved in the meeting to control risks identified. I also believe a <u>formal RMP would beneficial with trainings to bring more awareness and knowledge</u> and not just mainly due to our experience on certain project related issues, which of course projects do vary especially now that this private <u>power investors are coming into the system</u>, It will be very <u>beneficial</u> since we rely on <u>brainstorming and checklists</u> and have little training courses (HSE, managing projects) but <u>not precisely on RM</u>.</p>	<p>No RM training but general meetings</p> <p>Communication with teams and statutory bodies to discuss risk related issues</p> <p>Beneficial to IPP's and enhance knowledge</p> <p>Brainstorming and checklist</p>	<p>The signs of proactiveness</p>

Along with the expressed need for innovation, a recurring theme was that of actual steps towards performing consistent risk management processes. Some respondents came from company departments specialised in risk management and were able to detail the steps their companies took to prevent, assess and control risk.

For the identification of risk, many risk managers referred to strategies such as brainstorming or the checklist method, expressing their confidence that such approaches are successful for diagnosing organisational patterns that pointed to risky scenarios.

In regards to the evaluation of risk, some respondents stated that they used risk registers to measure risk levels and also templates and software tools that allowed for a systematic evaluation of relevant risk factors.

Other respondents referred to in-company strategies, devised for monitoring project progress, and to contingency methods to attenuate risk throughout the development of the project. Such respondents stressed the fact that making use of risk management methods brings incremental advantage to the company and is cost effective in the long-term.

Several respondents were either risk management consultants with significant experience and expertise, or managers who stated that their company turns to such experts in times of need. These interviewees talked about how hiring a consultant is an advantageous way to deal with risk and recognised the importance of a proactive organisational approach in the face of risk. In this context, hiring a consultant would not only ensure that the company is properly equipped with the right strategies, it would also be more cost effective than recruiting full time staff, as making use of timely measures may save the company significant resources.

Lastly, a few respondents had taken the risk management agenda to a new level, stating that they had taken part in courses and trainings and they were actively seeking to improve their knowledge of this dimension. These respondents happened to be the same ones that spoke most about the importance of innovation and who pointed to the flawed practices on this level within the Nigerian power sector. Moreover, there were some cases of respondents that stated they had performed surveys within their companies in order to assess the level of awareness as far as the concept of risk management is concerned.

5.9 Summary of findings

Corroborating the findings from the quantitative survey with those of the qualitative interviews, it can be noticed that these complement each other, generally pointing to a deficit in terms of risk management practice in the Nigerian power sector.

The quantitative results indicate reactive risk management practices, which are not in line with standard frameworks – as part of these, risk management is conceptualised as proactive, anticipatory and systematic. What is more, it is noticed from the quantitative results that many companies from among those that have been investigated do not have an assigned risk management team, which points to the fact that risk management is carried out informally and is ambiguously integrated into the general managerial practice.

This can only indicate that the ability to carry out risk assessment, planning, implementation and control is hindered. Without implying that risk management ought to be compartmentalised within an organisation, it can be argued, based on the results that indicate that there is a scarcity of risk management activities, that there is not much openness towards formalising a risk management approach and that many companies lack a coherent vision in this respect.

There is a bias on behalf of companies against risk review, monitoring and control, as a sign of the fact that, albeit standard risk management measures might be formulated and implemented at times, roughly the second part of the process, having to do with adhering to an established course of action, is the one where deficit occurs.

This is to indicate that there is little continuity in the risk management approach of Nigerian managers, likely due to the limited ability to estimate and anticipate a variety of risk factors acting interactively.

Also, it appears that few companies appeal to risk registers as a form of recording past risk experiences, which is to indicate a lack of continuity impeding on avoiding and mitigating future risk.

While quantitative results are mainly indicative of the „what“-s of risk management in the Nigerian power sector, their qualitative counterparts can cast further light on the „why“-s of the process.

The themes that have emerged from the qualitative analysis are to provide insight into the causal mechanisms that underfeed adequate risk management.

Based on participants' responses, it has been noticed that risk management in the Nigerian power sector is affected by the interference of external factors, mainly political (Theme 1). This fosters a climate of instability and diminishes the efficacy of risk management measures, as respondents often admitted to a kind of powerlessness whenever having to anticipate risk. Politicians' vested interest may endanger not only the durability of the projects, a risk itself, but also the effectiveness of the risk management process, by underfinancing it and hindering its implementation.

A second theme tackles the limited knowledge and practice of managers and experts. Their reduced ability to develop on the concrete steps that are taken inside their organisation, as well as the admitted deficit in knowledge regarding the topic of risk management has indicated that often, experts are under-equipped and lack consistent vision. This can help explain the pessimistic results of the quantitative responses as well.

Thirdly, because of the political context and limited resources, a third theme has indicated that the Nigerian power sector makes use of an individualised approach (Theme 3) to risk management, deeply embedded into the economic, social and cultural realities of the Nigerian business sector and characterised by its appeal to experiential and makeshift practice. For instance, respondents often referred to appealing strictly to the top managers' „experience” and rejecting the use of computerised measures or consultants.

Theme 4, however, nuanced the process and showed how many managers and experts do acknowledge the need for innovation. They also engage in the implementation of more valid risk management procedures (Theme 5).

All in all, risk management, as resulted from the survey responses and confirmed by the five themes, follows a continuum from powerlessness to proactiveness, which will be further exposed in the model introduced in Chapter 6.

CHAPTER 6: MODEL DEVELOPMENT

6.0 Introduction

The success of risk management practice depends to a great extent on the implementation strategy adopted by an organisation and the implementation strategy depends on the identified risk and its potential effect on the organisation and her project. Across literature, Cooper et al (2005) posits that it has been observed that there is a dearth in information regarding risk implementation models as all existing risk management models lays emphasis on the entire risk management process and not on specific phases due to the challenges various organisations encompasses within their project activities (See Table 5).

As an ultimate finding, the previous chapter has reunited the quantitative and qualitative data into a more comprehensive view of risk management, as applied in the Nigerian power sector.

There are nuances in the degree of preparedness of companies, as the qualitative interviews have also shown, and a gap between discourse and practice in the way risk management systems are conceived in this area. In order to unify the results of the raw statistical analysis, the most significant predictors of company performance (operationalised as a composite of revenue and project success) were used for forming two comprehensive variables. Considering their conceptualisation as either motivation or ability (Burke and Litwin, 1992), they were treated as two different dimensions of risk management success, which were labeled as „contemplation” and „implementation”, respectively. The former incorporates the degree of awareness regarding the importance of risk management practice, whereas the latter is an indicator of the company's degree of action in terms of translating intention into practice.

The statistical analysis showed that the „contemplation” variable managed to predict both implementation and company performance. What is more, risk management implementation was a significant predictor of company performance itself. Nevertheless, because it had been theorized (and confirmed by the qualitative results as well) that contemplation alone cannot help predict how well performing a company will be, it was verified whether the „implementation” variable, measured as

specific risk management processes translated into concrete practice, is the missing link.

During the data analysis stage of the research (from the correlations and sample test table), it was discovered that there was serious gap between risk management and risk implementation in Nigeria (from the results of the correlation of questions **b2** (52% agreed that risk management planning is always used in their organisation but this differs based on the company size for larger organisations against smaller organisations and **b3** (only 41% adhered that risk identification is the first phase of risk management. Then again from the correlation (See Table 33) it could be seen that the value was low when comparing the relationship between variables **b2 and b3** which turned out to be **0.205**). The same can be seen from the results between **b2 and b7, c3, d1 and e2**. The results turn out to be positive but have a very low value which means that the concept of risk management varies within company structure but most significantly within larger organisations but the fundamental risk implementation is not fully adopted).

As demonstrated in the previous chapter, the qualitative findings which have been obtained can cast light onto the specifics of the process, namely onto the factors that feed and entertain the stability of the framework. Outer forces, as well as organisational factors, were thus found to be responsible for the varying degrees of fragmented knowledge and implementation practices, as well as for the fragile success of projects in the power sector of Nigeria. Based on insights from the qualitative interviews, the following extended framework has been developed. Within future studies, these mechanisms can be verified through quantitative methods and the extended framework can be validated by more thorough analyses.

Therefore this section of research study will seek to propose a risk implementation framework for the Nigerian power sector. These variables would be used as part of the components that form part of the foundation of the quantitative framework.

6.1 Procedure for Model Development

According to Andrew (2009) and Shortreed (2003) a model is simply put a construct of the human mind aimed facilitating a thorough understanding of a real world system with the aim of solving problems. In other words, a model helps to simplify and break down process into simple stages. They further reveal that there are three common attributes associated with model development. These attributes are:

- i. Simplifying assumptions must be made
- ii. Initial conditions must be identified as well as model boundary conditions
- iii. Range of application of the proposed model should be understood.

As seen in the preceding chapter (See Figure 33 and Table 25) based on the survey results, a significant proportion of professionals in Nigeria recognise the importance of risk management practices and are somewhat acquainted with principles of risk management. At the same time, there are still many professionals that only appear to contribute to a scattered mobilisation of in-company assets and who have equivocal levels of expertise. This is to be further expressed in the degree of implementation, where it is clear that many managers are not systematically applying principles of risk management to an extensive degree, as descriptive results had also anticipated.

In accordance with the suggestions of Andrew (2009) and Shortreed (2003) for model development the following were considered for developing this model:

Table 44: Considerations for proposed framework

S/N	Item	Description
1	Model Assumptions	<ul style="list-style-type: none">• There is basic risk management knowledge in the organization• There are qualified individuals within the organization who can carry out risk implementation strategies• There is top management involvement in the implementation strategy
2	Initial Conditions	<ul style="list-style-type: none">• Lack of suitably qualified individuals within the organization with in depth knowledge of risk management (this is based on the results from the data

		<p>analysis from questions b3, c2, d1 and e2). This can also be supported with the results of the qualitative analysis; Theme 2- Fragmented knowledge and practice</p> <ul style="list-style-type: none"> • Lack of top management commitment to risk management (no designated risk management team task with proper planning and identification). This is also based on the results of the qualitative analysis; Theme 2- Fragmented knowledge and practice • Based on the challenges faced within the Nigerian power sector that have led to project failures (this is based on the qualitative analysis; Theme 1- concerning regards of risk factors such as political, financial, economic, design, human, technical, construction) • Poor decision making, cost effectiveness and Key performance indicator. This condition can be supported by theme 4- The need for innovation
3	Boundary Conditions	<ul style="list-style-type: none"> • Nigerian power sector (based on the survey results)
4	Range of application	<ul style="list-style-type: none"> • The proposed model has a wide range of applications and can be applied to all sectors where risk management is needed

6.1.1 Justification and assumptions for the proposed framework

The framework was developed based on some assumptions and these assumptions as outlined above in table 44 were necessary to provide guidance and give directions to the framework. The assumptions were also based to a large extent on the outcome of the data analysis process.

For the model to be effectively utilized, the first assumption was the basic knowledge of risk management within the organisation. Without basic risk management knowledge it becomes almost impossible for the proposed model to be successfully implemented within any organisation.

However the presence of basic management knowledge on its own is not sufficient to guarantee the success of the model and that paved the way for the second assumption; presence of qualified individuals within the organisation tasked with the development and implementation of risk response strategies.

The importance of the second assumption based on which the model was developed cannot be overemphasized. It is well alluded that people are an organisations greatest asset and this is especially true with respect to this second assumption. The presence of suitably qualified and skilled individuals guarantees to a large extent that the information gathering stage leads to the generation of ideas worth their weight in salt.

The involvement of top management is a very important part of any process as without the support of top management the proposed model would be unable to achieve any tangible result.

6.1.2 Initial Conditions Prior to the Development of the proposed framework

The absence of suitably skilled qualified risk management practitioners coupled by the absence of top management commitment formed the initial conditions present in some of the organisations under consideration in this research work leading to the development of the proposed model.

The proposed risk model also factors in issues relating to the main critical success factors highlighted such as financing, political risk which entails adopting the (Renn, 1999) model which advocates for stakeholder management and a risk finance team. It was important to identify these initial conditions as they helped in arriving at the assumptions for the model.

The question that easily comes to mind at this point is “What is the significance of these initial conditions to the development of the model?” This question is easily answered by taking even a cursory look at the model assumption as the initial conditions helped frame the assumptions upon which the model is based.

The first stage towards developing the proposed model was to elucidate the assumptions upon which the model is based. After this was successfully done it became important to highlight the steps necessary for the implementation process to be successful. Risk Insurance and Management society (RIMS) (2012) and (Hopkin, 2014) posit various strategic guides and approach towards implementing risk management and these include:

- i. A clear definition of the gains to be accrued by an organisation from implementing risk management
- ii. An understanding of different standards and frameworks currently in operation

- iii. A clear understanding of what is currently been practiced in the organisation(s) in question
- iv. Seek external help and support (if need be)
- v. Keep it simple
- vi. Start small
- vii. Go for quick solutions
- viii. Delegate “fixes” to risk owners
- ix. Continuous monitoring and progress reporting
- x. Development of “soft skills”

Table 45: Further considerations for proposed framework

S/N	Description	Recommendation for proposed model
1	A clear definition of the gains to be accrued by an organization from implementing risk management	<ul style="list-style-type: none"> The benefits from implementing the proposed risk management model have far reaching implications for organizations. Among other things some of the gains include: <ul style="list-style-type: none"> <i>Better understanding of risk management practice</i> <i>Increased profitability resulting from better handling of risks associated with the organizations business case</i> <i>Increased project success rate</i>
2	An understanding of different standards and frameworks currently in operation	<ul style="list-style-type: none"> Majority of the risk management models currently in existence/operation lays emphasis on the stages involved in the risk management procedure. They emphasize primarily on risk identification, risk analysis, risk control and risk reporting. However, in literature a model dedicated to risk implementing is unavailable. This could be due to the fact that the process of risk implementation is usually left to the discretion of the organization
3	A clear understanding of what is currently been practiced in the organization(s) in question	<ul style="list-style-type: none"> Fifty nine percent (59%) of the respondents who participated in the survey reveal the absence of a dedicated team task tasked with risk implementation. However, for ethical considerations the names of the organizations cannot be revealed. Based on the data collected a conclusion can be drawn regarding the current state of risk management in the Nigerian power sector
4	Seek external help and support (if need be)	<ul style="list-style-type: none"> External help (in the form of the respondents) was

		sought during the data collection stage and it based on the information collected that the decision to propose a risk management implementation model was reached as this was discovered to be a major drawback in the success of the risk management program of the organizations in question.
5	Keep it simple	<ul style="list-style-type: none"> This was taken into consideration while developing the model as a complicated process may lead to the failure of the proposed model.
6	Start small	<ul style="list-style-type: none"> This step is NOT APPLICABLE to the proposed model
7	Go for quick solutions	<ul style="list-style-type: none"> This step is NOT APPLICABLE to the proposed model
8	Delegate “fixes” to risk owners	<ul style="list-style-type: none"> One of the main indications of success for any program is “ownership’ mentality. One of the main highlights of this model is the delegation of responsibilities so that it is easy to track the success of the model by knowing who was responsible within the organization for the various stages of the model
9	Continuous monitoring and progress reporting	<ul style="list-style-type: none"> Continuous monitoring was ensured through the various feedback loops within the model. One of the main functions of continuous monitoring through the feedback loop was to ensure continuous improvement of the model
10	Development of “soft skills”	<ul style="list-style-type: none"> This process ensures that top management and the individuals within the organization share the same vision and passion towards the success of the proposed model

Supplementing the views of RIMS (2012) and Hopkin (2014) from table 45, Shortreed (2003) also reveals three basic considerations towards implementing a framework which are;

- I. Organisation culture inherent to adverse risk
- II. Stakeholder’s awareness to risk factors within the organisation
- III. Available resources within the organisation

Table 46: Supplementary considerations for proposed model

S/N	Description	Recommendation for proposed model
1	Organisation culture inherent to adverse risk	<ul style="list-style-type: none"> This was taken into consideration as the culture of risk management from a broader perspective based on the analysis has not been fully implemented within some originations. Thus, the aspect of culture within an organisation acts are a prerequisite for critical success factors which include; <ul style="list-style-type: none"> ➤ <i>Defining the key objectives</i> ➤ <i>Ensuring management support</i> ➤ <i>Improve information technology and communication</i> ➤ <i>Developing detailed project planning</i> ➤ <i>A well-defined control mechanism</i>
2	Stakeholder's awareness to risk factors within the organisation	<ul style="list-style-type: none"> Considering both internal (within the organisation such as design, financial, contractual, technical, Human resource) and external (outside the organisation such as political, economic, environmental) factors should be clearly defined as organisations are prone to risk issues and it is imperative that these risk factors are identified and considered. Thus, it is easier to identify the internal risk factors but proper consideration should be given to both in order to achieve a successful project completion. As it was seen from the analysis that full risk identification within an organisation differs from company size. Making the process more efficient
3	Available resources within the organisation	<ul style="list-style-type: none"> Contingency plans, risk registers, risk control measures, designated risk management team, agency objectives, policies, standards, assurance plans, guidelines, trainings/ workshop. This was considered as it can be seen from the analysis (Theme 3- individualized approach) that these attributes are not commonly implemented within some organisations (which is left based on intuitive judgement and experiences only which to a default has its own limitations)

6.2 Risk Implementation Model

As previously discussed in the methodology section, two frameworks would be developed based on results of the analysis from both the quantitative and qualitative analysis and later on both model components will be merged into one final output of the proposed framework. Each of these results from both the quantitative and qualitative supplements each other from a pragmatic perspective. This is because when considering the value of the study, beyond the pursuit of a strictly theoretical understanding of risk management in the Nigerian power sector, and for bettering subsequent practices a new risk implementation framework would aid as a significant prerequisite for the success of projects.

6.2.1 Proposed risk implementation framework from quantitative results

Across literature, various existing models (See Sections 2.8 and 2.9) have been distinguished showing their advantages and disadvantages. However, this provided a foundation for the basis of part of the new proposed Framework to be developed as the conceptual framework grassroots based on the inadequacy of these existing models. Thus, it seems appropriate to propose another risk management model that would use the features and sequences while trying to avoid repeating their weaknesses.

The framework in figure 61 entails various components of risk management process and organisations strategy based on the results from the quantitative analysis and the following components were used to develop the framework into various stages. The quantitative components have been identified earlier in the introductory section (See Section 6.0).

The latter has been a result of merging quantitative and qualitative results into one coherent explanatory framework that is expected to bring added value to the understanding of the field. Had the two been treated separately, the derivation of causal mechanisms and of a higher-order framework would have been less comprehensive (Teddlie and Tashakkori, 2009).

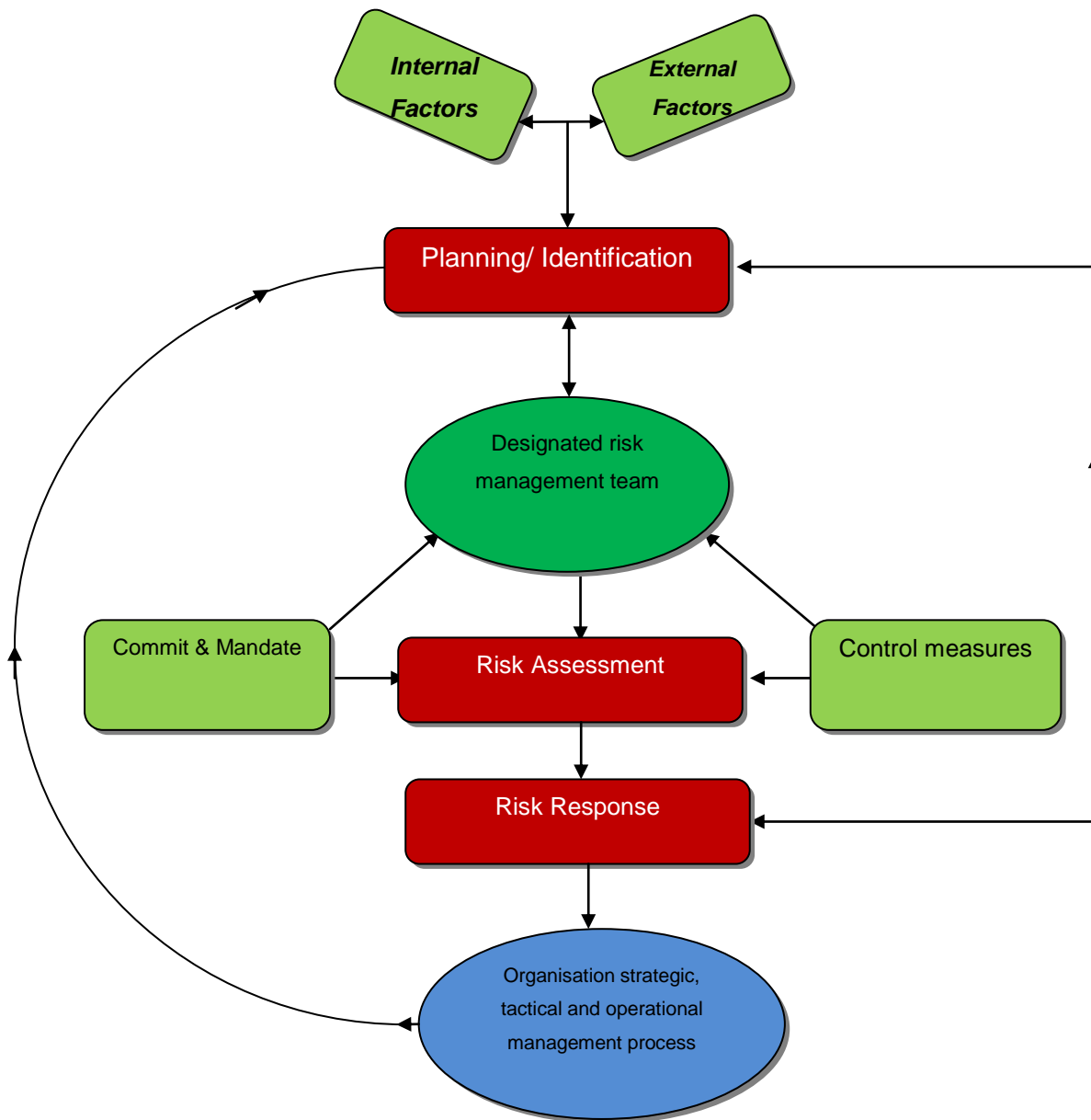


Figure 61: Quantitative risk implementation Framework

6.2.2 Explanation of the proposed risk implementation framework from quantitative results

The Planning and identification of risk is always the first phase of risk management and is influenced by the internal and external factors. As earlier mentioned during the consideration of proposed model which are peculiar within an organisation that include as design, financial, contractual, technical, Human resource) and external (outside the organisation such as political, economic, environmental) factors should

be clearly defined as organisations are prone to risk issues and it is imperative that these risk factors are identified and considered.

After the risk planning and identification, a designated risk management team should be tasked with carrying out constructive inputs, control measures and commit and mandate (policy statements, appropriate standards, Assurance plans, and guidelines) so as to find alternatives to mitigate these risk factors. This will aid in identifying areas of potential problems within design specification, construction risks, technical inferences and organisation performance. The reason for the control measures in the model is aimed at ensuring organization management and risk owners can effectively review decision taking on risk response strategy in order to ascertain if the decisions have fully mitigated or solved the highlighted risks and if there is need for review of decision based on the current information at hand.

The designated risk management team carries out risk assessment (to prioritize those potential risk factors that may have a high degree of risk that may hinder the success of projects) to determine uncertainty associated with the event and to evaluate the probability related to occurrence. It is essential to perform risk assessment in all the phases of the project life cycle. When any project starts, a high degree of risk is associated with it, but gradually, as the project progresses, the degree of risk keeps on declining. Integrating the risk response strategy into organization strategic objectives enhances decision making and enables the organization to align its strategic objectives for a project to risk response strategy

The next phase of the model hinges on the developing an effective risk response strategy that will enable the organization to take strategic decision on how well to mitigate and transfer all risks associated with a project. The aim of risks response strategy is also enhanced decision making also aimed at incorporating organization management decision into risk planning. The risk response plan also entails understanding the effect of internal and external factors on risk planning in order for effective decision making. This includes inculcating project objectives into risk planning and knowing the impact of the risk on the project enabling effective decision analysis.

The last phase of the model includes strategic process for establishing aims and objects, comparing planned actions against performed actions, continuous monitoring and control, operational decisions at strategic levels, implementing

tactical prerequisites not only to improve decision making but moreover act as key performance indicators within projects and organisation.

6.2.3 Procedure for implementation

1. Carry out proper planning and identification to determine the level of risk that may affect the project
2. Select a designated risk management teams tasked with individual responsibilities
3. Adhere to policy standards, design specification and assurance plans
4. carry out risk assessment and risk response
5. Document observations and lessons learnt during monitoring and control phase

6.2.4 Proposed risk implementation framework from qualitative results

The independent variables (components) for the proposed model have been earlier identified and the model in figure 62 portrays the result of the qualitative analysis and it will later be merged within the quantitative results. Thus, this model seeks to supplement the quantitative model as discussed in the methodology section to form one conciliatory framework.

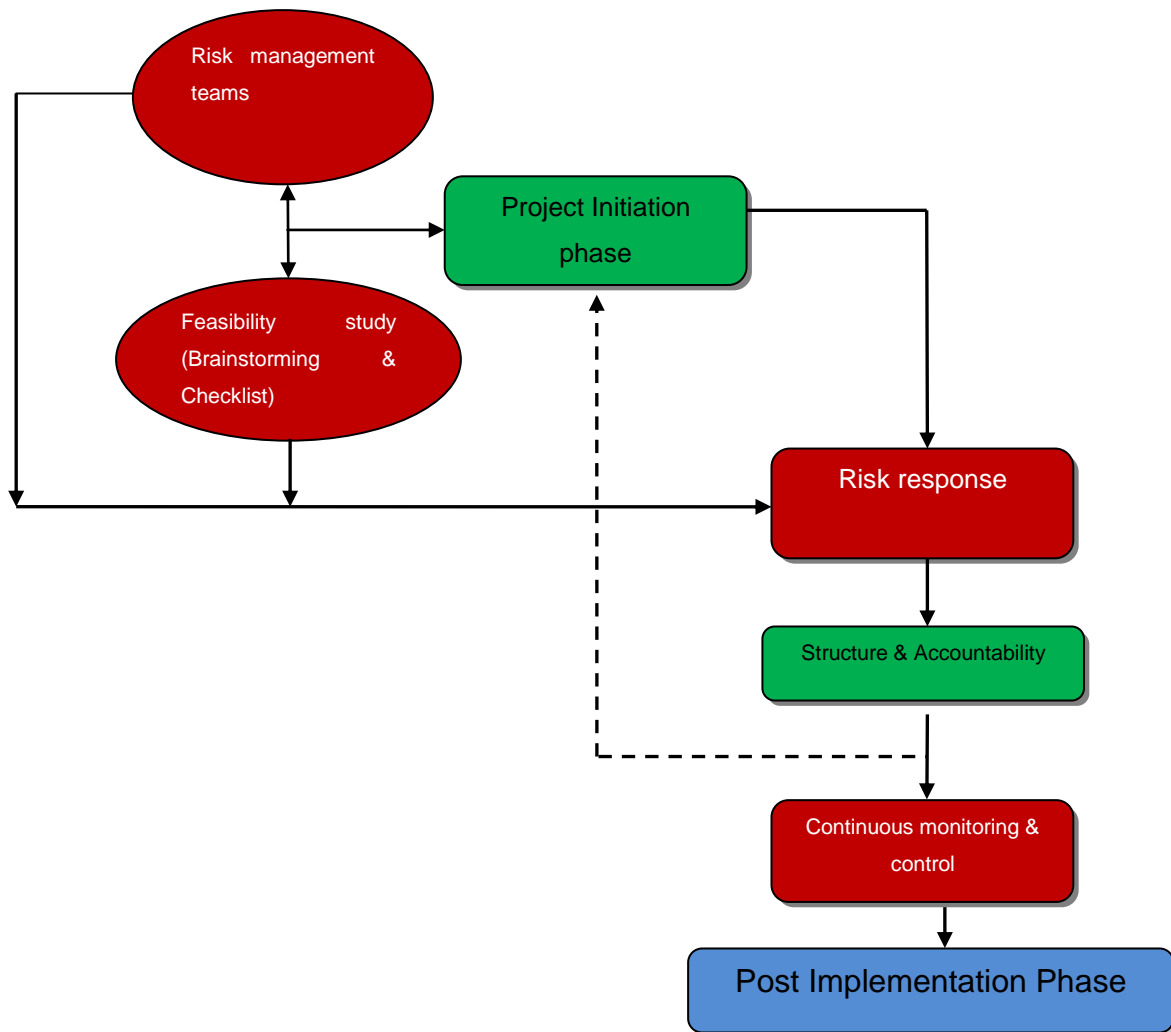


Figure 62: Qualitative risk implementation Framework

6.2.5 Explanation of the proposed risk implementation framework from quantitative results

The model above in figure 62 shows basic steps interconnected with the risk management process. The risk management team tasked with their respective responsibilities carry out a feasibility study during the project initiation phase (project aims and objectives, constraints), with the aim of defining the scope and preparing alternative solutions to unforeseen circumstances before the project execution phase commences.

The initiation process entails defining the problems or opportunities and associated risk, identify potential stakeholders, assign responsibilities and resources.

Feasibility study of the project is carried out on the basis of the project proposal and it is essential to implement the concept of risk management at every phase. Thus, this stage is characterised by number of options and it is important to identify and evaluate various options, define the scope of the project, identify risk hazards using risk scenarios so that risks associated with all the alternatives can be identified with their proposed solutions.

From the data collected, it was observed that some organisations carry out risk response as reactive measures (Theme 2- fragmented knowledge and practices and Theme 3- An individual approach- See Sections 5.8.2 and 5.8.3) rather than a proactive measures and this information played a crucial role in the model development. After developing the risk response strategy the next stage is to plan the risk response. This stage is a very critical phase and suitably colour coded. Recall that across literature there are five basic types of risk response (accept, avoid, mitigate, share, transfer) and the choice of the risk response to adopt is agreed on at this stage. The process of planning how to respond to a risk is one of the most difficult tasks to accomplish during the risk management process as the effectiveness of the response choice plays a part in determining if the risk exposure increases or decreases during the project.

The next phase introduced is the structure and accountability which the top managements (Board of directors) ensure that risk owners have adequate accountability and authority to manage risk, oversee risk implementation of within the department.

The monitoring and control phase in the model is aimed at ensuring organization management and risk owners can effectively review decision taking on risk response strategy in order to ascertain if the decisions have fully mitigated or solved the highlighted risks and if there is need for review of decision based on the current information at hand. This stage also aids in effective risk review and informed decision making.

After developing the risk response plan, the next phase of the model is to implement the chosen plan and this is very important to the success of the implementation strategy and top management support and participation is crucial at this point.

The final stage in this model is the review phase. It is at this stage that the lessons learnt during the implementation stage and the monitoring & control phase

are reviewed and documented for future purposes and also serves as a feedback loop to help in the risk response planning stage for future similar risks. This stage also involves a review of past risk handling and assessment in previous projects to ascertain the level of improvement within the organization risk management system and maintain an effective risk register. After developing the risk response plan, the next phase of the model is to implement the chosen plan and this is very important to the success of the implementation strategy and top management support and participation is crucial at this point.

After the risk implementation strategy has been implemented, monitoring and control is very essential as this ensures that the developed strategy is being correctly implemented. This phase is important as it also helps the organisation develop an understanding on better risk mitigation strategies.

6.2.6 Procedure for implementation

1. Select a risk management team
2. Undertake feasibility studies and preliminary analysis (using risk matrix to establish priorities) for project specification (research the and identify project aims and objectives, identify any alternative solutions)
3. Establish the project context during initiation phase (List key roles and responsibilities, define the scope of the project, list the critical success factors)
4. Adhere to the risk response planning phase
5. Set up the project office (structure and accountability) which include risk and control owners, project risk management committee
6. Document observations and lessons learnt during monitoring and control phase before implementation (comparison planned actions vs performed actions)

6.2.7 Integrating both models (quantitative and qualitative framework)

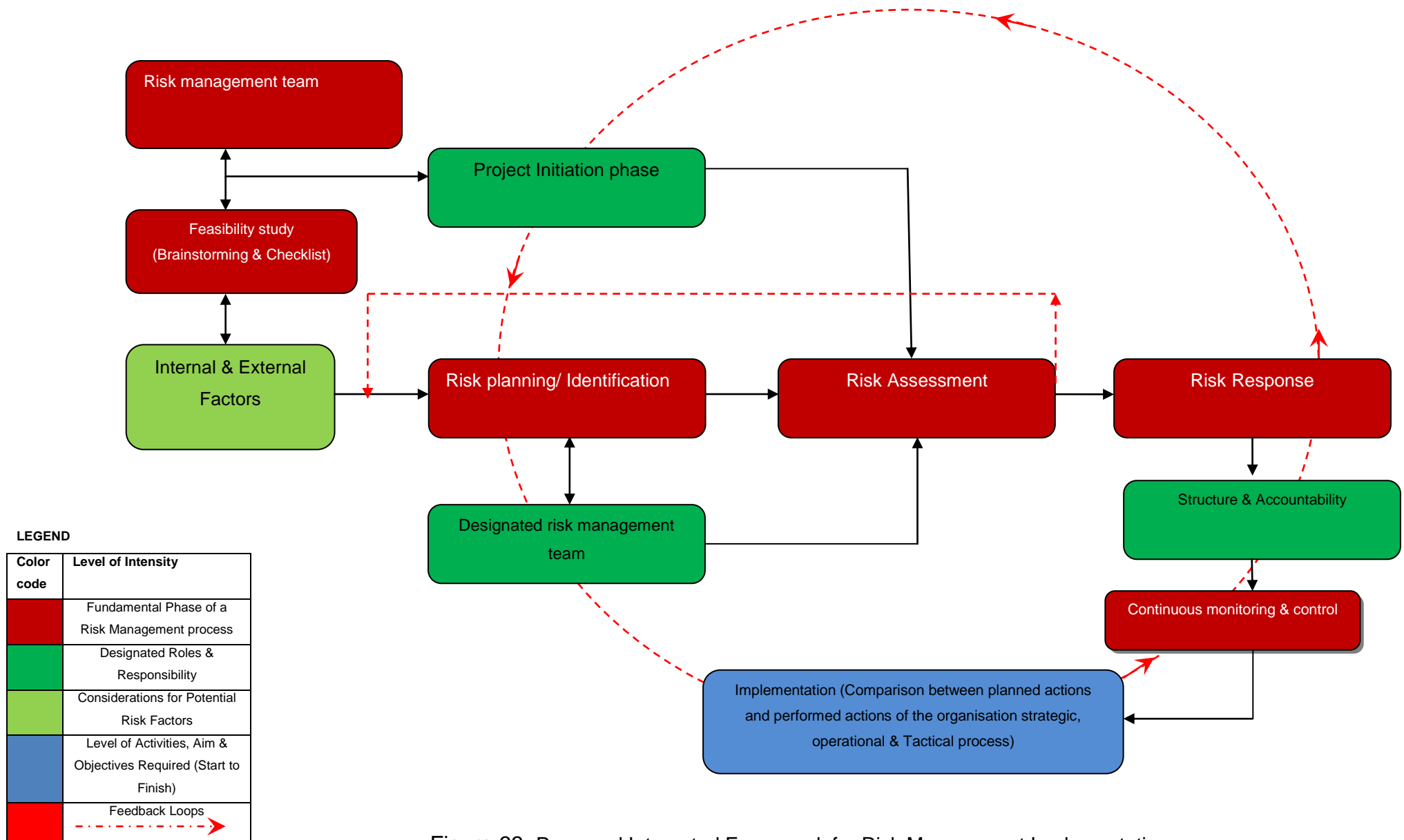


Figure 63: Proposed Integrated Framework for Risk Management Implementation

6.3 Practical Application and Explanation of the Proposed Framework on a Project

Given the above-mentioned framework, there are several implications that can be suggested for each step of the risk management process, in order to transpose theory into practice and facilitate the transitioning to a culturally aware risk management practice in the Nigerian power sector, the framework and steps will be tested on the project below to see the proposed outcome of the project performance with the implementation of the risk management framework with the aim of having a deeper understanding during the entire project phase from estimate to execution phase.

Table 47: Project Overview

OLORUNSOGO II 754 MW Combined cycle power plant		Location: Olorunsogo in Ogun State	
		Project status:	Commissioned 2015
		Service providers:	Engineering design & supervision Project Management
Project Description		The contract for the 754 MW Combined Cycle Power Plant, which is an extension of the 335 MW Power Plant was signed on 16th April 2007, with Messrs SEPCO III Electric Power Construction Corporation of China and with Messrs Oskaro & Partners Ltd/Scott Wilson Plc. (now URS Corporation) to supervise the project.	
Project Aim		At the inception of the present democratic dispensation in Nigeria (in 1999), the Federal Government of Nigeria resolved to improve on her infrastructural provision nationwide. This needed improvement in domestic and industrial electricity to the people of Nigeria. It also necessitated the rehabilitation of the various Power Generating Stations for the Power Holding Company of Nigeria, PHCN (formerly National Electric Power Authority, NEPA).	
Project Scope		The design, procurement, supply and construction of four GEFrame 9 (PG 1971E) heavy duty mono axial Gas Turbines each rated 125 MW. These Gas Turbines were to be operated in the Combined Cycle mode by the addition of a Heat Recovery Steam Generators (HRSG) at the exhaust of each Gas Turbine. Steam generated by these HRSGs will be led to two Steam Turbines (2 HRSGs to 1 Steam Turbine) each rated 125 MW.	

The nature of all projects differs from one another making it practically impossible to implement a similar kind of framework in all the projects because risk is inherent as various project differs from one another. However, the proposed framework above is simplistic which can be applied within the Nigerian power sector (based on the results of the analysis) to improve organisation project performances. Every project, regardless of the sector in which it is operating has a start and finish time. Although, the main stages of a project life cycle remains the same for all the projects operating in various sector of the business, its scope and terminologies related to the various phases of the project may vary from project to project and industry to industry.

The first stage of the model starts with a pre project planning which is why, as a result of this a feasibility study (Brainstorming & checklists) is carried by the risk management team at the initiation phase which both internal and external factors are put into consideration so as to timely identify all the kinds of risks that may hamper the performance of the project so that timely measures can be implemented. Adopting the process will also provide more options of risk breakdown structure, benchmarking, stakeholder analysis and workshops. However, attention ought to be paid to the less visible factors such as, as seen from the qualitative analysis, the political climate.

The next phase is the planning and identification which is usually the first stage of risk management. It is a non-stop process which includes developing a broad and organized approach related to managing risk through a concise master plan characterized by coordination and specificity. It was observed from the analysis that not all companies carry out proper risk planning and identification (question c 3, from the survey 59% revealed the absence of this significant phase- See Figure 42 and Table 29) so this phase stems to act as an essential phase for companies within the Nigerian power sector to implement as an integral phase. This process must have proper coordination among all project related activities, proper integration between planning of all levels, a link between preceding and succeeding activities, defining objectives, key aspects and boundaries of the project, identify the system, subsystem and components required, identifying the failure modes and their impacts on past projects, identifying the causes behind the failure (providing information

against present and future similar/likewise inferences), identify the risk associated with the current project.

However, from the results of the survey (semi-structured interviews) the following risk in table 48 below (See Appendix A), have been identified which are peculiar to the current project which have been classified into various categories and the results these identified risk will be assessed (risk analysis/evaluation) in the next phase of the framework.

Table 48: Identified risk factors

Financial Risk	HR Risk	Contractual Risk	Construction Risk	Design Risk	Environmental Risk	Political Risk
1.Budget 2.Inflation 3.Uneven cash flows 4.Default payment of contractors 5.Scarcity of funds 6.Price fluctuations 7.Disruption of business partners	1.Unavailability of manpower 2.Ineffectiveness of workers 3.Poor or no labour policies 4.Incompetent workers 5.Absentees of workers 6.Seasonal work load	1.Stringent terms and conditions 2.Errors in invoice 3.Downgrade standards of supplier and contractors 4.Delay in orders	1.Shortage of resources 2.Interruption in projects 3.Outdated technology 4.Calamities and accidents 5.Poor communication 6.Poor quality control	1.Poor designing 2.Frequent changes in design 3.Approvals 4.Poor coordination between contractor and designer	1.Pollution 2.Bad weather 3.Poor waste management	1.Unstable political scenario 2.Currency fluctuation 3.Taxation 4.Regulatory changes 5.Corruption

The next phase is the risk assessment phase. Again it was observed from the analysis that not all companies perform adequate risk assessment/analysis within their projects (question d1, from the survey 59% revealed the absence of this significant phase- See Figure 46). However, just identifying the issues will not necessarily help in achieving the project specifications. In other words, it is essential for them to prioritize (in an order of preferences ranging from high to low) all the identified risk for proper actions to be taken on them as all risk vary from both probability and impact (high risk and low risk) on a particular projects. Analyzing the challenges through different approaches enables the risk management team in

deciding which particular risk requires immediate actions (risk response) and which issues can be held for time. Various kinds of risks are coupled with a project, but the intensity or negative or positive impacts of all the factors are not similar. Therefore, it becomes very important to arrange the risks in the order of issues (priority) required immediate attention or on the basis of their repercussion on the project using various risk assessment methods (risk probability and impact matrix, risk rating matrix, risk categorizing). Thus, it is one of the most important stages of the risk management proposed framework which ought to be implemented within companies specific to the Nigerian power sector that do not perform this phase within their projects.

Based on the risk factors identified above, a questionnaire (See Appendix A for results) was designed and administered to 7 different respondents who were directly involved in the project to rate (individually) the level of risk probability and impact that may influence the project performance (in terms of cost, time and quality). The criteria for selecting these 7 respondents were based on the roles and responsibilities of the project and the categories of risk identified. These respondents are project manager, financial manager, human resource manager, contract manager, civil engineering manager, site manager and consultants. Due to the fragmented knowledge and practice (See Section 5.8.2), the Qualitative assessment approach is best suited and has been adopted for the research as Lyons and Skitmore (2004) argued that it is one of the simplest methods for analysing risk since it includes probability and impact assessment as compared to the complexity of using quantitative approach.

According to the Project management institute (PMI) (2004), the concept of risk management is among the nine (9) knowledge areas of project management and authorization. Thus, a positive relationship tends to exist between managing risk and a achieving a project success.

6.3.1 Measures Used for Rating the Risk Parameters

Furthermore, based on PMI (2004), here is the measure used for rating the risks on both parameters which was combined with direct observations by the researcher in table 49, 50 and 51:

Table 49: Risk Rating

OLORUNSOGO II 754 MW Combined cycle power plant		Project performance (PLC) risk rating			
		Risk probability		Risk Impact	
		Number	Percentage	Number	Percentage
	Very low	10	0.10	10	0.10
	Low	20	0.20	20	0.20
	Moderate	30	0.30	30	0.30
	High	40	0.40	40	0.40
	Very High	50	0.50	50	0.50

Table 50: Risk Matrix

Probability		Risk Matrix				
		0.10	0.20	0.30	0.40	0.50
Impact	0.50	0.05	0.10	0.15	0.20	0.25
	0.40	0.04	0.08	0.12	0.16	0.20
	0.30	0.03	0.06	0.09	0.12	0.15
	0.20	0.02	0.04	0.06	0.08	0.10
	0.10	0.01	0.02	0.03	0.04	0.05

Risk matrix is created on the basis of the probability of the risk and its impact. It is easy to deduce the actions to take against the valuated risk. A range of scale is specified between 0 and 1 and then values are calculated by multiplying risk probability with risk impact. Colours codes have been denoted on the basis of the level of risk impact that may impede a project success.

Table 51: Risk Matrix Colour code

Color code	Level of impact
	Severe
	Moderate
	Minor

6.3.1.1 Financial Risk

Table 52: Probability and Impact of Financial Risk

Financial Risks (Finance Manager)	Risk Probability	Risk Impact
Lack of budgets	20	50
Inflationary conditions	20	30
Cash Flow issues	20	20
Default of contractors or suppliers	10	30
Unavailability of funds for payments	20	20
Price changes on materials and equipments	30	40
Disruption of business partners	20	40



Figure 64: Probability and Impact of Financial Risks

From the graph above in figure 64 based on the results of table 52, it can be seen that the risk of lack of budget possess a high impact of the project performance. Although, its probability of occurrence is low, still, if such kind of risk arises once or twice in any project, there is a high tendency that it may have negative consequences for the companies and its projects related activities. Another risk factor which is significant and should be noted is the risk of price fluctuations.

The graph shows that the probability of occurrence of this is moderate to high while its impact are high, which means that, if the projects management teams do not deal with this risk properly, it may either result in project delay or poor quality.

This statement is consistent with the views of Smith et al (2006) who suggested that the nature of risk fluctuates as projects progress relating to a number of issues but effective control measures should be implemented to mitigate such risk factors.

6.3.1.2 Human Resource Risk

Table 53: Probability and Impact of HR Risk

HR Risk (Human Resource Manager)	Risk Probability	Risk Impact
Construction Workers not available	20	30
Poor quality and productivity of the workers	30	40
Unavailability of Labour policies and manual workings	20	20
Incompetency of workers	10	30
Health issues and absentees of workers	20	30
Seasonal work load	10	30



Figure 65: Probability and Impact of HR Risk

Presenting the results of table 53 based on the questionnaire survey (See Appendix A), from the graph above in figure 65 it can be depicted that poor quality and productivity has the highest impeding factor on the project.

The probability of occurrence of such risk is quite moderate, and in addition, its negative impacts on the project performance are high. The researcher observed that due to unavailability of competent work force, companies are not able to optimally utilize its resources. Further, both firms are not able to meet the standard efficiency level because of incompetent workers.

6.3.1.3 Contractual Risk

Table 54: Probability and Impact of Contractual Risk

Contractual Risk (Contract Manager)	Risk Probability	Risk Impact
Direct Liability in contract	20	40
Strict terms and conditions of contracts	30	40
Invoice errors	20	30
Low standards of suppliers and contractors	10	20
Delay in orders	30	40
Low standards of orders	20	50



Figure 66: Probability and Impact of Contractual Risk

From the graph above in figure 66 based on the results of table 54, low standard of orders is the most significant. Since companies do not have sufficient funds which leads to the problem of incompetent labour force. In such circumstances, firms are not able to deliver standard output. It impacts the brand image of the companies.

Another risk that the companies must be cautious of is strict terms and conditions of contracts. At the time of entering into the contract, companies have to sign certain legal documents, which include information regarding project completion time, quality of output, etc. Companies have to meet all the requirements, failure to which results in tremendous loss, considering both internal and external factors.

6.3.1.4 Construction Risk

Table 55: Probability and Impact of Construction Risk

Construction Risk (Civil Engineer)	Risk Probability	Risk Impact
Delay in project	30	50
Shortage of equipments, machines, fuels and etc.	30	40
Low quality supply of material	20	40
Low quality subcontractors and contractors	20	40
Not able to construct new technology or use new methods	20	30
Accidents, calamities and etc.	20	30
Poor ground conditions	30	30
Poor communication among staffs	20	20
Lack of communication between construction workers	20	20
Theft	10	20
Damage of material, equipment during transportation	20	20
Damage during construction	20	30
Low quality control	10	30



Figure 67: Probability and Impact of Construction Risk

Another risk identified by the researcher through direct observation was construction risk. From table 55 and the graph in figure 67, low quality of contractors and sub-contractors is a major concern for concerns for the companies and project performances in terms of cost, quality and time.

The reason behind this is, again can also be partially supported by Ogunlana et al (1996) in the research into construction delays in fast-growing economy, who stated that, unavailability of labours and competent contractors and thus can lead the fragile success of project and project delay. Another risk on which the companies must concentrate is the risk of low quality raw materials.

During the research, the researcher identified that at the time of entering into the contract, companies agree to use quality raw materials, but due to financial limitations and frequent price fluctuations they have to switch to lower grade raw materials. This radically affects the quality of the final outcome.

6.3.1.5 Design Risk

Table 56: Probability and Impact of Design Risk

Design Risk (Consultant)	Risk Probability	Risk Impact
Incomplete design and specification	20	40
Incorrect design	10	30
Change in designs	20	40
Lack of interaction between design and construction	20	40
Late confirmation & approval on design	20	30



Figure 68: Probability and Impact of Design Risk

Based on the survey results of table 56, what can be observed is that proper designing of plant lay out is very important for such firms as improper designs result in duplication of work and delays the completion of the project. From the graph in figure 68, frequent changes in design and delay in approvals are the most severe risks on which the companies must work on accordingly.

Such kinds of risks are faced by the companies at the time of project initiation, and it is essential for them to rectify it timely by setting the designs correctly to avoid such kinds of risk on the project performances.

This statement can also be supported by Zou et al (2007) in the research into understanding the risks in construction projects in China, who argued that frequent changes and project schedule are one of the greatest impacts of project objectives.

6.3.1.6 Design Risk

Table 57: Probability and Impact of Environmental Risk

Environmental Risk (Site Manager)	Risk Probability	Risk Impact
Pollution	20	20
Poor Waste management	30	20
Bad Weather	30	30



Figure 69: Probability and Impact of Environmental Risk

The researcher also identified some of the environmental risks that these companies faced from time to time, such as poor waste management, pollution, bad weather, etc. From the graph above in Figure 69 ranging from the survey results in table 57, what can be noticed is that the issues resulting to bad weather tends to be one major factor that may pose a project performance (workers on site, drastic project delays) as a result of unforeseen circumstances (uncertainty).

The researcher also identified that if companies abide themselves with the environmental laws and develop apposite waste management system, they can considerably mitigate the environmental risk.

6.3.1.7 Design Risk

Table 58: Probability and Impact of Political Risk

Political Risk (Project Manager)	Risk Probability	Risk Impact
Unstable political scenario	40	50
Currency fluctuation	30	30
Taxation	30	30
Regulatory changes	40	40
Corruption	30	40



Figure 70: Probability and Impact of Political Risk

In combination with direct observation, the survey results from table 58 as depicted in the graph in figure 70 while investigating the operations of both companies, the researcher found that due to political instability, companies are not able to formulate adequate policies, which on the other hand possess severe consequences on the performance and operation of projects. Government does not provide substantial financial or non-financial aid to companies operating in this sector which stems in the regulatory changes. In such scenario, companies find it very difficult to operate smoothly.

The risk of corruption has increased the operating cost of the companies and has resulted in decrease in their profit margins. In addition to this, because of corruption, companies do not get approvals in time which delays the entire project.

Thus, political risk is one of the most precarious risks for such companies. This further justifies the results in qualitative section (the theme-1 concern regarding the interference of political factors –See Section 5.8.1).

In order to quantify these already identified risk factors on its impacts it may have on the project, a risk load quantitative assessment (quantitative technique) method under the risk break down structure (RBS) and work breakdown structure (WBS) has been applied to provide more realism in the project estimation of the overall project performance rather than relying strictly on probability and impact risk rating (qualitative techniques).

Table 59 below shows a representation of different categories of the risks which are presented in RBS and WBS and they are categorized into further 3 phases of the project. These three different phases are the beginning (phase 1-Initiation), operational (phase 2- Execution) and ending phase (phase 3- Closeout) of the project.



For calculating the total risk in each different dimension from table 59, the codes are assigned to each and every risk which is linked with the project based on the results of the survey. “P” indicates the probability of the risk and “I” indicates the impact of risk on the projects.

1) The total risks at Financial Division:

The total risk at financial division is calculated by multiplying all the probability of each financial risk with their impact and it is determined by considering time, cost and quality of the project. Further all the seven identified financial risks are summed up to calculate total risk at financial division.

$$\begin{aligned}\sum_{i=1}^7 Ei (P, I) &= P_1.I_1+P_2.I_2+P_3.I_3+P_4.I_4+P_5.I_5+P_6.I_6+P_7.I_7 \\ &= 0.10 + 0.06 + 0.04 + 0.03 + 0.04 + 0.12 + 0.08 \\ &= 0.47\end{aligned}$$

2) The total risks at Human Resource Division

In Human resource, six different risks were identified and each risk is determined on the basis of their probability and impact. All the risk of human resource is computed to evaluate total human resource risk.

$$\begin{aligned}\sum_{i=8}^{13} Ei (P, I) &= P_8.I_8+P_9.I_9+P_{10}.I_{10}+P_{11}.I_{11}+P_{12}.I_{12}+P_{13}.I_{13} \\ &= 0.06 + 0.12 + 0.04 + 0.03 + 0.06 + 0.03 \\ &= 0.34\end{aligned}$$

3) The total risks at Contractual Division

In contractual risk also the different types of risks calculated by multiplying the probability with their impact and total risk is calculated. Impact of risk comprises of time, cost and quality since they are major factors of project specifications.

$$\begin{aligned}\sum_{i=14}^{19} Ei (P, I) &= P_{14}.I_{14}+P_{15}.I_{15}+P_{16}.I_{16}+P_{17}.I_{17}+P_{18}.I_{18}+P_{19}.I_{19} \\ &= 0.08 + 0.12 + 0.06 + 0.02 + 0.12 + 0.10 \\ &= 0.50\end{aligned}$$

4) The total risks at Construction Division

In risk of construction division there are thirteen different types of risk and each risk have different probability and impact. On the basis of their

probability and impact the total risk at construction division is computed. Highest calculated risk is in the construction division of the project.

$$\begin{aligned}\sum_{i=20}^{32} Ei(P, I) &= P_{20}.I_{20} + P_{21}.I_{21} + P_{22}.I_{22} + P_{23}.I_{23} + P_{24}.I_{24} + P_{25}.I_{25} + P_{26}.I_{26} + P_{27}.I_{27} + P_{28}.I_{28} + \\ &\quad P_{29}.I_{29} + P_{30}.I_{30} + P_{31}.I_{31} + P_{32}.I_{32} \\ &= 0.15 + 0.12 + 0.08 + 0.08 + 0.06 + 0.06 + 0.09 + 0.04 + 0.04 + \\ &\quad 0.02 + 0.04 + 0.06 + 0.03 \\ &= 0.87\end{aligned}$$

5) The total risks at Design Division

There are also some risks which are identified at design phase of the project and to total risk at this division is also calculated by probability and impact of each risk of designing of project during the project initiation phase.

$$\begin{aligned}\sum_{i=33}^{37} Ei(P, I) &= P_{33}.I_{33} + P_{34}.I_{34} + P_{35}.I_{35} + P_{36}.I_{36} + P_{37}.I_{37} \\ &= 0.08 + 0.03 + 0.08 + 0.08 + 0.06 \\ &= 0.33\end{aligned}$$

6) The total risks at Environmental Dimension

The risk which is computed in environmental division of the project has the lowest value and there are only three risks in this division. These risks are also calculated on the basis of their probability and impact and further the total outcome is determined.

$$\begin{aligned}\sum_{i=38}^{40} Ei(P, I) &= P_{38}.I_{38} + P_{39}.I_{39} + P_{40}.I_{40} \\ &= 0.04 + 0.06 + 0.09 \\ &= 0.19\end{aligned}$$

7) The total risks at Political Dimension

Similarly in the Political dimension there are five different risks after calculating each value of the risks of the political risks, the total risk of political division is computed. The total outcome of the political risk represents that there is greater impact on the activity of the project.

$$\begin{aligned}\sum_{i=41}^{45} Ei(P, I) &= P_{41}.I_{41} + P_{42}.I_{42} + P_{43}.I_{43} + P_{44}.I_{44} + P_{45}.I_{45} \\ &= 0.20 + 0.09 + 0.09 + 0.16 + 0.12 \\ &= 0.66\end{aligned}$$

The risks are prioritized on the basis of the categories as they are calculated by a total score in each division as seen from the table below.

Table 60: Risk Ranking By Division

Risk Ranking No.	Division	Total Score
1	Construction Risk	0.87
2	Political Risk	0.66
3	Contractual Risk	0.50
4	Financial Risk	0.47
5	Human Resource Risk	0.34
6	Design Risk	0.33
7	Environmental Risk	0.19

This ranking of risk in table 60 will help the project management team recognize the importance and level of risk and type of division that may impede the project performance.

After prioritizing all the risk on the basis of severity, the next activity which the team needs to perform is assessing if the identified risks are within acceptable level or not. That is, consequences of each of the risk are evaluated (risk evaluation) on the overall project. If the risks are within an acceptable level, there is no need for the team to be concerned, and the process comes to an end.

On the contrary, if the risk pose to be very threatening/ major factor, then it becomes mandatory for the designated teams assigned with their responsibilities to take appropriate actions to optimise such events that may hinder the success of the project. If the risks have serious repercussions on the projects, then the risk management process does not end and the process moves to next level, that is why continuous planning is an effective phase within the entire process of the proposed framework.

In order to determine if the risks are within the acceptance level, it is essential for the designated team to have sufficient knowledge on the competencies and skills. Without self-information, it is very difficult for the manager to define the acceptance level. This also justified the theme 2- fragmented and adequate knowledge in the qualitative section (See 5.8.2) as a significant number of respondents were unaware

of risk management and its applications not just to projects but within the organisation itself since they rely on assumption and predictions through intuitive individual approach (Theme 3- See 5.8.3) on the basis of their respective experiences on past and current projects.

Once the acceptable range is defined and it is decided whether the risk lies within this level or not, the next step is selection of a suitable action plan for eliminating or mitigating the risks (Risk response). For alleviating or eradicating different kind of risk, a same approach cannot be applied. Different risks have different characteristics and impact the project in a unique manner. Therefore, it is not possible to employ the same approach towards all challenges.

Basically, there are five major techniques for handling the risks as earlier discussed in the literature section (See section 2.3.3). These are risk avoidance/prevention, risk reduction/mitigation, risk acceptance, risk transfer and risk retention. It is based on the nature, characteristics, impact of the risk and the competencies of the risk management team, a project manager can select any of the aforementioned methods stated above as an action plan against the identified issues within the project which could also serve as a strategy or mitigation action.

Some risk response actions are suggested in table 61 below for the proposed project based on the results of the survey.

Table 61: Risk Response action

OLORUNSOGO II 754MW Combined cycle power plant	Risk Avoidance	Risk Reduction	Risk Transfer
Risk Number	1, 3, 5, 8, 10, 13, 16, 17, 20, 21, 22, 25, 26, 27, 28, 32, 37, 38, 39, 40	2, 6, 7, 9, 12, 23, 24, 29, 30, 31, 36, 41, 43, 44, 45	4, 11, 14, 15, 18, 19, 33, 34, 35, 42
Total	20	15	10

Simultaneously responding to different risks in different methods is very common process. However, simply implementing a suitable action plan to respond to the risks for mitigating or eliminating them does not solve the purpose if continuous checks are not practiced by the manager. That is why the feedback loops are also denoted with **red lines** to assure constant planning and accountability for the identified and the unidentified risk which may pose a threat that may result to project failure.

It is also important to consider the structure and accountability in the proposed framework because it is at this phase the top level managers (board of directors) are accountable for these implementation of risk management within their organisation. All projects are distinctive and require certain time scales and specific specifications, notwithstanding, Project risk management (PRM) ought to be incorporated within the organisational culture, authority of risk owners and the strategic operation to ensure appropriate projects approval and are delivered successfully.

Continuous monitoring and control is a never ending process as it keeps on assessing and evaluating each stage and activity of the project which is another significant phase of the proposed model. This helps keeping good track records of each sequential phase of the project and the risk identified are within acceptable levels or totally eliminated. Therefore, frequent monitoring and review of actions will ensure that applied strategies are effectively working and are not resulting into some other related issues.

The final phase of the proposed model is the implementation phase which includes the organizational strategic, operational and tactical processes is in order when comparing the planned actions and performed actions. Thus, once the control actions are implemented in the project, the manager has to continuously measure the performed actions with that of planned actions to find out if any discrepancies still exist or if any could arise due to the proposed action. As stated, there are chances that proposed measure may sometimes give rise to some other problem which were unidentified earlier.

After comparing the planned performance with the actual performance, the project manager once again must determine if those risks which pose a significant threat are mitigated or not, or are still ranged within a desired level. If the risk lies within the acceptable range it means the applied control measure has worked and has not resulted into some other risk. This ends the risk management process. On

the other hand, if the risks do not come within the acceptable range, the process of risk management does not end and moves unto the next step. This stage of the model is very significant as it determines if the risk lies within certain boundaries. If it is, the process concludes there only but if not, there can be two possibilities, either the control actions are still in process and will provide necessary results in time or the applied action has not been able to serve the purpose for which it has been adopted.

If it's the first case, then the management and the entire team keeps on monitoring the control action but if it is the second case, then management needs to discover some other measures to control the event. In this way the activities keep going on (continuous monitoring and control with feedback loops denoted in red lines) until the results attained conforms to what was initially planned and the scope and specifications for the projects are met and successfully delivered. This certainly helps in attaining appropriate and effective results and also aids in attaining the ultimate objective from this model.

In a case where actions attained from this model does not match the end results, another suitable plan will be selected just after the evaluation of risk for acceptance level for better actions to be implemented. With this, a cyclic nature of the model has been obtained and this certainly helps in attaining success to project with minimum entailment of risk in it. However, this final stage of the model is to undertake a comprehensive review of the decision taken against the planned actions and performed actions in order to know if the actions planned are effectively been implemented, if the highlighted risk was solved and then into a feedback process aimed at continuous improvement of the proposed model and achieving enhancement in organization decision making process through risk planning and response strategy aimed at informed decision.

This shows that the proposed risk management model is cyclic in nature and can be applicable within the Nigerian power sector as currently most companies do not possess attributes of utilizing a risk management framework within their project related activities.

The sequential framework shows how level of implementation is an imperative step towards materialising the awareness of the firm regarding the need for risk management. The company then needs to translate its idealised notion of managing risk into concrete steps, in order to attain company success. The findings,

observations, suggestions and recommendations during this stage serve as a veritable tool during the first stage of the risk management implementation model for future projects.

6.3.2 Procedure for implementing the proposed framework

The method statement for implementing the proposed risk management implementation framework is captured below based on the results from both surveys (quantitative and qualitative) were merged together and based on the inadequacy and weaknesses of some existing risk management frameworks/models previously identified and discussed in the literature section which provided the basic foundation for the model developed and formed a new distinctive framework. These methods are;

1. Select designated risk management team members
2. Carry out feasibility studies
3. Consider both internal and external factors
4. Categorize and maintain proper risk planning and identification
5. Generate, sort and refine ideas for risk response after assessing the risk
6. Plan the risk response strategy
7. Develop risk response strategy
8. Seek top management approval of developed strategy
9. Modify implementation strategy (If need arises, if not proceed to next step)
10. Implement response strategy
11. Align risk plan to project objectives and aims
12. Carry out monitoring and control of the implemented response strategy
13. Document observations and lessons learnt during the monitoring and control phase
14. Carry out a review of the risk response implementation strategy to ascertain its level of success, seek opinions and views of actual participants during the implementation stage
15. Identify risk lessons learnt from past and present projects and analyze their impact on organization project
16. Use feedback loops to document all lessons, observations, suggestions and recommendations for future use

An external socio-political and cultural element has been included in the extended framework, based on the interviewees' appraisal of its importance as a factor and its interference with the stages of the process. This factor was firstly said to minimise motivation to engage in risk management procedures, by acting on participants' perception of support from institutional forces. However, because this one was usually perceived as minimal, participants also often justified their limited knowledge as an effect of limited support and a generally low financial commitment of the state towards expanding know-how. At the same time, respondents referred to the pressing need for innovation – this acknowledgment made for an important part of their contemplation, which often touched the urgency of change. Here, participants mentioned expertise and infrastructure as important assets that ought to be acquired by the power sector, and drew comparisons with the more competitive global environment.

In terms of the mediating variable, the level of implementation, both the broader context and the particularities of the contemplation stage appear to be meaningful for its representation. The presence of fragmented insight and a non-supportive sociopolitical and cultural environment results in fragmented and unsystematic practice in terms of risk management in the Nigerian power sector. Participants tackled the use of poor practice in their answers, in spite of not specifically admitting it. Their statements did not match common Western views of risk management; instead, they admitted to relying on short term planning and an approach to mitigation that was based on experiential measures.

On the one hand, participants referred to the unstable political climate as problematic in terms of implementing a longer-term perspective. Instead, they appreciated a more individualised perspective, based on local principles and factors and an appeal to „experience” as more suitable in this context. On the other hand, the blame is not to be put entirely on the unreliable outer environment, as it appears that also the know-how to help combat the pitfalls of an unstable government and the necessary organisational empowerment to do so (proper to the fragmented knowledge and practice) are affecting implementation. Reactive measures were often preferred, as was the credibility of the more experienced, albeit less formally qualified, and the respondents appeared to be skeptical of more formalised means of anticipating and mitigating risk.

For example, risk monitoring appeared to be deficient, which is obviously a sign of the incapability to keep up with the multiple challenges that may occur for companies in the power sector. When these challenges are volatile and unpredictable, formal efforts need to be engaged to standardise risk monitoring (Olsson, 2002). At the same time, the quantitative analysis confirmed that the companies that showed a more proactive approach to managing risk were also the more performant ones. They assessed risk more accurately and proceeded to better informed approaches to risk mitigation, as indicated in their self-reports.

6.4 Critical Success Factors for the Success of the Proposed Framework

Critical success factors can be defined as elements which are required to be present to achieve success within a project. Critical success factors are seen as key elements that must be achieved for the entire project to be successful. A failure to achieve a critical success factor will ultimately lead to failure of the entire project. Critical success factors therefore are pillars which form the foundation framework which a project manager must pay explicit attention to in order to achieve project completion. However, it is imperative that for an effective project model and success criteria, critical success factors must be fully integrated into the project model to achieve project success.

The success of the proposed risk implementation framework is hinged on some critical success factor. These factors outlined below are based on the survey results and findings (quantitative and qualitative):

1. The presence of individuals within the selected organisation charged with developing the risk response strategy (designated risk management team)
2. Improve organisational performance (project risk management interpersonal skills and Training programs/facilities)
3. Timeline for the implementation of the chosen risk response
4. Top management commitment and support
5. Clear goals and realistic objectives, focus and scope
6. Effective awareness and communication
7. The quality of the output from the 'develop risk strategy' phase must be such as would provide the input required to develop the risk response.

8. Risk owners must be assigned after the risk response has been developed.
The responsibility for the effective implementation of the agreed response is borne by the risk owner
9. Selecting the best risk owner and project team competence
10. Monitoring and evaluation of performance (used as KPI's)
11. Technical and business knowledge
12. Risk management information system
13. Dedicated resources

6.4.1 Role of CSF in Proposed Model Implementation

An organization requires a designated team who are tasked with developing an effective risk management and response strategy in order to achieve project success. The need for internal risk assessment and management team was highlighted by (Smith et al., 2014) who stated that a team must be dedicated within an organization for effective analysis, planning and risk strategy development and implementation.

There should be a timeline for effective implementation of the risk response strategy in order to ensure that risk are managed at appropriate time so as to mitigate its impact on the project.

This is a critical part of the framework as risk monitoring helps in ascertaining the level of risk implementation plan, make adjustment to the risk plan and will ensure complete risk strategy completion.

Kaplan and Mikes (2012) stated that top management support is vital to any risk management system or strategy. This model hinges on the incorporation of top management support as top management is fully incorporated into the model and serves as the main drivers of the model.

Risk ownership is critical to model success as incorporating the model into organization structure requires adequate decision making to an individual (risk owner) skilled and knowledgeable on risk in which they are assigned.

6.5 Chapter Summary

The importance of implementing risk timely planning and identification, response and control strategies plays a significant role in the success of any risk management programme. This chapter forms one of the main outcomes of this research. A risk management implementation framework was developed as well as steps to adopt in implementing the model, practical applications of the model was also observed using a commissioned power project showing the merits of the applications of the proposed framework whilst addressing the sequential steps.

Such a model fits the previous findings in the Literature, which signals the gaps between the expressed need for change and the existence of relatively knowledgeable professionals, on the other hand the failure to systematically implement management strategies, within the business sector of emerging economies (Yamakawa et al., 2008).

Merely importing practices that appear to work in Western societies may be inefficient in the medium term, as the underlying mechanism appears to have to do with the organisational culture of the companies within emerging economies. Deeply embedded into the national cultures of these organisations, such factors may be incompatible with the implementation of effective practices and may not favour growth (House et al., 2004). The way it has been hypothesised here, this can translate as reactive approaches, rooted in experiential perspectives and traditional assumptions about risk that likely apply to more than the business sphere. However, because of this, it is imperative that the relationship between fragmented knowledge and implementation and the precise ways in which it occurs needs to be further clarified.

Failure to acknowledge and understand culture as a determinant means the failure to act on the underlying features of the system and thus management failure (Van der Berg and Wilderom, 2004). Sometimes, the problem will be as straightforward as strikes, protests or lack of cooperation on behalf of partners or the state, but sometimes, risks may not be as evident, on the contrary, they may become invisible (sabotage, silence, corruption), and in this case, understanding their cultural dimension may be the first step towards a grassroots approach to risk avoidance and mitigation (Olsson, 2002).

CHAPTER 7- DISCUSSION, RESEARCH FINDINGS AND CONCLUSION

7.0 Introduction

The importance of risk management to the successful completion of projects within the power sector of any nation cannot be overemphasised. More so because the growth and development of any nation is directly or indirectly linked to the provision of sustainable electricity and for this to be possible, it is imperative that more attention be paid to how projects within the power sector in Nigeria are handled in terms of risk identification, risk response and risk control. This section of the research will discuss the risk implementation strategies of some foreign countries with the same attributes of Nigeria and a discussion of research findings.

The research objectives will be highlighted again for emphasis and inferences will be made on how the aim and objectives of the research have been met.

7.1 Discussion

Electricity plays an important role in both the technological and social economic development of any nation. However in Nigeria, the demand for electricity is much higher than its supply as there are several issues and challenges relating to power generation and supply in the nation (Idris et al., 2013). Regardless of the abundant natural resources Nigeria is bestowed with, there still persists an acute shortage of power supply and this has hindered the growth and development of the nation (Akpan, 2002). This was also acknowledged from the respondents in the semi-structured interviews when identifying the potential risk factors within their respective projects (See Section 5.8.1 and Table 48). It is a common fact that there is a correlation between the availability of power in any nation and its socioeconomic development.

Ahmed (2008) claims that the main objective of the report concerns energy planning and increasing the energy capacity in the region. However, in order to increase and improve electricity generation, supply and distribution through the initiation of more power projects, more emphasis needs to be given to the concept of risk management.

Obioma and Obioma (2012) claims that the best way to manage risks associated with power projects is through the direct involvement of the project

sponsors and the government (in cases where the project is not being sponsored by the government).

Parallels can be drawn from other nations in the world on how to effectively manage and mitigate risks associated with power projects. Nations such as the USA, the United Kingdom and India are some of the countries to be emulated in their approach to increased power production through the implementation of risk management. These countries serve as a good reference point because they share similar characteristics with Nigeria in terms of population density (USA and India), the availability of cheap labour (India) and availability of raw materials for power generation (USA and UK).

Kenneth and John (2013) assert that the implementation of a risk management process had helped to improve the success rate of power projects in the USA, United Kingdom and India. Samson et al (2009) adds that this has helped boost the efficiency of the power sector in these nations thus helping them to meet their electricity demands. For instance, according to Treven (2003) and Rastogi (2010), the involvement of project sponsors in risk management implementation greatly improved the success of power projects. Bowers and Khorakian (2014) reveal further that some strategies were implemented by the Indian government for mitigating the risks associated with power projects. Some of these strategies include: contracting strategy, setting up standards for budgeting and estimating, effective development of policies and risk control measures, resources planning methods and tax efficient procurement. Djebabra et al (2006) reveals that these strategies and policies initiated and implemented by the Indian government were part of the risk implementation strategies that were created in response to the identified risks in the country.

For any risk implementation strategy to be truly successful, it is very important to have a thorough understanding of the risks involved. In the United Kingdom for instance, Smister (2000) claims that ineffective and poor utilisation of low carbon technologies, accessibility and high cost of finance, political interference in the power sector and high cost of infrastructural development are some of the major risks typically associated with power projects in the country and as part of the risk implementation strategy, the government initiated policies such as developing policies for European Union members in order to attain standardisation of practice with regards to power projects, optimal settings of carbon prices in order to enhance

the environment opportunities in the United Kingdom along with managing capital risks. All these policies helped enhance the success rates of power projects in United Kingdom.

The power sector of the United States is highly efficient and thus has the ability to meet the rising demand for sustainable power supply (Martinko 2004). Bowers and Khorakian (2014) reveal that the success of projects in the power sector of the United States is due to the application of risk management models and highly specialised risk management teams.

These nations (India, UK and USA) have increased their electricity production capacity to match the demands of their population through the implementation of risk response strategies in projects in the power sector. For Nigeria to enjoy the same rewards, concerted efforts must be made to implement risk management strategies to mitigate against all identified risks and potential risks likely to affect projects in the power sector.

7.1.1 Discussion of Findings

This research sought to analyse risk management implementation within the Nigerian power sector and from the findings ascertained in data presentation (See Section 5.1- 5.9), there is an urgent need to review risk management implementation especially within the Nigerian power sector as a wide gap exists in implementation process i.e. organisations that adopt a reactive implementation process where risk has already occurred, before seeking risk mitigation ways instead of adopting a proactive approach to risk management.

The previous section (See Section 7.1) of this chapter has adequately drawn parallels between risk management implementation in countries that have successfully undertaken risk management to improve their power sector in order to draw strengths that will aid the Nigerian power sector.

1. The inability of the organisations and the Nigerian government to undertake project risk identification is one major cause of project failure as risks involved with the projects ranging from political, financial, community, raw material, technical and stakeholder management are not properly analysed.

These therefore lead to project delay, cost overrun and in some cases project abandonment (See Section 5.8.1 and Section 6.3.1).

It can be argued based on the results of the survey, most respondents indicated that the companies they are part of do not conduct risk identification actions (See Figure 35 and Table 24), although most of them do consider risk management to be important and they assert that the risk management process is an important part of strategic management and therefore one of the main parts of the organisation's management (See Figure 33).

Besides reflecting a certain approach of risk management, these answers also reflect a particular perception (that of the representatives of these companies) on what risk management is or ought to be. This limited and subjective interpretation of risk management points once again to the necessity of providing a well-designed model of risk management implementation adapted to the particularities of the Nigerian power sector.

The inability of Nigerian organisations and government to conduct risk identification may lead to ignoring major risks inherent to the background on which all Nigerian power projects are developed, namely the national political context (See Section 5.8.1).

The results of the qualitative research pointed out that this is one of the main concerns of those involved in such projects and the risk associated with it is considered to be superior in impact compared to that associated to technical, security or financial aspects (See Section 5.8.1 and 5.8.2). The state interference within the power sector decision-making mechanism together with its unstable politics are what investors (and representatives of the sector as proven by the answers participants gave in interviews) view as major threats.

Conducting risk identification could ensure proper understanding of the specific feeble points of this background and could provide the basis for addressing those that act as main catalysts for inquietude and reticence. Moreover, solutions could be found for increasing investors trust in the actions of the Nigerian state, thus improving the power sector's efficiency which is now also considered to be reduced as an effect of the lack of transparency and commitment on behalf of the Nigerian state (See Section 5.8.2 and 5.8.3).

2. The inability of government and organisations involved in the power sector to have an internal risk management team or outsource risk management to third parties tasked with undertaking risk assessment and management has led to most organisations having a reactive attitude towards risk entailing them to seek ways to mitigate risk impact after the risk has occurred instead of having a proactive approach that is aimed at planning and mitigating risk before it occurs (See Section 5.8.3).

The fact that the majority of those participating in the survey have disagreed or strongly disagreed to the assertion that the organisations they are part of have designated risk management teams is a confirmation of the hypothesis (See Hypothesis 3 - Table 27 and 36) that could have been deducted from realising that most companies do not proceed to identify potential risks, they only address risk as it appears and, generally, do not consider it important enough to create and adopt a structured model for risk management implementation. These points to what the qualitative analysis indicated to be a fragmented knowledge and practice of risk management (See Section 5.8.2).

As indicated by the results of the research, most companies consider it relevant to award importance and, of course the necessary resources, only to some of the constituent elements of risk management. Among the ones considered necessary is risk handling. However this proves that there is a lack of awareness concerning the necessity of the all elements as they are not awarded equal attention (See Section 5.8.2). This lack of awareness and the failure to fully understand the interdependence of all elements (risk planning, risk assessment, risk handling, risk monitoring and risk reporting) is also reflected in the incoherent image associated with risk management within a given company.

Participants in the study have proven that there is not a shared language of risk management within the companies they are part of (See Figure 28 and Table 26). Moreover some of them have proven unable to provide consistent descriptions of risk management, and some of those who were able to formulate definitions using relevant concepts related to risk management were not always capable of identifying and pointing to organisational implications. Some of the respondents' answers indicated that within their companies, risk

management is considered a process specific to certain departments and does not reflect a unique, coherent, company-wide risk management strategy (See Section 5.8.3). This can be perceived as yet another argument of the fact that risk management is not a strongly formalised process, but a fragmented practice (See Theme 2- Section 5.8.3).

3. No standard of risk management within the Nigerian context especially within the Nigeria power sector has led to a standardised risk management model generic to the Nigerian environment. This lack of a fundamental and adequate risk management model has made some organisations and even government-owned agencies completely eliminate their risk management department from their organisational structure and set up (See Section 5.8.4).

The answers provided within the survey point to the lack of team designated to cover the proper implementation of risk management (See Hypothesis 3 - Table 27 and 36), the lack of risk registration and that of a risk planning phase within the process of addressing risk management (See Figure 40 and Table 28). These are merely a few indicators of the companies' decision to avoid setting up a risk management department.

4. Most organisations that practice risk management ignore risk review and monitoring and control which lead to the inability of organisations to effectively adapt and be flexible to changes in risk management during project delivery.

The results of the survey also pointed out that most organisations decide not to appoint specific individuals to deal with risk management and they do not consider it important neither to perform risk assessment, nor risk planning (See Figure 46, 47 and 48). Under these circumstances of ignoring critical steps of the risk management process to which risk review, risk monitoring and risk control are somewhat complementary aspects, neglecting to address the latter seems only coherent to the company's general approach.

However it cannot be omitted that such an approach is prone to impeding the company's projects in the long-term, as it will avert it from gaining the necessary experience to easily mitigate future risks and will also impede it from assessing its progress even in respect to addressing present challenges. This also relates to what was identified as the preference for an

individualised approach. As pointed out within the research (See Section 5.8.4 and 5.8.5), many of those participating in the study have alleged their lack of trust in a unique, generalised approach to risk management, expressing the conviction that every problem that might arise should be dealt with separately, considering only the specifics of the situations that defines it.

A complementary aspect of this approach and of the perspective from which it is looked at is that many respondents have also proved mistrustful with respect to consultants (See Section 5.8.2 and 5.8.3). Their answers indicated that they perceive consultants as outsiders and they considered it more appropriate to address risk issues by involving inside company experts.

Besides being trustworthy, the latter are also believed to have enough experience and insight to qualify for dealing with the given problem. Last, but not least, cost efficiency is also a strong argument for encouraging the individualised approach (See Theme 3 - Section 5.8.3).

5. Lack of risk registers also shows that organisations do not formally document risks encountered in previous projects and learn how to easily mitigate such risks again or completely eliminate them. Results from the survey shows that, 64% either disagreed or strongly disagreed that the organisations they represent are using risk register (See Figure 40 and Table 28).

This finding is particularly important because in order for a company to be able to better face risks as they appear and be able to prepare itself both for future potential risk regarding the impact they might have, it must always be aware of the challenges that was encompassed in proceeding and past projects and with the outcomes of the solutions implemented at that point.

Looked at risk from this perspective, risk register is important in order to assess the effectiveness of past approaches as well as the opportunity to implement different ones.

The factors highlighted above, shows which are the major flows of the risk management system within the context of the Nigerian power sector based on the survey results (See Chapter 5) and suggest how these drawbacks could be corrected so that risk can easily be mitigated. This could be done if these factors were effectively put into practical (risk management) implementation.

7.2 Summary of Findings

The summary of the research work will be presented in this section. The research objectives will be examined to ascertain if they have been achieved, while conclusions will be drawn on the research objectives based on the findings.

Research Objective 1

To examine the efficacy of risk management process in practice

Summary of Findings

A significant proportion of professionals in Nigeria recognise the importance of risk management practices (from the survey results - See Figure 33) and are somewhat acquainted with principles of risk management. At the same time, there are still many professionals that only appear to contribute to a scattered mobilisation of in-company assets and who have equivocal levels of expertise. This is to be further expressed in the degree of implementation (fragmented practice and individualized approach- See Section 5.8.2), where it is clear that many managers are not systematically applying principles of risk management to an extensive level, as descriptive results had also anticipated which resulted to the fragile success of power projects in the Nigerian power sector. At the same time, respondents referred to the pressing need for innovation (See Section 5.8.4) – this acknowledgment made for an important part of their contemplation, which often touched the urgency of change. Here, participants mentioned expertise and infrastructure as important assets that ought to be acquired by the power sector, and drew comparisons with the more competitive global environment.

However, according to Raz et al (2002), who argues that evidence in favour of the efficacy of risk management in practice can be found in organisations that practice risk management as this has helped them who realise their goals and objectives in the decision-making process, making them more effective. The importance of risk management in practice was revealed by various authors (Smith et al 2006; Akintoye and Macleod 1997; Shortreed et al, 2003; Samson et al, 2009; Cooper et al, 2005) as a veritable tool for business sustainability, and a means of maintaining competitive advantage.

Capturing the hidden cultural messages of risk is immensely important, because they represent cues as for what are the undermining factors that need to be addressed at one moment or the other.

It is therefore evident that the practice of risk management is very important to the success of any project and not only to projects in the power sector, as among other things, it aids in decision-making which is an important part of organisational life.

Research Objective 2

To identify the various risks typically associated with projects in the Nigerian power sector.

Summary of Findings

Various risks typically associated with projects in the Nigeria power sector were identified and categorised, with some mitigation strategies also proposed. The study refers to the following risk factors, associated with projects developed: the possibility for projects to not be completed within the designated time frame (the completion risk), the impact that decisions made at a political level can have on projects that are dependent on investments pertaining to private sector representatives (regulatory risk), the volatility of prices and the unpredictable and unstable nature of revenues (economic risk), the dependence on primary resources (fuel risk) as well as imminent fluctuation of the international financial market (foreign exchange risk). Risk of completion is mainly related to how responsible the project management conducts activities. Regulatory risk is more dependent on an external context, which can only be addressed by ensuring the high quality nature of the project. The project should be indispensable, even for the stakeholders that have the power to decide the outcome the context the project is developed within and dependent on.

As described earlier within the study, the economic risk can be mitigated by separately addressing the factors that are responsible for the variation of prices and revenues (See Sections 3.4). The same approach must be considered when addressing foreign exchange risk. As for fuel risk, this could be mitigated by making the fuel provider's profit dependent on the project's success. A SWOT analysis was

carried out to identify the major weaknesses and threats to the success of power projects in Nigeria (See Section 3.6 and Table 14). The cheap manpower and the large market represented by the country's population are among the first strengths worth mentioning in the system. The poor management of resources and poor implementation of power reforms are considered to be the top threats.

Furthermore, the identified risks in the Olorunsogo power plant project provides an insight on risk identification of construction projects on Nigeria as these identified risk are peculiar and as projects vary could appear in other industrial construction project related activities (See Table 48 and Appendix A).

Research Objective 3

To determine the current situation of risk management practice and the importance of risk management process to the success of projects in the Nigerian power sector.

Summary of Findings

The findings from the questionnaire analysis indicate that while a basic knowledge surrounding risk management exists, its level of implementation is poor. This can also be correlated with the fact that despite a basic knowledge on risk management, the concept seems to still remain at the level of limited and subjective interpretation.

Although 88% of the participants agree or strongly agree that risk management is a basic element of strategic management, more than half of the participants, 57%, assert that the organisations they are part of do not consider risk management to have an important effect on the project management process (See Figure 33). The answers offered to the questionnaire express a unanimous (40% agree and 60% strongly agree) belief that it is best to perform risk management at project level (better than performing it at corporate level- See Figure 44). Despite these results, the majority (59%) of those participating in the survey declared that within their organisation, risk planning is not carried out prior to initiating the project. An undeniable statistic is that 57% of the respondents believe there is no shared language and definition of risk management within their organisations (See Figure 28 and Table 26).

The qualitative analysis performed also pointed out that risk management is not yet a formal and sufficiently consolidated language within the Nigerian context as most of those interviewed failed to provide a consistent description or examples of consistent practice within the organisations they represented. Furthermore, only 10% of respondents revealed the presence of functional risk management teams within their organisation. This gives us an indication of the current situation of risk management practice in Nigeria. Therefore, the degree of implementation of risk management is still low and, therefore, it is difficult to ascertain the role that the implementation of risk management would have had on the success, or otherwise, of power projects.

Research Objective 4

To develop a risk management framework applicable to the Nigerian power sector.

Summary of Findings

The research revealed that, to a certain extent, a basic knowledge and understanding of the concept of risk management exists within the power sector of Nigeria. However this is unequal and typically fails to reflect in company-wide consistent perceptions. However, despite the basic knowledge and understanding of risk management, the level of implementation was discovered to be low as a result of the perception that risk response is a reactive process rather than a proactive one. Almost half (44%) of those participating in the survey attested that a risk management plan is not always used within their organisation, 59% of those questioned indicated that their organisation does not perform risk assessment and 58% of the respondents confirmed that risk assessment is only performed as a reactive measure within the companies they are part of.

Emerging from the statement of problem (See Section 1.2), one of the main deliverables of this work therefore was to propose a risk implementation framework (based on the results of both surveys) that details the stages, through which the Nigerian power sector may pass on a managerial level, and regarding risk management in particular. Organisational and societal factors, emerging from the quantitative analysis and nuanced by its qualitative counterpart, have been

discussed. These have been proposed to sustain, and at present, the faulty development of company performance which is based on fragmented and reactive risk management practices.

The framework may seem intuitive; however, it can be argued that it helps explain the mechanisms behind the deficits in risk management practices in the Nigerian power sector. There are nuances in the degree of preparedness of companies, as the qualitative interviews have also shown, and a gap between discourse and practice in the way risk management systems are conceived in this area.

The merits of the framework are in fact that it illustrates the importance of implementation as a mediator in the relationship between acknowledgement and performance (See Figure 63). Thus, while there were many respondents to provide data to indicate high awareness in terms of risk management benefits and exact procedures, what truly made a difference in company performance (expressed as revenue and project success) was whether there was a stable and valid risk management system in place.

Therefore, it is not only necessary that companies recognise the boons of risk management, they also have to translate this availability into a proper strategical approach. This pattern complies with the views of Dey and Ogunlana (2004) who stated that construction projects (based on the aforementioned identified risks which are peculiar to the Nigerian power sector) are prone to adverse risk due to the nature of the characteristics that govern them and thus in solving such related issues will require a thorough understanding and application of a systematical risk management framework to improve the rate of success of projects.

Nevertheless, most companies are somewhere on the continuum between powerlessness and proactiveness, in the sense that they either have a relatively good appreciation of risk, but they still rely on obsolete and unsystematic risk management procedures, or they have not yet conceptualised risk adequately and they deal with its prospect reactively and unstrategically.

Research Objective 5

To provide recommendations on how risk management process can be used to improve the Critical success factors in the Nigerian power sector.

Summary of Findings

Recommendations on how to improve the knowledge and practice of risk management were also proposed and these recommendations also included as directions for future studies (See Section 8.2). The framework, developed for providing a structured and relevant approach to risk management within the context of the Nigerian power sector, is one of the most prominent recommendations presented within the study regarding how to use risk management for improving the critical success factors (See Figure 63 and Section 6.4).

The broad display of risk management elements, risk identification methods and risk analysis methods, together with context discussions, are also relevant for reconsidering a proper approach to risk management within the studied context.

An outlook on the Nigerian power sector is also included within the study, which points to its strengths and weaknesses, as well as the opportunities and threats it faces. This provided a good starting point for initiating discussions about which components of the sector should be addressed first and how this could be done effectively.

7.3 Conclusion

Risk management plays an important role in the economic life of a nation and has significant importance across all sectors. However, the role of the power sector towards the growth and development of any nation cannot be overemphasised as a nation's availability and provision of a stable and regular power supply is one of the most important drivers of development nation.

The practice of risk management in Nigeria is yet to attain full flight and this is directly or indirectly responsible for the nation's poor power sector. Its inability to meet its energy demands is as the result of poor planning, lack of commitment on the part of industry stakeholders and corruption. All of these factors have culminated in the abandonment of power projects. Ogunmade (2012) reveals that a whopping \$16 billion was spent by General Olusegun Obasanjo's administration during his tenure as president of Nigeria towards improving the power sector. This was without success and failed due to reported project timing. If risk identification and assessment were carried out prior to initiating the project then it would have been evident to all that the project was bound to fail, before it had even started.

The government of Nigeria has taken a step in the right direction by privatising the previously government-owned Power Holding Company of Nigeria (PHCN). However, without proper risk management practices and the timely implementation of risk mitigation strategies coupled with a strong commitment on the part of all project stakeholders, Nigeria may be regarded as one of the dark countries of Africa for a while longer.

7.4 Limitation of Research

Every research work has its shortcomings and this work is no exception. The main limitations of this research are encapsulated below:

- ❖ Lack of existing data: Little existing information was available regarding the subject matter and this posed a limitation as the researcher had no previous work carried out in the Nigerian sector to draw inferences from.
- ❖ The quality of information obtained from the secondary data collection also posed another limitation to the researcher as secondary data was not easily accessible.
- ❖ Ethical issues relating to confidentiality and anonymity of the respondents and their organisations was a problem when presenting the research findings, as the research outcome could not be presented to the respondent's organisation to help them improve their risk management practices.
- ❖ The research outcome cannot be generalised and the model developed is best suited for the Nigerian power sector. It may not therefore be easily implemented elsewhere, except if a similar problem statement was established.
- ❖ The time frame of the research was not sufficient enough to conduct a critical study of the concept of risk management in Nigeria through direct observation. Thus the research outcome was based on second hand information obtained from the respondents which may be biased, untrue or contain half-truths.

CHAPTER 8- SIGNIFICANCE OF RESEARCH, RECOMMENDATIONS & DIRECTION FOR FUTURE STUDIES

8.1 Introduction

This part of the research work lays emphasis on the research significance and contribution to knowledge as well as steps needed to improve the overall performance of projects within the power sector of Nigeria as a whole.

The significance and limitations of the research will also be elucidated to serve as a precursor to directions of future research.

8.1.1 Significance of Research

This study has a lot of significance both theoretically and practically. This research work has been able to add to the body of knowledge of risk management as it applies to a particular area—one that was identified as insufficiently researched—the Nigerian power sector. It was discovered during the course of the research that while the basic concept of risk management was, to a certain extent, clearly understood in Nigeria, there was a gap between theory and practice in terms of the implementation of risk management. Most organisations adopted a reactive approach to risk planning, ignoring to create a complex, structured and comprehensive model.

Moreover, in turn, this research has in addition helped develop a risk implementation model specific to the Nigerian power sector which hitherto was not available. Thus, one major significant outcomes of this research is the awareness it brings to practitioners of risk management in Nigeria regarding the important role that a risk management team (responsible for ensuring the proper implementation of risk management) plays in the overall success of a project. The study's main points of significance include:

- i. The importance of risk management not just to the success of projects but to that of the entire organisation was emphasised. A risk management culture enhances the integrity, performance and reputation of an organisation, thus improving its chances of attracting new business/projects.

- ii. Typical risks associated with projects in the Nigerian power sector were also highlighted. The significance here is that stakeholders in this sector have a better understanding of how these risks can be planned for and mitigated against.
- iii. The development of the risk implementation framework presents a roadmap to improving the concept of project (power) management in Nigeria as it identifies key stages in the risk implementation process while also going a step further to ascribing responsibilities for the success of risk management in organisations.
- iv. The developed model has theoretical as well as practical implications. Among the theoretical implications, one might consider the fact that although it is designed to be successfully applied to the power sector in Nigeria, it can be used as one of the relevant necessities for developing other similar models suited for other sectors as well as other countries. The practical implications are directly related to the model's aim, which was to provide a structured, reliable and effective approach for addressing present and potential risks associated with the Nigerian power sector. The framework is applicable to organisations in context within the sector.
- v. This report also places emphasis on the importance of decision-making in the risk management process. Hitherto, previous research about risk management in Nigeria did not emphasise the importance of decision-making as a critical ingredient for the success of risk management. Another major significance of this report therefore is highlighting the importance of the decision-making process.
- vi. Apart from practical implications, that have already been discussed, among them the necessity to provide a reliable model for effectively implementing risk management within the Nigerian power sector. This research therefore consists of theoretical implications too. Professors and lecturers who want to gain knowledge on this subject matter can refer to this study (secondary

data). For students who decide to pursue a career in this area, this study holds great significance as it provides them with the opportunity to understand the basis of the risk management process along with knowledge on how to develop a risk management model for various entities. Finally, this study is also of great significance for scholars who want to conduct research on risk management or related topics. They can use this as reference material, as this paper will provide them with a basis to initiate their study.

- vii.** The implications of the model have also been outlined, but beyond identifying generic gaps (with arguably a cultural basis), it is more important that professionals seek to translate it into specific courses of action related to either contemplation or implementation. The differentiation is important, because it helps distinguish between forms of intervention centred on awareness and education, and others with a more pragmatic and instructional component. Perhaps the contemplation dimension is more holistic in nature and should be used by trainers and self-teaching professionals from a more reflective stance. Conversely, the implementation dimension is to be treated as a stage to be acquired instructionally, but as a consequence of acknowledging the importance of systematic practice. However, while implementation is to be carried out successfully only once motivational resources on behalf of the organisation exist, it still remains the variable that can make the difference between a knowledgeable company and a successful one. Because of this, teaching managers to act, beyond being theoretically prepared and motivated, is crucial here.

8.2 Recommendations

These recommendations represent ways in which the performance of the power sector can be enhanced, in terms of power generation, power supply and, very importantly, how the success of projects within the power sector can be improved.

The projects within the Nigerian power sector are mainly geared towards activities leading to the generation and supply of electricity and therefore recommendations proposed will represent this.

The following are recommendations on how to improve the performance of projects within the Nigerian power sector and the overall performance of the power sector also based on the survey results in the Chapter 5 data analysis section and the practical application of the proposed model on a project owing to from the survey results attributed in chapter 6 (See Section 6.3):

8.2.1 Submission of Risk Management Plan during Procurement Phase

Organisations submitting proposals leading to the award of contracts to undertake activities in the power sector should as a prerequisite also submit a comprehensive risk management plan. The need for a risk management plan as part of a prerequisite to the contract award process helps to ensure that organisations undertake a comprehensive risk assessment of the project in order to outline existing risk and detail ways to mitigate and manage outlined risk (Smith et al., 2006). This can be further justified based on the results from the cross tabulation and hypothesis 1 (See Chapter 5 – Table 23 and 35).

The practical implementation of this can be adopted in Nigeria at government level through enforcement by the National Electricity Regulation Board and Bureau of Public Procurement. These should ensure that not only do companies submit risk assessment plans before awarding contracts but a team of professionals, especially third party risk consultants, should be set-up for effective monitoring to ensure risk assessments are effectively carried out.

As part of the Indian power sector reform, organisations were compelled to undertake risk assessments before embarking on any power project. This was imperative for risk planning, which was adequately supported by the Indian

government and Indian Electricity Board (Singh, 2006). The contents of the plan should be assessed for completeness by competent risk management practitioners.

8.2.2 Establishment of Risk Management Teams

As part of the pre-contract evaluation process, the presence of dedicated risk management teams within the bidding organisations should be ascertained and made a mandatory prerequisite before awarding contracts. This can be enforced by ensuring organisations submit a comprehensive breakdown structure of the organisation and project breakdown structure stating all personnel involved in the project, their level of experience and skills. The results of the survey can be attributed to justifying this particular recommendation as seen from the Chapter 5 - Table 27 and hypothesis 3 - Table 36 that the level of implementation is rather very low and has not been fully explored. This further gives justification to the theme 2- Fragmented knowledge and practice (See section 5.8.2)

This project breakdown structure should include a risk management team and their level of experience should be ascertained by a risk team led by external consultants to ascertain if they possess the requisite knowledge required to manage and mitigate all associated risks in the project.

Monitoring of the risk management team should be undertaken through setting up risk performance benchmarks, which will be monitored by both internal organisation management and third party professionals to ascertain their level of implementation and knowledge in risk management. The competence of the members of the risk management teams should also be assessed against established benchmarks.

8.2.3 Transparency in the Procurement Process

For any risk management process to be truly successful, there must be a certain degree of transparency in the procurement process. This is important because the process of risk management involves risk identification and the degree of accuracy of the risk identification phase depends largely on the quality of information available to the risk management team. The results from the quantitative section (See Figure

37 Table 25) and the qualitative section (See Theme 2- Fragmented knowledge and practice - 5.8.2 and Theme 4- The need for innovation - 5.8.4) can supplement the recommendation indicated above as the level of implementation seems quite inadequate and depleted.

The process leading to the award of contracts in Nigeria is usually long and typified by information hoarding by the procurement department in order to favour their preferred bidder. It is thus very important that complete and accurate information be provided to contractors during the project bid phase to enable them to have a clear understanding of the potential risks they are likely to be faced with during the course of the project. This is one of the main causes of the long and endless lists of abandoned projects in Nigeria.

8.2.4 Government Participation in Risk Management

The need to establish a risk management team within a government project monitoring team is essential as that will ensure a reduction in the number of abandoned projects and project failures (Onaiwu, 2009). Currently there is no fundamental dedicated risk management office tasked with project monitoring in Nigerian government power sector projects (See Chapter 5 - Table 27 and hypothesis 3 - Table 36). Again further justification for the proposed recommendation can be seen from the summary findings in objective 3 (See Section 7.2) to determine the current situation of risk management and the importance of RMP to the success of projects in the Nigerian power sector.

The setting up of this dedicated government risk management project team within the Nigerian power sector will ensure that governments conduct the following:

1. Efficient monitoring of risk associated with projects
2. Ability to monitor risk management teams in organizations executing power projects and supplies
3. Mitigate risk associated with obsolete equipment and lack of turnaround maintenance
4. Monitor risk strategy plan submitted during contract award to ensure they are effectively met and constantly updated

5. Set standards for risk strategy and management for the Nigerian power sector

8.2.5 Quality of Investment Decision

The quality of investment decision by both governments and organisations is another issue that should be addressed. Some key factors must be considered in the location of power projects. These factors should include

1. Closeness and availability of the power project to required raw material such as natural gas should play a prominent role in the investment decision of government, rather than basing their investment decision on trying to score cheap political points.
2. Need to undertake a risk assessment on power project financing and political risk before embarking on the project. One major hindrance to power sector project failure in Nigeria is the problem of financing and political risks that arise from policy changes and lack of political will to implement reforms as this has served as a major source of hindrance. A practical approach to mitigate financing risk is through the involvement of public private partnership (PPP). Wang et al (2000) detailed the use of PPPs in mitigating political risk in power projects. Delmon (2009) also highlighted the role played by PPPs in bridging the gaps in project financing, thereby eliminating all risk associated with financing.

The aforementioned points highlighted above can be attributed to the results of the Swot Analysis (See Table 14) and results from the model validation and identified risk factors (See Section 6.3 and Table 48).

8.2.6 Participation of Foreign Investors

The power sector requires high amounts of investment for upgrading technology that will enable the companies to generate more electricity at lower cost. This will not only reduce operational costs, but simultaneously help in meeting the actual demand of power in the country. There is a practical need for the government to encourage foreign participants to raise finance for the Nigerian power sector. This can be achieved through the enforcement of reforms within the Nigeria power sector and oil sector through the deregulation and privatisation of government-owned companies.

This will break government monopoly, reduce corruption and ensure a stable gas supply to generation companies (Onaiwu, 2009). The use of a transparent bidding process, exclusive of political patronage, is required for the ongoing power privatisation in Nigeria (See Theme 1- concerns regarding the interference of political factors - Section 5.8.1). This will attract genuine foreign investors who possess the technical knowledge and financial strength needed to drive change within the Nigeria power sector. This further justifies the results from the semi structured interviews (qualitative analysis) chapter 5 (See Section 5.8.4 and 5.8.5).

This is important because foreign firms would require a return on investment and would thus ensure that all risks militating against receiving a return on investment are addressed. However, the performance record, financial capacity and experience of the foreign investors must be considered.

8.2.7 Focus on the Needful

The current technique being employed by the government in increasing the electricity generating capacity of the country is through expansion of existing plant facilities (Okoro and Chikuni, 2007). However, the emphasis should not be on the expansion of current facilities but availability of the raw material, such as gas and the maintenance of existing facilities which has been a major hindrance to power generation and distribution (See Section 5.8.1).

The inability of most generating plants to access gas supply has hampered their operations and should be the current focus of government. Currently,

regardless of the considerable size of the majority of power plants in the country, their actual generating capacity is much lower than the planned generating capacity.

8.2.8 Establishment of a Team Assigned the Task of Developing Sustainable Electricity

As discussed earlier from the problem statement (See Section 1.2) and the results from the data analysis (See Theme 2 and 4 – Section 5.8.2 and 5.8.4), there must be a dedicated team assigned to build a sustainable electricity market in the nation. For the economic growth of any country, ‘energy security’ is a prerequisite. An adequate amount of energy must be available to all users at affordable price (Okoro and Chikuni, 2007).

The main responsibility of this team will be to ensure that appropriate funds are available with the companies to upgrade their existing infrastructures and be capable of optimally utilising these available resources. This will directly enhance the productivity of electricity in the country (Gratwick and Eberhard, 2008).

Further, the role of state and local participants must be clearly stated in the national master plan. This dedicated team should comprise of technocrats from the Nigerian power sector, private sector professionals and international power sector professionals that have successfully implemented power sector reforms in countries in a similar scenario to Nigeria. Further justification for this recommendation can be highlighted and inferences can be drawn based on the prevailing issues from the literature review (See Sections 1.2, 3.3, 3.4 and 3.8) and results from the data analysis and model development (See Sections 5.9 and 6.5).

8.2.9 Establishment of a Risk Management Standard

A risk management standard should be established that is tailored towards the Nigerian environment (RMS ISO 31000:2009). This entails establishing a comprehensive risk management model, which aims to tackle risk difficulties that are inherent within the Nigerian environment (See Section 2.11).

Furthermore, the government needs to take an active role in risk management as it is not just limited to the Nigerian power sector but other sectors of the Nigerian economy (See Section 5.9). This will entail setting up agencies and boards that are tasked with risk framework implementation, along with the constant review of risk practices to meet world and industry best practices. This can be achieved through active collaboration with the Nigeria private sector (See Section 6.4 and 6.5).

8.3 Directions for Future Studies

As mentioned in the previous chapter, every study has limitations deriving from different shortcomings encountered throughout the research. Some of these shortcomings are directly related to the scarcity of existing research in the field and can therefore be identified and classified as recommendations for further studies. Others are not necessarily related to existing research, but to the limitations imposed by the context within which the research is performed, for example, those imposed by the research's timeframe. However, these also indicate relevant starting points for developing further research. The study conducted, therefore, offered relevant suggestions for future research based on the research topic:

- Within this study, a risk management implementation framework appropriate for the power sector was developed. A similar one could be developed for other sectors of the Nigerian economy too. A clear understanding of the proposed risk management model and its extension, if applicable, to other sectors of the Nigerian economy could encourage and facilitate research in this direction. The reason behind this is that a comparative study could be carried out with the view to ascertain the level of implementation of risk management in other sectors of the Nigerian economy. This would clearly help to further understand if the knowledge gap existing in the area of risk management in the power sector applies to other sectors of the economy as well. As proper risk management implementation enhances the efficiency of projects, and since efficient projects lead to prosperity and economic development, analysing other Nigerian economic sectors from this perspective is an important component of the national strategy for development.
- More research is required in ascertaining the level of risk management practices and the level of implementation in respect to power projects in distribution, generation and transmission within their organisations to understand which area requires a more developed risk implementation model. In addition to this a comparative study between Nigeria and other Africa Nations who have the same or share similar issues in relation to the low productivity of power and success rate of projects. A good example to justify

this can be seen in the Map of Africa showing the electricity capacity generation and energy projection (See Chapter 3- Figures 20, 21 and Table 6). This would provide, together with an ample diachronic perspective on the subject matter, a basis for proposing credible and relevant provisions on how evolution might continue. The results of such a study could be analysed in comparison with those of the present study, formulating even more reliable conclusions.

- Additionally, the outcome of this research can serve as a source of secondary data for future research on the subject. Nevertheless, some of the measures highlighted, provides significant guidelines, directions and benchmarks based on the subject (risk management) on what needs to be done, but on the other hand does not fully address how they can be achieved. Factors in relation to prevailing issues in these contexts are required and recommended for further investigation on future research.

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APPENDIX 1: SEMI-STRUCTURED INTERVIEW QUESTIONS

General Information:
How long within the power sector? And what role are you playing now?
What are your responsibilities on the project?
Are you familiar with the concept of risk management?
How would you describe a risk within the projects you take part in?
Is there a risk management process? If so what is the RMP applied within the project?
What are the risky situations you have dealt with?
Risk Identification:
How do you identify risks within your projects?
I. Individually?
II. Using risk consultants?
III. Or you allocate the risk to owners in the projects? And who/how?
IV. Do you rely on previous past experience from other projects?
V. Are there any specific risks in the power sector which may have an adverse effect on a project success? Or based on the current projects you currently engage on?
Risk Assessment (Analysis & Evaluation):
Are the risk assessed appropriately? If so, please particularise on this?
I. Individually? Or Consultants?
II. Do you use software tools?
III. Having identified a number of risks within a project, how do you prioritize them?
IV. Does the method or procedure bring about cost effectiveness on the long run?
Risk Response:
What actions do you usually take against risk (Q no. 6)? (For example; cost overruns, delays of projects, time, quality)
I. Do you rely on previous past experience from other projects?
Risk Communication & Consult:
Regardless of your role, are all individuals made aware of the importance of managing risk at

their responsibility level? If so, how?
I. Do you carry out any sort of training in relation to risk management?
II. Do you think that a formal risk management process will be essential within any organisation embarking on Power (construction) projects in Nigeria?

APPENDIX 2: QUESTIONNAIRE

PROJECT RISK ANALYSIS AND MANAGEMENT QUESTIONNAIRE

Dear Respondent

I am a PhD ESM student at Aston University, Birmingham, United Kingdom. I am carrying out research on project Risk Analysis and Management in the Power Industry, as a pilot study for my future dissertation paper.

In order to conduct a credible analysis I need a good amount of responses, therefore I would be extremely grateful for your participation.

You can complete this questionnaire at your convenience before July 2014, although it is recommended that you do so now as it requires minimal effort and takes from 5 to 10 minutes to complete.

All responses will be kept confidential, and will not be passed on to any other party. All data within this research will be gathered and presented in an anonymous and un-identifiable manner. Research is purely academic in nature; no financial gains shall be made directly or indirectly.

If you have any questions, or would like a copy of the results and findings, please contact me at the email address provided below.

I thank you greatly for your time and contribution, and appreciate your assistance with this important issue.

Kindest Regards

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PART A - PARTICULARS OF RESPONDENT

Please select one answer unless stated otherwise

1. What best describes your Company / Organization	2. What type of project is your organization typically involved in?
Project management consultancy <input type="checkbox"/>	General building <input type="checkbox"/>
Civil contractor <input type="checkbox"/>	Civil works <input type="checkbox"/>
Design build contractor <input type="checkbox"/>	Industrial projects <input type="checkbox"/>
General contractors <input type="checkbox"/>	Power Projects <input type="checkbox"/>
Others:	Telecommunication <input type="checkbox"/>
	Others:

3. Numbers of Employees In The Company/Organization

- ☐ 1 – 20
- ☐ 21 – 50
- ☐ 51 – 100
- ☐ 101 – 500
- ☐ More than 501

4. What Best Describes Your Role/Position in Your Organisation

- ☐ Company Director/CEO
- ☐ Contracts Manager
- ☐ Project Manager
- ☐ Senior Manager
- ☐ Procurement Manager
- ☐ Contractor's other Team Manager (Electrical Engineer, Civil Engineer, Structural Engineer, Mechanical Engineer, Quantity Surveyor, Architect)
- ☐ Client's Project Manager
- ☐ Consultant
- ☐ Risk Manager
- ☐ Other:

5. Years of Experience in the Power Sector

- ☐ Less than 5
- ☐ 5 – 10
- ☐ 11 – 20
- ☐ 21 or more

6. Years of Experience in Risk Management

- ☐ Less than 5
- ☐ 5 – 10
- ☐ 11 – 20
- ☐ 21 or more

7. How Did You Gain Knowledge on Risk Management

- ☐ Educational background
- ☐ Organizational Training
- ☐ Experience only
- ☐ Combination of the above
- ☐ Others (None of the above)

PART B - RISK MANAGEMENT SYSTEM WITHIN AN ORGANISATION

To what extent do you agree with the statements below with regards to your risk management within your organization

S/N	Questions	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
1.	Risk Management is a basic element of strategic management					
2.	Risk Management plan is always used in your organization					
3.	The first stage in the risk management process is the risk identification phase					
4.	Risk management system is one of the main parts of an organizations management and is typically linked to the organizational structure					
5.	Your organization considers risk management to be of high importance in the project Management process					
6.	There is a 'shared language and definitions for risk' in your organization					
7.	There is a designated 'Risk Management' team within your organization					
8.	Risk Register is always used in your organization					

PART C - RISK IDENTIFICATION AND RISK PLANNING

S/N	Questions	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
1.	Risk planning a non-stop process in a project life cycle					
2.	Risk planning/identification is the most phase of the risk management process					
3.	Risk identification and planning is carried out prior to initiating any project within your organisation	Yes	No	<i>(If yes proceed, if No continue to Part D)</i>		
4.	There is a dedicated team assigned the task for identifying and planning for risks within your organisation					
5.	Feedback loops are always ensured (planned responses are initiated, progressed, monitored, measured for success, reviewed, adjusted, closed)					
6.	Risk planning and identification although necessary is time consuming and it is best to tackle the risks as they occur rather than expend time and resources on the planning exercise					
7.	It is better to perform risk planning at project level rather than on a corporate level					
8.	When planning for risk every identified risk should be given the same priority					

9.	All identified risks usually have a negative effect/impact					
10.	Decision making is an important part of the risk planning/identification exercise					

PART D - RISK ASSESSMENT/RISK ANALYSIS

S/N	Questions	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
1.	Does your organization perform risk assessment/risk analysis	Yes No <i>(If yes proceed, if No continue to Part E)</i>				
2	Is there a dedicated team within your organization tasked with performing risk assessment?					
3.	Risk assessment in your organization is a reactive measure (It is carried out as the risk occur)					
4.	Your organization employs ONLY quantitative (e.g numerical analysis) risk analysis techniques in assessing risks					
5.	Your organization employs ONLY qualitative (e.g descriptive analysis) risk analysis techniques in assessing risks					
6.	Risk probability and impact assessment is an integral part of the risk analysis process					
7.	Quantifying and analyzing risk in a systematic way is a new process (less than 5 years) within your organisation					
8.	In the less 5 years, Project risk analysis have been carried out in ALL the projects your organization have been involved in					
9.	Risk categorization is NOT an important part of risk assessment process					
10.	Risk analysis is a tedious process that is best avoided if possible					

PART E - RISK RESPONSE & CONTROL

S/N	Questions	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
1.	Risk response is initiated ONLY after the risk is quantified	Yes No				
2.	Is there a dedicated team within your organization tasked with implementing risk response strategies?	Yes No <i>(If yes proceed, if No continue to Part E)</i>				
3.	Risk avoidance is a form of risk response technique					
4.	If an identified risk severely impacts the objects of a project and measures required to mitigate such risks are not cost effective the organization must modify its aims and objectives instead of implementing risk control measures					

5.	It is better for an organization to terminate a project if there are no risk response measures for an identified project risk					
6.	Risk retention is usually the last step in the risk response process and is usually employed when the identified risk cannot be transferred or avoided					
7.	Monitoring and review are part of the risk control process					
8.	ALL risks associated with a project can be controlled					
9.	Risk transfer/risk sharing leads to mistrust between the parties sharing the risk					
10.	Some risks are positive and can present opportunities for growth					

PART F - ADDITIONAL COMMENTS

Many thanks for taking the time to fill in this questionnaire. I would kindly appreciate any additional comments regarding the studied issue or the questionnaire itself

APPENDIX A: QUESTIONNAIRE FOR OLORUNSOGO II 754 COMBINED CYCLE

POWER PLANT

Risks Identified			
No.	Financial Risk (Finance Manager)	Risk Probability	Risk Impact
1	Lack of budgets	low	Very High
2	Inflationary conditions	low	Moderate
3	Cash Flow issues	low	Low
4	Default of contractors or suppliers	Very Low	Moderate
5	Unavailability of funds for payments	low	Low
6	Price changes on materials and equipments	Moderate	High
7	Disruption of business partners	low	High
	HR Risks (Human resource Manager)	Risk Probability	Risk Impact
8	Construction Workers not available	Low	Moderate
9	Poor quality and productivity of the workers	Moderate	High
10	Unavailability of Labour policies and manual workings	Low	Low
11	Incompetency of workers	Very Low	Moderate
12	Health issues and absentees of workers	Low	Moderate
13	Seasonal work load	Very Low	Moderate
	Contractual Risk (Contract Manager)	Risk Probability	Risk Impact
14	Direct Liability in contract	Low	High
15	Strict terms and conditions of contracts	Moderate	High
16	Invoice errors	Low	Moderate
17	low standards of suppliers and contractors	Very Low	Low
18	Delay in orders	Moderate	High
19	low standards of orders	Low	Very High

	Construction Risks (Civil Engineer)	Risk Probability	Risk Impact
20	Delay in project	Moderate	Very High
21	Shortage of equipments, machines, fuels and etc.	Moderate	High
22	low quality supply of material	Low	High
23	low quality subcontractors and contractors	Low	High
24	Not able to construct new technology or use new methods	Low	Moderate
25	Accidents, calamities and etc.	Low	Moderate
26	Poor ground conditions	Moderate	Moderate
27	Poor communication among staffs	Low	Low
28	Lack of communication between construction workers	Low	Low
29	Theft	Very Low	Low
30	Damage of material, equipment during transportation	Low	Low
31	Damage during construction	Low	Moderate
32	Low quality control	Very Low	Moderate
	Design Risks (Consultant)	Risk Probability	Risk Impact
33	Incomplete design and specification	Low	High
34	Incorrect design	Very Low	Moderate
35	Change in designs	Low	High
36	Lack of interaction between design and construction	Low	High
37	Late confirmation & approval on design	Low	Moderate
	Environmental Risks (Site Manager)	Risk Probability	Risk Impact
38	Pollution	Low	Low
39	Poor Waste management	Moderate	Low
40	Bad Weather	Moderate	Moderate

	Political Risks (Project Manager)	Risk Probability	Risk Impact
41	Unstable political scenario	High	Very high
42	Currency fluctuation	Moderate	Moderate
43	Taxation	Moderate	moderate
44	Regulatory changes	High	High
45	corruption	Moderate	High

APPENDIX B: PARTICIPANTS DEMOGRAPHIC BACKGROUND, TRANSCRIPTS AND INTERVIEWEES INFORMATION

GEOGRAPHIC REGION	COMPANY NAME	RESPONDENTS	YEARS OF EXPERIENCE	OVERALL SAMPLE SIZE	COMPANY SIZE
NIGERIA	NIPP - NATIONAL INTEGRATED POWER PROJECT	• Project Manager (Gen) – PM1	28	45	LARGE
		• Project Manager (Txn) – PM2	32		
		• Senior Manager (Txn) – SM1	12		
		• Contract Manager (Txn) – CM1	19		
		• Consultant (Planning) – CS1	29		
		• Head of Department (Dis) – HOD1	35		
		• Senior Engineer (Civil) – SE1	10		
		• Senior Engineer (Planning) – SE2	7		
		• Senior Engineer (Mechanical) – SE3	5		
		• Site Manger – STM1	8		
		TOTAL RESPONDENTS (10)	185		
	PHCN - POWER HOLDING COMPANY OF NIGERIA	• Project Manager (Txn) – PM3	22		LARGE
		• Project Manager (Dis) – PM4	36		
		• Head of Planning (Gen) – HOP1	40		
		• Senior Manager (Txn) – SM2	11		
		• Senior Manager (Electrical) – SM3	25		
		• Contract Manager – CM2	14		
		• Human Resource Manager – HRM2	8		
		• Consultant (Gen) – CS2	18		
		• Consultant (Txn) – CS3	21		

		• Head of Department (Dis) – HOD2	32		
		• Senior Engineer (Elect) – SE4	13		
		• Senior Engineer (Civil & Environmental) – SE5	16		
		• Line Manager (Gen) – LM1	27		
		• Site Manager – STM2	15		
		• Regional Manager – RM1	39		
		TOTAL RESPONDENTS (15)	337		
	MOP- MINISTRY OF POWER	• Project Manager (Construction) – PM5	24		LARGE
		• Head of Planning (Txn) – HOP2	34		
		• Senior Manager (Gen) – SM4	17		
		• Senior Manager (Dis) – SM5	26		
		• Contract Manager (Gen) – CM3	32		
		• Contract Manager (Txn) – CM4	19		
		• Human Resource Manager – HRM2	13		
		• Consultant (Projects) – CS4	36		
		• Head of Department (Gen) – HOD3	31		
		• Senior Engineer (Electrical) – SE6	7		
		• Line Manager (Planning & Txn) – LM2	12		
		• Site Manger – STM3	16		
		• Regional Manager (Gen) – RM2	44		
		TOTAL RESPONDENTS (13)	303		

	NERC NIGERIAN ELECTRICITY REGULATORY COMMISSION	• Project Manager (Implementation and Control) – PM6	29		
		• Head of Planning (Dis) – HOP3	16		
		• Senior Manager (Electrical) – SM6	12		LARGE
		• Contract Manager (Dis) – CM5	8		
		• Consultant (Planning) – CS5	20		
		• Head of Department (Txn) – HOD4	33		
		• Senior Engineer (Electrical & Planning Design) – SE7	6		
		TOTAL RESPONDENTS (7)	124		

