KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY- KUMASI, GHANA.

DEVELOPMENT OF A SUGGESTIVE FRAMEWORK FOR THE MANAGEMENT OF RISK IN THE PROCUREMENT PROCESS OF THE OIL/GAS INDUSTRY AT TULLOW OIL, GHANA

BY:

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CERTIFICATION

This is to certify that, no part of this **Dissertation** has ever being submitted to this University nor any other University or body whether for the purpose of assignment, publication or for any other purpose. I therefore declare that except for references to work of other researchers which have been duly cited, this project work consist entirely of my original research finding and that no part of it has been presented for another award elsewhere.

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ABSTRACT

Procurement has been identified as capable of adding to an organizations' competitive edge and also as a major player in every successful project. Procurement like all other

endeavors comes with risk, and very crucial are the risks that come with the undertaking of Procurement activities in the oil/gas industry.

This study was a case study geared towards the Procurement Unit (PU) of Tullow Oil, Ghana (TOG) and involved twenty working staffs from TOG. Data was collected using questionnaires which most were close-ended questions and a few being dichotomous questions which demanded yes or no answers. Analysis of the data was done using SPSS software which gave a statistical description of the data for convenient and relevant discussions to be carried out on the results.

Findings showed that TOG has a six steps procurement process which involved: identifying a need, requesting for the need, approval of budget for the need, reviewing the scope of work/specification, sourcing –which involved tendering/request for quotation, and then tender evaluation plan. Findings also showed that TOG has a general risk management plan for the perusal of the whole organization, but has none for the individual departments within the organization, thus posing challenges for departments in undertaking their risk management tasks, which the PU was not an exception. The study also revealed the lack of familiarization with the AHP and Decision Tree Model (DTM). The study therefore suggested for the adoption of the Procurement Risk Management Framework developed, which has the tendency of providing efficient results, as similar kind of framework has been applied to complex works like the establishment of an oil refinery worth millions of dollars and has been proved worthwhile.

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I pray my heavenly Fathers' blessings to all whose name I have mentioned, and even to those who have in one way or the other have been of help to me whose name I could not mention, in Jesus Christ my Lord and Savior's name, Amen.

DEDICATION

This work is dedicated to my heavenly Father and my Lord and Savior Jesus Christ for Their undeserved kindness, mercy, favor, guidance, protection upon me, and They being there for me always, Amen.

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ABBREVIATIONS

BOT	Build Operate and Transfer
IOC	Integrated Oil Companies
BP	British Petroleum
NOC	National Oil Companies
AAR	After Action Review
PO	Procurement Officer(s)
EPC	Engineering, Procurement and Construction
TOG	Tullow Oil, Ghana
PE	Procurement Entity
GNPC	Ghana National Petroleum Corporation
PP/PS	Procurement Process(es)/Stage(s)
PC	Procurement Cycle
PPP	Public Private Partnership
UCP	Uncertainty, Complex, Pace
PRM	Project Risk Management

PUM	Project Uncertainty Management
PRMF	Procurement Risk Management Framework
SSPR	Special Selected Procurement Risk
SPSS	Statistical Package for the Social Science
PU	Procurement Unit
RMP	Risk Management Process
SHAMPU	Shape, Harness, And Manage Project Uncertainty
AHP	Analytical Hierarchy Process
DSS	Decision Support System
ECEG	European Commission Expert Group
KPI	Key Performance Indicators
GSA	Government of Southern Australia

CHAPTER ONE

INTRODUCTION

1.1 Background to Study

The term risk as used in the field of construction, concerns a supervisory body which checks the compliance with building regulations to prevent any potential harm noncompliance may have on users of buildings, and the negative effect non-compliance to building regulations might have on climate change, (Berman, 2012). Risk in this instance is being interpreted as effect of non-compliance to set standards or regulations. Risk can also be associated with uncertainty, whether measurable or not measurable as expounded by Knight, and referenced by Ellsberg in his book, Risk, Ambiguity, and Savage Axiom, (Ellsberg, 1961). In this case risk is a measurable uncertainty that has to do with numerical probabilities or none measurable uncertainty that does not have the support of numerical probabilities or data. But Daniel Ellsberg tried to prove that for a rational man, all uncertainties can be reduced to risks. Although uncertainties can be narrowed down to risk, Chapman and Ward (2001) in their paper, "Transforming project risk management tried to distinguish between the two, commenting on risk as narrower than uncertainty. Risk moreover, is identified as any uncertainty that may arise in the execution of a project, and has the potential of affecting the project objectives, Schroeder and Jackson (2001). This uncertainty is the degree of occurrence or probability of occurrence and the effect is the magnitude of impact (severity). Schoroeder and Jackson (2001) quoting Kerener's definition of risk, said it is the measure of the probability and consequence of not achieving a set project goal, and basing on this, explained risk management as a means of using variables such as probability and severity to typify risk and risk events for further action or consideration.

But in a risk can be found a risk that poses as a threat, that is, the occurrence of such a risk has the potential to negatively affect a project, and also the existence of a risk that poses as an opportunity, that is, the occurrence of such a risk has the potential to impact positively on a project, (Schoroeder and Jackson, 2001). Schoroeder and Jackson (2001) underscored in their writing that teams often underestimate positive impacts of risk and concentrate more on the negative impacts, and established the process of carrying out risk management as, identifying the risk, listing them, accessing the risk, prioritizing the risk, registering and controlling the risks in a project life cycle, reducing the probability of occurrence, and the impact that will be caused by a risk that poses as a threat.

Touching on procurement and procurement processes to identify interrelationship with risk and risk management in the oil/gas industry, Nissen (2001) in the Wiley Guide to Project Technology, Supply Chain, and Procurement Management, explains procurement as a broad subject, which encompasses entities such as, functions, organizations, systems, and processes, and as a term which is changing through time, as related developments in connection to it have become necessary for the advancement of any enterprise. Procurement as pointed out by Nissen (2001) was once a clerical work, which involved purchasing well specified items, but is now a strategic area handled by senior executives in some organizations. According

Gershon, (1999, pp 5-7), there exist no one “cradle to grave” process for managing procurements which are large, complex and new.

Projects are procured internally (within an organization) as well as externally (to an outsourced entity), and generally have a mix of hard (tangible) and soft (intangible) deliverables characteristics. Turner and Cochrane (1993) developed a goal and method matrix that is useful in understanding the requirements of various types of projects,

which leads to the essence of the application of relevant procurement measures. It has been observed also by Walker et al that a one for all kindof approach to procurement is unwise. Procurement according to Nissen (2001) in The Wiley Guide to Project Technology, Supply Chain, and Procurement Management by Morris et al (2007) underscore that procurement can be described as a function, system, organization, worker skill, specific job task, and Manelli and Vincent (1995), also describe procurement as a mechanism. But Nissen (2001) establish the importance of describing procurement in various ways such as; process encompassing vendors, producers, customers along the supply chain management with their related activities; actors which comprise market researchers, and buyers; organization which undertake purchasing and contract management; and technologies which include electronic catalogues, and communication networks. It is these processes in procurement that can be varied according to the procurement options such as, the traditional approach, construction management approach, project management approach, design and construct approach, BOT approach, and Turnkey approach, to meet the project type one might choose with their associated risks.

Establishing the interrelationship of procurement process and risk, Chan et al (2010, pp. 23-29) reiterated that procurement are usually faced with suppliers, consultants or contractors failing to accomplish a project or to provide supplies as expected successfully. They further established that the consequence of project failure is due to the risk which is posed by the procuring entity or institution not having adequate information about suppliers ex ante. They proposed a model of competitive procurement and contracts for a project as a controlling mechanism. Kovacic et al (2006) presuppose cartels and collusion in procurement as a risk and worked towards analyzing ways which contracting parties can employ, whiles desisting of applying

public laws that condemn cartels, such as designing strategies of detecting cartels, by providing inducement to insiders to alert authorities about existence of cartels, strengthening the private rights of action by public agencies to support anti-cartel enforcement strategies and the remedial measures such as civil damages and criminal punishment and imprisonment, to defeat or discourage collusion in the procurement process. Again from Nissen (2001) to Kovacic (2006), is a clear indication that the type of procurement process being followed is a risk factor in the work of procurement management.

According to Inkpen and Moffett (2013), there are financial and political risks in the oil/Gas industry. Inkpen and Moffett, 2013, reiterated that Integrated Oil Companies (IOC) have come to the realization that uncertainties (risks) are inherent part of the industry, and they come in cyclical form. IOCs are oil companies that operate in several segments of the oil and gas industry from exploration to refining, marketing and retailing. Example of IOCs include, ExxonMobil, Royal Dutch (Shell), British Petroleum (BP), and Chevron. Before these IOCs became mergers, there existed Standard Oil of New York (Sacony), Standard Oil of California (Socal), Gulf Oil, Texaco, which together with Standard Oil of New Jersey (Esso), Royal Dutch (Shell), and the Anglo-Persian Oil Company formed the Seven Sisters, (Inkpen and Moffett, 2013).

Again, there is the National Oil Companies (NOC) which holds the largest oil and gas reverses in the world than the IOCs. The NOCs are partially or wholly owned by a country, but their reputation is said to be most often marred in terms of long bureaucracies and inefficiencies. Andrew and Michael Moffett gave an example of such NOCs as the National Oil Company of Indonesia, Pertamina. They described Pertamina

as being operated as autocratic manner, where transparent business practices are absent, without the involvement of any ministry, with the President

Suharto and his cronies having full control over the finances of the company. President Suharto is said to award contracts to his friends and those close to him, which consequently do not usually follow formal bidding or negotiation processes. Bppka a foreign contractor management body for Pertamina is also found to have long bureaucratic process. This kind of scenario has been observed to permeate where NOCs operate such as Venezuela, Nigeria and elsewhere in the world. According to analyst, NOCs have failed to live up to expectation almost everywhere it is in operation as they suffer from excessive and government intervention, except few places such as Norway's Statoil Hydro which is also ranked as the best NOCs. Other types of Oil Company is the Independents oil companies which are not owned by government, and focus on either the upstream or the downstream activities, and firms like Schlumberger, Halliburton and Baker Hughes which specializes in areas throughout the exploration, development and production phases and are the oil field services firms.

All these are risks factors in the procurement process, which together with other risk factors will be considered in this work. But Jacobus et al (2010) in United States Patent, Managing Procurement Risk, mentioned some more specified procurement projects or contracts which come with their accompanied procurement risks as a result of the kind of procurement approach or method applied or followed according to

Walker and Rowlison (2008) reference to the matrix developed by Turner and Cochrane (1993), and are worth mentioning for now, these include contracts such as; spot purchases, depletion of inventory for each period of a planning horizon based on forecast scenario for resource demand, price of resource, and availability of resource and a inventory carrying policy specifically for the resource. It is among these risk

factors in the procurement process and others that this work seek to identify similar relation in the oil/gas industry using the Tullow Oil, Ghana, as case study, with the Ghana National Petroleum Cooperation, and the Atuabo Gas Cooperation, as supporting institutions for this research.

1.2 Statement of the Problem

According to Commerce Edge an educational body for procurement and supply chain management, procurement risk can be detrimental to an organization, where mishaps often radiate and spun out of control, and are only identified lately, posing far more progressive consequence than what is expected, (www. commerce edge).

Carrillo (2005, pp. 1-11) mentioned that construction industry has recognized the possibility of transferring previous experiences in executed projects to others, because of certain activities which usually do repeat themselves. She continued also by saying, British Petroleum (BP) and other companies use the After Action Review (AAR) developed by the US Army and the Retrospect mechanism to build information to help them draw patterns, formats or standards to be used for future projects. She further quoted Siemieniuch and Sinclair (1999) re-emphasis the importance of taking note previous project experiences and transferring them to current undertaking projects to help minimize risk and enhance performance. It is for this reason that this work seek to unravel some of the risks that cut across the procurement contracts in the procurement process of the oil/gas industry in order to put together a framework which can facilitate the work of procurement officers in the industry to carry out their risk management task. This work will seek to apply the AAR mechanism among other factors in its' methodology in the assessment of risk in previous procurement contracts of Tullow Oil, Ghana, and other supporting companies such as the Ghana National Petroleum Cooperation, and the Atuabo Gas to develop a framework that will facilitate the

management of risk in the procurement process of the oil/gas industry by procurement officers (PO) in the industry.

About 50% of executives according to Mckenna et al (2006), are not satisfied with their companies' total project performance, citing costly budget and schedule overruns that bedevil greater percentage of their projects, which are directly linked to the engineering, procurement, and construction (EPC) contracts. This shows how important procurement officers have to consider their area of operation to ensure that they minimize their contribution towards these failures, and risk management is an area POs can consider. It is in this regard that this work has chosen to understudy previous contracts procured by the procurement entity in the Tullow Oil, Ghana, which will be the case study for this work, and other institutions like the Ghana National Petroleum Cooperation, and the Atuabo gas, and with the work of others as a benchmark, to draw relations and patterns for the development of a framework in risk management for procurement practitioners in the oil/gas industry. This is to minimize the failures in procurement contracts or projects and promote or improve efficiency and success in the procurement process and management in the oil/gas industry. Mckenna et al (2006) support the stay of this work as they mentioned the constrained of supply of oil/gas, and increase demand of the commodity as contributing to some of the following important shifts:

i. Rethinking project framework, in order for companies to make better leverage of their scarce internal resources
ii. Standardising design if possible to reduce project cost and to focus on technological innovation iii. Re-examining contractual framework in order to enhance the level of constructive cooperation owners and suppliers. These all are applicable to the upstream, middle stream, and downstream activities of

the oil/gas industry. It is these framework and standardization of designs which are essential for working environment we found ourselves, that this work seek to develop in the area of risk management in the procurement process in the oil/gas industry to facilitate the work of procurement officers in carrying out their risk management task, and to ensure improvement/efficiency and greater success in managing procurement contracts and projects.

Every kind of procurement contract/project precipitates a kind of procurement choice/approach, and every kind of procurement choice/approach has its own kind of procurement process with their associated risks. This work therefore seeks to look at the interrelationships that exist among types of procurement contract/project and the various procurement processes, and the risks that are likely to evolve out of these interrelationships or variables.

1.3 Aim of the Research

To develop a framework for managing risk associated with procurement in the oil and gas industry.

1.4 Objectives of the Research

1. To identify the processes involved in procurement at Tullow Oil, Ghana (TOG)
2. To establish whether TOG has a Procurement Risk Management Framework
3. To identify the challenges associated with the usage of TOG Procurement Risk Management Framework

4. To develop a suggestive framework for carrying risk management in the procurement process of the oil/gas industry, at TOG

1.5 Research Questions

1. What are the processes involved when undertaken procurement at TOG?
2. What are the various potential risks associated with procurement at TOG?
3. How does the Procurement Entity (PE) in TOG manage risk associated with procurement?
4. What kinds of challenges does the PE at TOG encounter in fulfilling their mandate of managing risk?
5. How can a framework for carrying out risk management in the procurement process of the oil/gas industry be developed?

1.6 Significance of Study

This research sought to through literature identify efficient framework for risk management and modify it for procurement risk management in the Procurement process of the oil/gas industry. It turns to reveal to managers and administrators of procurement how effective framework for the management of procurement risk will facilitate their work in achieving their procurement objectives, try to come out with a suggestive framework and documentation which can be easily referenced to for future decision-making, and to also facilitate the carrying out of risk management task by POs in the oil/gas industry. It is also meant to serve as a valuable resource for students and researchers in the academia.

Moreover, other relevant corporate organizations may also find the outcome of this research useful, as the framework and document may apply to their area of operations as well.

1.7 Delimitation of the Study

The study covered identifying procurement processes in the TOG, establishing whether the organization has a framework for managing procurement risk, if it has, the challenges encountered in its usage, and proposed a suggestive Procurement Risk Management Framework (PRMF) for the institution chosen for a case study and other supporting institutions. This is to help facilitate the work of procurement officers in discharging their task on risk management. This was done by comparing and benchmarking this work with work of others such as that of Dey (2012), Kalvet and Lember (2010), Chapman and Ward (2003), Hwang et al (2010) and the work of the Australia governments' document on risk management guide for procurement.

1.8 Outline of Methodology

In this work there will be an attempt to employ inductive reasoning to extract information for discussion, analysis, and development of framework to facilitate the work of procurement practitioners in the oil/gas industry. For this reason information will be sought from sources such as, chosen oil/gas industries, textbooks, articles, journals, and internet resources on procurement, procurement processes, and risk management mechanisms for procurement.

Moreover there will be direct consultation with procurement practitioners to obtain first-hand information through analysing available documents from chosen industry, administering questionnaires, and conducting interviews with practitioners from chosen oil/gas industry to obtain required information purposely for this work.

1.9 Scope of the Study

This study will take into consideration mainly the working group of the Tullow Oil, Ghana National Petroleum Cooperation (GNPC), Atuabo Gas Cooperation. Moreover it will compare and benchmark this work with the work of others such as that of Dey

(2012), Kalvet and Lember (2010), Chapman and Ward (2003), Hwang et al., 2010, and the work of the Australia governments' document on risk management guide for procurement.

1.10 Organization of the Study

The first chapter gives an overview of the whole study, which comprises background to the study, statement of the problem, aim of the study, objectives to the work, research questions, delimitation of the research, outline of the methodology of the research, and scope of the research.

The second chapter involves the reviewing of relevant works on procurement, procurement, processes, risk management for procurement, and literature on the oil/gas industry as related to procurement and risk management in procurement.

Chapter three reveals the methodology used for the study and illustrates the population sampling technique, the design of the study, instrument used for the study, and procedures used for the collection, and analyzing of the data analysis. It identifies relevant concepts and operational definition that provides variables that will direct the research to its logical conclusion.

The fourth chapter emphasizes on the description of the respondents and the analysis made on the data, and

The fifth chapter provides succinct information on findings of the study, conclusion, and recommendation(s) for the work.

CHAPTER TWO

LITERATURE REVIEW

2.1 Overview

This chapter delve into experts and professionals works on Procurement Processes or Stages, the meaning of Risk, Risk Management in focus, Risk Management in Procurement, and in the Oil/Gas industry in particular, and then different Frameworks on Risk Management and how such Framework can be developed for Procurement Risk Management in the Oil/Gas industry, at TOG.

2.2 Perspectives of Procurement Processes or Stages (PP/PS)

To put this work in proper perspective, one factor that has to be addressed is the way by which procurement is referred to. According to Nissen (2007 ,P. 217) in, the Wiley Guide to Project Technology, and Supply Chain Management, Procurement can be referred to as a:

i. Function, which can be described in terms like labour, specific job task, and work skills, ii. Organization, which describes particular entity in the whole organizational set-up, iii. A system, which involves the assessment of inputs, outputs, transfer functions, and the environment.

Love et al (n.d) in their work, reveals that Procurement System, which is one way of describing Procurement as indicated by Nissen (2007), is usually used interchangeably with contractual arrangement. Love et al (n.d), explained procurement system as organizational and allocates duties and authorities to people, and defines the roles of members in an ongoing project. They classified Procurement System to include:

i. Traditional method, ii. Design and construct method, or iii. Management method

But Nissen (2007) mentioned that he finds it useful to describe procurement as a process that is, as a series of processes interconnecting suppliers, producers, and buyers along the supply chain, with their associated activities. He emphasis that describing procurement as process, places it in a unique perspective, as it is crossfunctional, inter-organizational, systematic, and allows one to concentrate on important aspects that relate to project management, and which also support analysis that can have maximum impact on improving performance.

Subjecting this work to similar scrutiny, with the aim of developing a framework for managing risks in the procurement process of the oil/gas industry, the work seeks to look at activities involved in carrying out procurement in the oil/gas industry, and how the potential risks associated to them are managed, and out of literature try to come out with a framework that will facilitate the work of procurement officers in the oil/gas industry in carrying out their risk management task, having also in mind that a kind of procurement method and or process is also likely to influence the adoption of a particular risk management style. For this reason adopting the word process for procurement for this particular work will be appropriate and convenient, and to also help in carrying this work to its proper and logical conclusion. Thus the term Procurement Process/stages has been adopted and will be used throughout this work.

Walker et al (2008) mentioned procurement process as understanding managing relationships, identifying service levels and expectations, penalty clauses, liquidated damages etc. According to a work on how to prepare, procure, and

deliver PPP projects, Procurement Process (PP) or Bidding Process, involves: Procurement notice, Pre-qualification and listing of tenderers, inviting to tender, interacting with bidders, and evaluating of tenders and awarding of contract. Also Longford et al (2007, P. 259), described Procurement Processes as: Planning of Procurement, Planning of Solicitation, Solicitation, Selection of Source, Administration of the Contract, and Closing out of the Contract. From Procurement / Construction Risk and Quality Management, Procurement Process include: the Procurement function, Preparation of the Procurement, Procedure chosen to procure, Publicizing the procurement, the Award and Post Award events.

Procurement Process also called Procurement Cycle includes: Planning, Sourcing, Contracting, Contract Management, Execution of Works, Payments for Works / Inspections, Authorization/Approvals, and Evaluation. In general, Procurement Process or Cycle can include the following:

- -Identification of requirement
- -Determination of Method of Procurement
- Planning and Strategizing
- Procurement Requisition Solicitation
- Documents Preparation and Publication
- -Pre-Bids/Proposal Meeting and Site visit
- -Bid/Proposal Submission and Opening
- Bid/Proposal Evaluation
- -Contract Award Recommendation
- -Contract Negotiation, and - -Contract Award.

But for Walker et al (2008), project types, forms, and phases influence procurement choice. Different procurement comes with difference or similar procurement processes and different or similar risk challenges, at different stages of the procurement process. According to Akbiyikli et al (2004), risk management is a continuous process and spans all phases of a project. Therefore at various stages of the Procurement Process (PP) comes a specific kind of risk challenges. Project types or forms can be hard/tangible or soft/intangible. Walker et al (2008) quoting Turner with Cochrane (1993) paper, stated the four (4) types of project they identified, and this include:

i. Engineering projects or "earth" projects which have both goals and methods clearly defined. They cite example of such projects as: construction, shipbuilding, aerospace and manufacturing projects.

ii. Project development or "water" projects which have poorly developed methods but well-developed goals. These kinds of projects are associated to fluid, but are in the form in which river, stream, lake or ocean usually creates a natural boundary.

iii. Applications software development or "fire" projects are said to have a clearly stated procedure but poorly described goals.

iv. Research and organizational change projects or "air" projects, these projects are said to have poorly defined methods, and poorly defined specific goals. These kind of project are characterised as being illusive, and to make these projects less difficult to deal with, is to either separate
the outcomes into several phased projects or to fully link the tangible and intangible outcomes.

Walker et al., (2008) further reiterated that the essential elements that influence the choice of procurement include the type of project, the expectations of the sponsors of the project, and their understanding of what constitutes value, and how it will facilitate in the delivering of the project. They also captured the several approaches which combine with several factors to determine a particular procurement choice which will suit a particular project type as:

i. Uncertainty, Complexity, Pace (UCP) model by Shenhar and Dvir (2004) ii. The two-by-two matrix cited in a paper by Shenhar and Wideman (2002) iii. Determining procurement choices based upon literature and ideas presented by people such as Tuner and Cochrane (1993), Shenhar and Dvir

(1996, 2004), Shenhar and Wideman (2002), etc iv.

Broad procurement choices using a relational table.

The various procurement choices can include:

Traditional Approach, Construction Management Approach, Design and Construct, Build Operate Transfer, Turnkey, Competitive Tendering, Request for Proposal/Quotation, Single Sourcing, Restricted/2 Stage Tendering, etc.

2.3 Focusing on the Description of Risk

Ellsberg (1961) referenced Frank Knight as saying there are measureable uncertainties (risks). That is uncertainties which can be represented by numerical probabilities, and there are non-measurable uncertainties (risks), these are uncertainties which cannot be represented by numerical probabilities. In the later sense of risk, there may not exist statistical figures of events to base on to make decisions, yet it has been observed that people have turn to behave as though there exist numerical probabilities and try to assigned degree of belief most often to events impinging on their actions although there

exist no numerical figures. Although in some sense non-measurable uncertainties may not be likely considered as risk, Ramsey is referenced by Ellsberg as establishing the fact that to a rational man, all uncertainties can be reduced to risks.

Ward and Chapman (2001, P. 97) mentioned Green's characterization of project risk as primarily concerned with quantitative techniques (that is, supporting the use of numerical quantities in the prediction of risks). But Ward and Chapman (2001) registered their disagreement with Green's (2001) position as being inappropriately narrowed, mentioning Green's position as not paying attention to uncertainty associated with stakeholder interaction between construction projects and client organizations'. In this sense Ward and Chapman (2001), are supporting that aspect of uncertainties that avails themselves less to numerical dimensions, which in such situations making plans for risk control might pose great challenges. Green's (2001) position as emphasized by Stephen Ward et al will not facilitate proper decision making, for that reason they proposed transforming Project Risk Management (PRM) to Project Uncertainty Management (PUM), to embrace non-measurable quantities.

Supposedly, as they mentioned, this will direct attention to areas of project related uncertainty and management issues which are not captured by the current PRM processes. Chapman and Ward (2001) argue that the use of the term risk restricts the management of uncertainty in projects, thus the meaning of risk per se, being narrower than the meaning of uncertainty.

Schroeder and Jackson (2007) quoted Kerzner as defining risk as an estimation of the probability and consequence of not achieving a defined project goal. They further mentioned that inherent to any economic endeavor are two kinds of risk or uncertainties, that is:

i. Uncertainties that pose as threat, and that if they occur, has the possibility of affecting project objectives negatively ii. Uncertainties that pose as opportunity, in that if they occur, has the possibility of affecting project objectives positively.

They further pointed out how risk managers place emphasis on risks that have negative events and under-estimating those that have positive impacts. Kahneman et al (1979), critique utility theory as a descriptive model of decision making under risk, and developed a new model of a prospect theory. The theory of utility looks closely to risk outcomes that are certain to the disadvantage, and the risk outcomes that are possible. Thus according to Kahneman et al (P. 263, 1979), this result in a risk aversion in choices involving sure looses. This runs closely to Schroeder and Jackson (2007) assertion of how managers consider more of risks that have negative impact to the neglect of risks which have positive impact to project objectives. They again express how components are discarded which are shared by prospects under consideration, thus leading to what they term isolation effect. In their view, they suggested the assigning of values to gains and losses, where probabilities can be applied to help in decision-making.

Moreover, as it has been usually asserted, and is also emphasized by Dallas (2006, P.5), that risk is usually managed, shared, minimized, transferred or accepted, but it cannot be ignored. Sjoberg (1999) also investigated purposely on the essence of risk reduction and arrived at the finding, that the essence of risk reduction is influenced by the severity of consequence not the probability of harm.

But the extent of perceived risk is said to be associated to the probability of harm. Again, high perceived risk is associated to high essence of risk reduction. Sjoberg establishes that risk contain both probability and consequence, just like Schroeder and Jackson (2007), and quoted Sjoberg (1991), as saying risk is directly proportional to the

probability of a negative event, and the expected consequences also grow worse. He further analyzed that experts find the definition of risk base on probability to be attractive, but that position is hard for the grasp of a layman. Moreover, small probabilities have no intuitive basis and are measured with large precision when they are paired with large consequences. In such scenario, precision is based on theoretical models, since small probabilities correlate to rare events, thus empirical data base may be insufficient for a stable estimate, and theoretical models also usually result in controversies.

Risk has been usually paired with probability and consequence, either a small probability, and a large consequence, or vice versa. The former pairing has examples as nuclear power and genetic engineering and are referred to as catastrophic or fatal risks, and the later paring has example as buying deficient product or having to bother with a drunken person in a bus, and this is also referred to as everyday or trivial risks. It has been found that trivial risks turn to possess fatal risks, thus the need to investigate trivial risks to identify the fatal risks perspective. According Weinsten (2012), risk communication is meant to make people understand the hazards they face and base on that help them to make informed decisions. But base on his drawings or conclusions, he identifies information as a major factor in the assessing level of risk perception of people. Weinsten, 2012, work also support what has already been established by Kahneman et al., (1979) that factors such as: emotions, personal values, social pressures, environmental barriers, and economic constraints among other things affect risk perception.

In summary to experts understanding on risks, what can be drawn from these views include:

- -Risk being linked to uncertainty and how such uncertainty can be measurable or reduced to numerical values and probabilities applied and how uncertainty can be non-measurable leading to people perceiving risk as a degree of belief of occurrence of particular risk, as a result of nonexistence of numerical values that can help in the application of probabilities.
- -Others also try to establish the importance of occurrences which have no numerical values in the determining of the success of a project, and Chapman and Ward (2001) are among such proponents.
- -Risk is identified not only as probability, but also consequence of not achieving defined project goals. Probability is seen as impact or severity as op cit on a project, and consequence as the severity of a risk by Sjoberg (1999. P. 131).
- -Risk as pair of probability and consequence has either asmall or a large probabilities and their consequence respectively, and vice versa, and such combination can result in trivial or fatal risk.
- -Moreover there are certain factors that affect the level of perception of risk and how it is treated, and these include among other things, emotions, individual values, societal pressures, environmental issues, and economic constraints, and
- -Risk is said to be managed, minimized, shared, transferred, or accepted, but cannot be ignored.

Having drawn from various literature on experts view mostly on risk, I cannot but to side with Chapman and Ward (2001), that risk although have measurable and nonmeasurable dimensions, and professionals are attracted more to the measurable risk or uncertainties, for a proper decision on risk to be taken on a project, there is the need to factor in the non-measurable uncertainties, since they have negative effect on the success of a project. Thus it is imperative for professionals in risk management to find

ways of including such dimension in their models of decision-making on risk in order to arrive at a near realistic view on managing the risk.

2.4 Focusing on the description of Risk Management

Moving further away from literature on risk, is considering now works on risk management in particular, and then on in relation procurement, and procurement in the oil/gas industry. As stated by several experts, Chapman and Ward (2003) also emphasized risk as to be present in our everyday endeavor, hence the need for risk management, although they identify this as a function usually not structured, but mostly based on the use of common sense, relevant knowledge, experience and instinct. They describe project risk management, as an "added-in" (ie. Integral part) to project management process, and not an "added-on", and project they defined by referencing Turner (1992) as: an endeavor in which human, material, and financial resources are organized in a novel way, to carry-out a unique scope of work of a particular specification, within constraints of cost and time, in order to achieve a common beneficial change, through the delivery of quantified and qualitative objectives.

Project described as being a novel, give rise to new uncertainties at every given time irrespective of having being able to put certain variables together to achieve on goal or particular goals at one time or several times. Once it is a new project, it is a novelty and there surrounds it uncertainties which are peculiar to it, by virtue of environmental factors, human factors, material factors, and other relevant factors. In

Wiley's Financial Energy and Power Risk Management by Eydeland et al., (2003), managing risk comes in terms of pricing and hedging, that is, implementing trading/hedging structure. Procurement concerns buying a product/a project, and pricing of a project do not come in the way like pricing in the selling of fuel product which market volatility might call for this measure. Although procurement concerns

buying and involves buying of a product/project, most of products/projects are not volatile like the selling of fuel products which might call for trading/hedging structure, but with the kinds of equipment and services needed in the oil/gas industry which now dwells mostly on technology, and technology keeps changing, the industry Procurement entity might finding this way of managing risk in the pricing of projects in their contract management worthwhile.

Heinz-Peter (2010) described risk management as an activity which integrates the recognition of risk, risk assessment, developing strategies to manage it, and mitigation of risk using management resources. Risk management as expressed by Heinz-Peter is related to different kinds of risks such as:

i. traditional risk management-This centres on risks which relates to physical or legal causes such as natural disasters or fires, accidents or deaths ii. Financial risk management which focuses on risk that can be managed while trading financially

iii. Project risk management which focuses on managing threats and opportunities in a project.

In all these kinds of managing risk, the purpose is to minimize various risks to acceptable levels. Akintoye et al., (1996) mentioned a survey conducted by Simister with thirty-seven (37) members of the UK Association of Project Managers from various working related groups to obtained feedback on varied views of risk analysis and management, and found out for organizational management as one of the aspect, that contractors emphasized on risk associated with cost. For the management of risk as the other aspect, they cited risk management as a combination of risk retention, transfer, reduction, and avoidance. But they emphasized that risk retention according to William and Heins (1989) becomes optional when risk prevention or transfer is impossible, and

risk avoidance is undesirable, and possible financial loss is small, and the probability of the occurrence of risk is negligible, and the transfer of risk is uneconomic. Mills (2001) quoted Jacfar and Anderson (1995) as establishing that the management of risk can be viewed in three (3) stages, that is, risk identification, risk analysis, and risk response. For the identification of risk, Godfrey (1996) is quoted as stating that the main question to be asked is what are the discrete features of the project which might cause a particular failure? For the analysis of risk, techniques such as: code optimization, sensitivity analysis, probabilistic analysis and Monte Carlo Simulation, and kinetic free analysis are available. For risk response, it includes one or a combination in: avoidance to risk, reducing risk, transferring risk and absorbing risk.

Heinz-Peter (2010) stated that a good acceptable definition of management of riskis that it is a systematic approach to set efficient activity procedure to tackle uncertainty, by identifying, accessing, understanding, executing, and communicating risk issues.

For Heinz-Peter, tools used in managing risk include:

i. Identification of goals and context

ii. Identification of risks iii.

Analysing risks identified iv.

Evaluation of the risks identified

v. Management of the risks vi. Monitoring and reviewing of the risks. But functionalizing risk according to Schroeder and Jackson (2007) gives a tool for sound evaluation of potential adverse effect of a project, and when the risks are uncovered according to their exposure and manageability; high profile risks are isolated for specific and detailed review by appropriate stakeholders. Afterwards results are quantified in Expected Monetary Value (EMV) or

visualized in Pareto-style graphics to display the most prevalent risks rank-order.

Dallas (2006), tried to underscore the essence of value management in relation to risk management. In doing so, he stated that unless value is properly defined at the outset and then in the delivered final product, value cannot be optimized. Again on risk management, he stated that unless risk is identified and its consequences managed, value will not be achieved. When the two explanations are put together and analyzed, then it can be deciphered that value can be assessed on its own merit without considering as a factor. But for risk, it cannot be assessed without taking into account value. In this sense, value in a particular project can be assessed together with risk to help in managing risk properly. But to concentrate on managing value together with risk will be a double task which will have the likelihood of leading to several inefficiencies. Since the time that will be needed to consider managing risk effectively to obtain value, the same time will be required to be needed to manage value itself which risk is being managed to achieve. This will henceforth result in time wastage and inefficiency.

As op cit, projects involving energy in the upstream sector are usually faced with magnitudes combination of risks, and most often the kind of risk which are not commonly experienced, which are usually not so in other traditional projects.

2.5 Risk Management and the Procurement Process

The already description already gathered on risk management from experts are in generic terms, and drawing narrower on the management of risk and its relation to procurement process, will be considering mostly the works of the Government of

South Australia-GSA (2015), Hwang et al., (2010), and Kalvet and Lember (2010). Describing risk management as it relates to procurement process, the GSA (2015), states that it is a way of identifying, assessing, and managing risks associated with the purchase of goods or services, to ensure that unexpected or undesirable outcomes are minimized, while achieving the objectives of the procurement. The GSA reiterates that Practitioners who manage procurement risk well are more likely to achieve the project outcomes and objectives, and establishes Risk Management process as follows:

i. Communicating Consultation throughout the process ii. Establishing the procurement context iii. Identifying Risks iv. Analysing Risks
v. Evaluating Risks
vi. Treating Risks, and vii. Monitoring and Reviewing in an on on going basis

GSA (2015) further establishes common procurement risk categories as:

i. Planning and Preparation ii. Product/Service iii. Procurement Process iv. Industry and Suppliers
v. Management
vi. Stakeholders and vii. Contract.

For Hwang et al (2010), establish procurement risk management strategy for manufacturers who may need to purchase to purchase components parts on the market at the market rates or may enter into forward supply contracts in which settlement takes place in the future at a currently agreed upon price or a pre-defined price mechanism

such as a price indexed to other external or internal price mechanism. In the commodity resource markets they establish that suppliers have large discrepancies between forecasted demand and actual demand, therefore manufacturers or procurers can benefit from this in the following ways:

i. If the future contract cost is lower than the future market price ii. Increased price predictability provided by future supply contracts, if fixed price or price cap agreements help protect manufacturers' margin from possible component price increases, and iii. Assurance of supply provided by the contract agreements help prevent costly shortages

Manufacturers they reiterated are faced with uncertainties in demand, market price, and market availability, thus making valuing contract options difficult, especially where there are a number of contract options to be considered as a sourcing portfolio. Hwang et al invented a machine implemented procurement risk management method where inputs from one or more forward contracts in a sourcing portfolio for procuring a resource from one or more suppliers are specified and received. Inputs specifying one or more aspects of a target sourcing strategy for procuring the resource are also received and a procurement risk evaluation report comparing the sourcing portfolio and the target sourcing strategy is presented. For Hwang et al, production planning organizations such as sales, marketing and finance have knowledge of risks and uncertainties associated with the supply chain, thus consider these organizations as best positioned to manage procurement risks, but are not developed, so attempted to develop their model for procurement risk management around production planners.

2.6 Risk Management and the Procurement Process in the Oil/Gas industry

Brett Schroeder and Jackson (2007) put forward that capital projects and plant turnarounds in the oil/gas sector continue to experience high rate of failure due to failure to effectively managed risks that were identified during planning phases. Wade (1998) expound on the need of developing competency in identifying, assessing, and managing particular risk in the oil/gas industry, since they are usually plunged with highly politically charged environments. Thuyet and Ogunlana (2007) have also expounded some of the risks that affect the oil/gas industry construction project in Vietnam as follows: bureaucratic government system and long project approval procedures, poor design, incompetence of project team, inadequate tendering practices, and late internal approval processes. They in turned suggested the following mitigation measures: reforming the government system, effective partnership with foreign collaborators, training project executives, implementing contractor evaluation using multiple criteria decision-making technique, and enhancing authorities of the project people. Thuyet and Ogunlana (2007) however added that risk factors vary considerably across industry and countries, thus every organization having their own unique challenges.

Kalvet and Lember (2010) make an effort to establish how public procurement can enhance innovation and the part which this work is much concerned is the high risk management implication for procuring for innovation. Public procurement for innovation or public technology procurement is defined as when a public agency acts to purchase, a product/service/work or system that does not yet exist but could be created within a reasonable period of time, (Edquist and Hommen, 2000). Unlike usual procurement where orders can be placed for already made or off-the-shelf products, procurement for innovation might need an additional R&D work thus carry additional risks to all stakeholders. Risk management in the public sector requires putting in place

a corporate and systematic process for evaluating and addressing the impact of risks in a cost effective manner, having staff with the requisite skills to identify and assess for potential risks (National Audit office, 2000).According to Cabral et al (2006), screening for abnormally low offers and suppliers through insurance schemes, and different scoring rules that might outplay the most innovative offers comprise some of the techniques used in managing risk in procurement.

As op cit, the European Commission Expert Group-ECEG (2010) has identified five (5) major types of risks associated with public procurement for innovation, and they include:

i. Technological risks which is concerned with risks result in noncompletion, under performance, or false performance of procured service or product for reason that fall under technical operation. This can include, suppliers inability to meet to promised solutions, choosing wrong or suboptimal technology, choosing technology pre-maturely, failing to acknowledge technology compatibility, or failing to develop solution inhouse or buy components and knowledge as stated in tender process. ii. Market risks concerns situations where private demand or demand does not correspond to expectation, and public markets remain fragmented or there exist no companies who will be able to deliver the required innovation.

iii. Organisational risk, these involve all risk that cause the procurement to under- perform or fail for reasons emanating from within the organisation that is procuring. Procurement administrators are faced with challenges of cost savings, transparency, sectoral policies such as environmental, energy, industrial etc which they are to take into consideration for contradicting each other often, thus leading to the misallocation of resources.

iv. Financial risks can be categorised into two, that is, uncertainty arising in meeting target costs and the other being, the ability to secure funds needed for the project.

v. Turbulence risks-These are risks associated with large scale projects.

Just as GSA (2015) categorises risk at the various stages of the procurement process, so also does the ECEG (2010), whose categorisation is as follows:

1. Planning and preparation
2. Notification and pre-qualification
3. Tendering
4. Evaluation
5. Contract Award
6. Contract Management, and
7. Evaluation, which analysis can be carried out under the five (5) major risk areas mentioned above. Again, just as GSA, enumerates seven (7) processes for Risk Management, so also ECEG establishes three (3) major tasks for managing risks, and they are as follows:

i. Defining and assessing risks and rewards for all partners involved at the various stages of the procurement process, which include the nature of the risk, causes, source of the risk, the likelihood of the risks to occur, and the potential consequences for the occurrence of the identified risks.

ii. Taking action either to avoid or reduce the likelihood of each of the risk to materialise and allowing responsibilities to take action to reduce the likelihood.

iii. Defining actions to mitigate the potential consequences and allocating who bears the cost of mitigation, and the reduced benefit for each risk (Ward and

Chapman, 1991; Hood and Rothstein, 2000; Zhao and Duan, 2008). According to ECEG, there exist other risk management methods for procurement such as: awareness measures, contract design, early supplier involvement, training schemes etc.

2.7 Types of Frameworks for the Management of Risk in General, and risk related to Procurement with the oil/gas industry in view

Touching on available framework for the management of risk, and risk in the Procurement Process of the oil/gas industry, the works of Dey (2012), Chapman and Ward (2003), GSA (2015), and Kalvet and Lember (2010) will be considered. Dey recalled that Tuysuz and Kahraman (2006) developed a risk management framework using a fuzzy Analytical Hierarchy Process (AHP) and applied it in information technology project. From Dey (2012) point of view, there is no quantitative framework which integrates risk identification, analysis and response development, thus the reason for his work which allows for the identification, analysis, and response development and the controlling of risk throughout the project phases. The work developed a Decision Support System (DSS) which integrates risk identification, analysis, and responses development for managing construction project risks. Prasanta quoted different researchers and the extensive work done on risk management techniques in different areas such as; modelling competitive aspects of distribution channels (Xie et al, 2009), developing technology to aid in risk control across supply chain (Yang et al, 2009), managing supply chain risk (Oehmen et al, 2009), for managing enterprise risk (Wu et al, 2009), for reducing the risk of delayed delivering in make-to-order production environment (Stefansson et al, 2009). Kangan et al (1989) identified two categories of systematic models for use in risk management process and they include: Classical models (comprising probability analysis and

Monte Carlo simulation) and conceptual models, which comprise fuzzy set analysis. Some of these models according to Dey (2012) do not yield themselves for both subjective and objective approach to risk management, but the AHP as developed by Mustapha and Al-Bahar (1991) and Dey et al (1994) does resolve these shortfall, but only that it does not integrate risk analysis as shown earlier as one of the weakness of AHP.

Aside the AHP, there are several other framework developed for risk management framework which include: Alien Eyes by Wang et al (2004), this shows the hierarchical levels of risk and influence of relationships among risks; Schatteman et al (2008), this integrates computerized risk management model, which identifies and quantifies schedule risk; public private partnership means of managing risk in public sector by Shen et al (2006); using fuzzy AHP approach in information technology project demonstrated by Tuysuz and Kahraman (2006); multiple criteria decisionmaking method for minimizing risk by selecting right projects by Dey (2006) and Dey and Ramcharan (2008); identifying risks using brainstorming and deriving probability using AHP to determine impact using risk maps in project is a hierarchical framework for risk management introduced by Dey (2010). There are several others but as op cit, they lack integrating risk identification, analysis, and response development. The framework as op cit uses cause and effect diagram to identify risk, AHP to derive probability of occurrence of risk, risk map to determine impact, and decision tree analysis to measures for risk mitigation. This proposed framework has ten (10) steps as follows:

i. A work breakdown structure to identify all the work packages ii. Identifying factors that affect time, cost and quality achievement of particular work packages using cause and effect diagrams iii. Forming hierarchical risk structure in the AHP

framework considering all the risk factors likely to affect the entire project iv. Determining the likelihood of occurrences of each risk using the AHP

v. Using guesstimating to determine the severity (probability and impact) of each risk factor vi. Using probability theory to formulate the expected time and cost overrun of the project

vii. Drawing decision tree for each work package to show the possible responses with the likelihood of time and cost overrun viii. Developing risk responses ix. Calculating the EMV (ie the cost of risk response) and selecting the best option through statistical analysis and

x. Selecting the best options to be implemented. Below is the structure for Dey (2012) framework for risk management

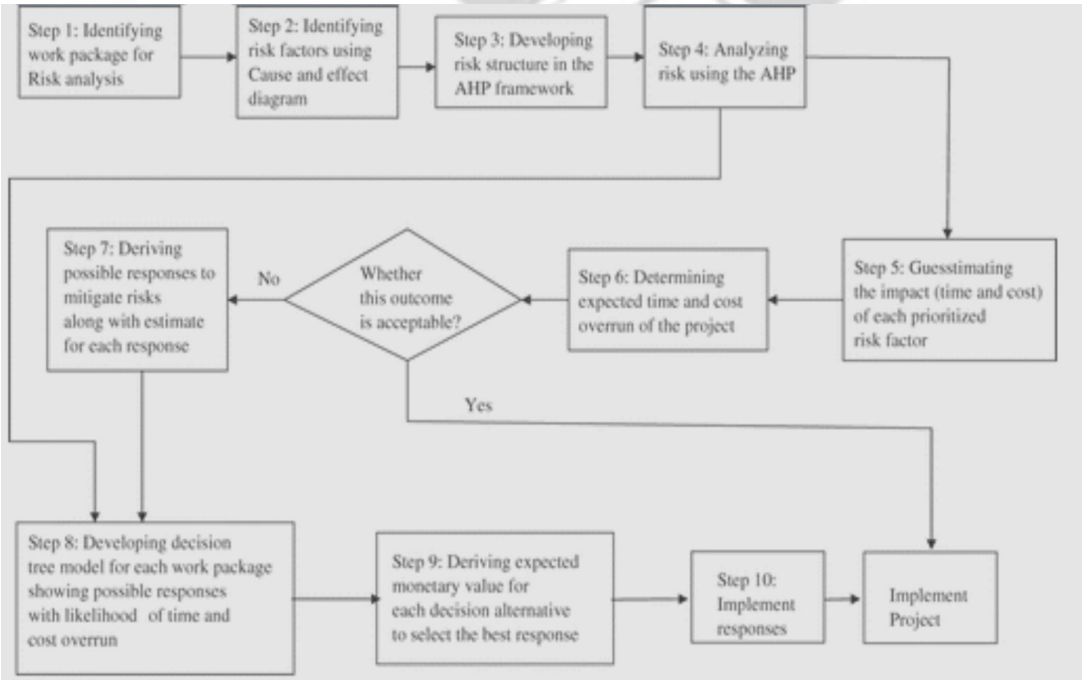

Figure 2.1 AHP risk management framework

Source: Dey, 2012

For Chapman and Ward (2003), they proposed a nine (9) stages framework for risk management and they include the following:

i. Defining the project ii.

Focusing on the process iii.

Identifying the issues iv.

Structuring the issues

v. Clarifying the ownership vi.

Estimating variability vii.

Evaluating implications viii.

Harnessing the plans, and ix.

Managing implementation.

This framework they called it SHAMPU (ie. Shape, Harness, And Manage Project Uncertainty), and the framework is presented in the below diagram:

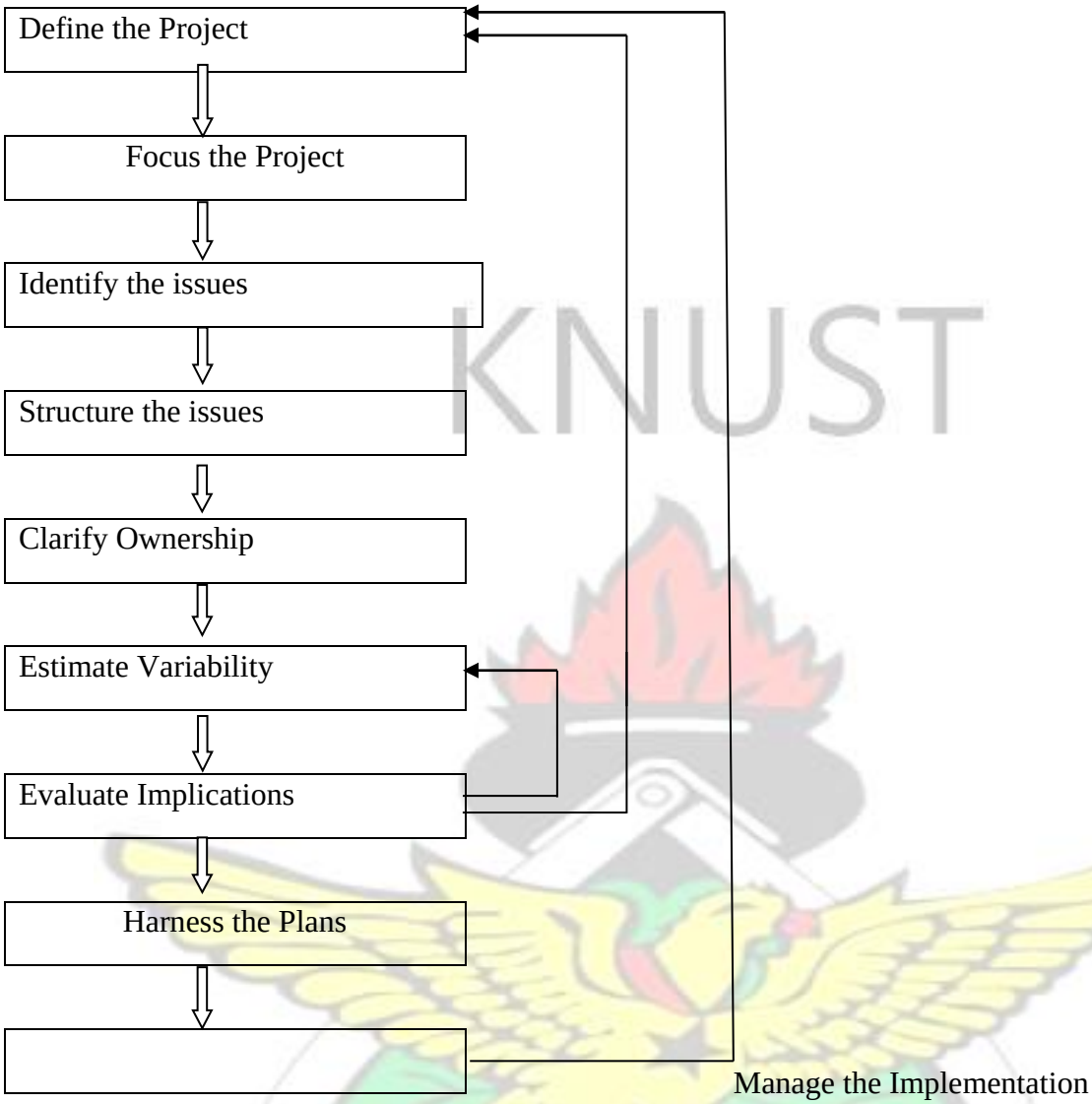

Figure 2.2 Framework for Managing Risk

Source: Chapman et al (2003)

For Hwang et al (2010) model, as mentioned earlier is a machine implemented procurement risk management where inputs from one or more forward contracts in a sourcing portfolio for procuring a resource from one or more suppliers are specified and received. Inputs specifying one or more aspects of a target sourcing strategy for procuring the resource are also received and a procurement risk evaluation report comparing the sourcing portfolio and target sourcing strategy is presented. Hwang et al consider production planning organization such as sales, marketing, and finance as having knowledge of risks and uncertainties associated with the supply chain, thus best

positioned to manage procurement risk, but are not developed, thus attempt to develop their model for Procurement Risk Management around production planners. For GSA (2015), they have the following as the framework for managing procurement risk:

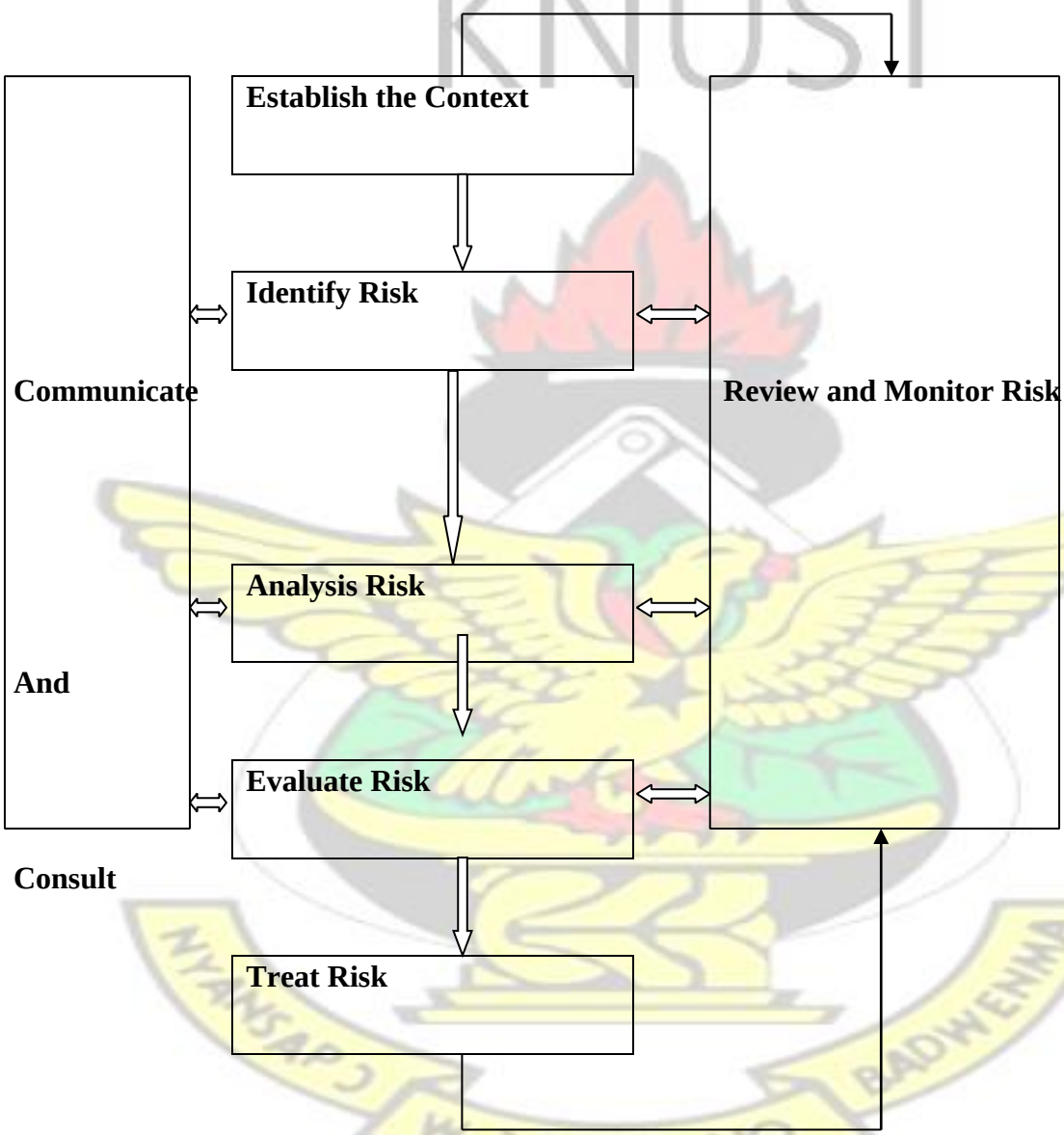

Figure 2.3 Risk management framework from the Government of Southern Australia (GSA)

For Kalvet et al, they have the following Road Map below as a form of a framework:

Figure 2.4 Risk management framework

Source: Kalvet and Lember, 2010

From the various frameworks identified, just as it was discussed in the literature and pointed out by Prasanta, they lack the integration of the identification of risk, analysing and response all together in a particular framework, thus exposing the Risk Manager in running into making consistent and effective risk management plan. It is as a result of this that this work has based mostly on the work of Dey (2012), with support from other works such that of GSA (2015), Chapman and Ward (2003); Kalvet and Lember (2010), to develop a a suggestive framework for managing risk in the procurement process of the oil/gas industry, at Tallow Oil, Group (TOG). As expounded by Chapman et al, all organizations that intend to make extensive use of risk management need to develop a formal Risk Management Process (RMP) framework, which is tailored to the specific

kinds of project and context that organization faces, and it is for this reason that this work seek to develop such a framework for the management of risk in the procurement process of the oil/gas industry, at TOG.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The purpose of this research in the first place was to develop a framework for the management of risk in the procurement process of the oil/gas industry, and to also find out whether the organization (TOG) being studied had a framework and if it had, the challenges being encountered in its usage, thus an applied research work being undertaken. Therefore this chapter discusses how the research was carried out, and included in this chapter are the following: the study design, variables, population and sample, tools used in the collection of the data, the methodology used in the collection of the data, and how the data was analysised.

3.2 Study Design

This work used analytical, applied kind of research, thus it used descriptive kind of study design and applies quantitative research methods. Thus information will be provided to officials at the Procurement Entity of TOG, and based on this determined TOGs' procurement processes, their framework for managing procurement risk if there is such a document, the challenges it faces in the application of such framework if there is such a document, and suggest an efficient procurement risk management framework for their consideration and adoption.

3.3 Study Population

A set of individuals, objects, or events of common observable characteristics in which a researcher is interested can be term as a population (Agyedu et al, 1999). It is also well-defined collection of objects or individuals of common binding characteristics or traits (Polit and Beck, 2010, 2013). Tullow Oil (TO) in general have a working force of

approximately 2000, with which 50% operate in Africa, where with there are three countries in which it operates, with Ghana being its largest operation field, hence an estimated workforce of 350-400 can be said to be working with TOG (Tullow Country Report, 2014). But in this work only members of the procurement unit were considered who numbered up to twenty (20). In this regard, all the members in the unit were given the same kind of questionnaire to answer, irrespective of their position.

3.4 Sampling Technique

The work being a case study which is targeted at a particular population, that is, the officials of the procurement unit of TOG, and as established by Denscombe (2008), that in a case study, a particular group among the lot which are all possible events is taken in which the research is carried on. In such a situation, the right kind of sampling technique to employ was the purposive sampling method, which this study so adopted. Hence purposive sampling technique was used which allowed for the selecting of officials of the Procurement Unit (PU) of TOG, who were twenty (20) in number. Out of this number, ten (10) of the questionnaires will be given to senior officials who are permanent members of the PU, and ten (10) to ex- officio members. Thus a total number of fifteen (20) questionnaires were given out to them, and they were all received.

3.5 Data Collection Instrument

Questionnaires were the instrument used in the collection of data from the officials at the PU of TOG. It was planned that a structured interview will be conducted to allow the researcher to have a good rapport with respondents and to ascertain the facts on the ground personally, but for the sake of time constraints, the researcher resorted to the use of only questionnaires. The questionnaires were structured in line with the objectives of the research of the study.

3.5.1 Questionnaire

The questionnaires were designed by the researcher and were examined by supervisor, and were found to be appropriate, and in simple sentence and language to the understanding of every average reading person. They were designed in such a manner that it takes less time to respond to them, as they involved ticking, and making simple statements for some probing questions. Parts of the questionnaire demanded the respondent to choose from a 5-point scale ranging from strongly agree to strongly disagree, and dichotomous response items which required yes or no answers. The questionnaires were put into sections, with each section addressing a particular research objective such as: section B, sought to establish the processes involved in the procurement process of TOG; section C sought to establish whether TOG has a Procurement Risk Management Framework (PRMF); and the section D, Proposed a suggestive PRMF taking into consideration the understanding of PO on certain factors as used mostly in the work of Dey, with the support of Chris Chapman et al (2003), GSA (2015), and Kalvet and lember, 2010, which form the benchmark of this work. The validity and reliability of the questionnaire were undertaken to establish the accuracy and consistency of the designed instrument respectively (Agyedu et al, 1999). For the validation of the instrument, the study applied content validation, where question such as: to what extent or degree does the content of the instrument measures the objectives of the instrument (Sproul, 1988). In applying content validity, friends were asked to help in establishing the adequacy ofthe content of the instrument as compared to the objective of the instrument, as posited by Kan and Best

(1993), that for content validity, there is no numerical way to express it, except to be judged by a panel as carried out by my friends. Thus, this approach was applied and the results were positive, that the instrument measures the objectives of the instrument,

which in this case was the sub-heading for the sections B-D. For establishing the Internal Consistency of this work, especially for the Section C of the Questionnaires of this work, which is in connection to reliability, the SpearmanBrown Reliability was applied, this states that:

$$R_{SB} = \frac{2Rhh}{1 + Rhh}$$

Here the items in this part of the questionnaires were split into two, by taking each item one half of the test. By summing up each half and finding their averages a correlation can be done and a correlation mean, $R_{xy} = \frac{\sum(X-\bar{X})(Y-\bar{Y})}{\sqrt{[\sum(X-\bar{X})^2][\sum(Y-\bar{Y})^2]}}$ in doing so R_{xy} was determined and was found to be, -0.0021500. Replacing R_{xy} with Rhh, R_{SB} was calculated and determined as follows:

$$R_{SB}=\frac{2Rhh}{1+Rhh}$$

$$R_{SB}=\frac{2(-0.0021500)}{1+(-0.0021500)}$$

$$R_{SB}=-0.0043094$$

From the result obtained it can be explained that the measure did not have a good reliability in my sample, as Nunnally (1978) has establish a value of 0.7 to be an acceptable reliability coefficient, but posited that lower thresholds however are sometimes used in literature. The lower reliability may be attributed to respondents less knowledge of certain variables used in questionnaire items.

3.5.2 Administration of Questionnaire

The questionnaires for the sake of time, travel distance, and tight schedule were delivered to respondents by a representative of the researcher to be administered to officials in the PU at TOG

3.6 Data Analysis

The data obtained from respondent were coded, keyed into, and analyzed using SPSS. Descriptive statistics such as frequencies, percentages, mean and standard deviations were used to present data in pictorial and table forms. Discussions were then carried out on them and through which a framework for the management of risk in the procurement process was developed and suggested.

3.7 Ethical Issues

Respondents were informed of the purpose of the research, and were free to decide whether to participate or not. They were also assured the responses were purely for academic purpose.

3.8 Information on TOG

Tullow Oil is Africa's leading independent oil and gas, exploration and production group.

Our operations in Ghana began in 2006. A year later the world-class Jubilee field was discovered and first oil was achieved in late 2010. This milestone marked Ghana's emergence as anew player in West Africa's energy industry. Further exploration activities resulted in the Tweneboa, Enyenra & Ntomme (TEN) discoveries in the Deepwater Tano block. A Plan of Development was approved for the TEN Project in 2013 and first oil is forecast for mid-2016.

Tullow Oil plc has been listed on the Ghana Stock Exchange since 2011 (Tullow Ghana Report, 2014).

CHAPTER FOUR

RESULTS, DATA ANALYSIS AND DISCUSSIONS

4.1 Introduction

This chapter displays the result of the study from the questionnaires administered to officials and ex officio members of the PU of Tallow Oil Ghana. The results are analyzed using tables and figures, followed by discussions on emerging issues.

4.2 Demographic Characteristics of Respondents

The study sought to distribute respondents by their demographic characteristics to determine the qualification of selected respondents to respond to the questionnaire instruments and also to determine if demographics had any influence on the findings of the study.

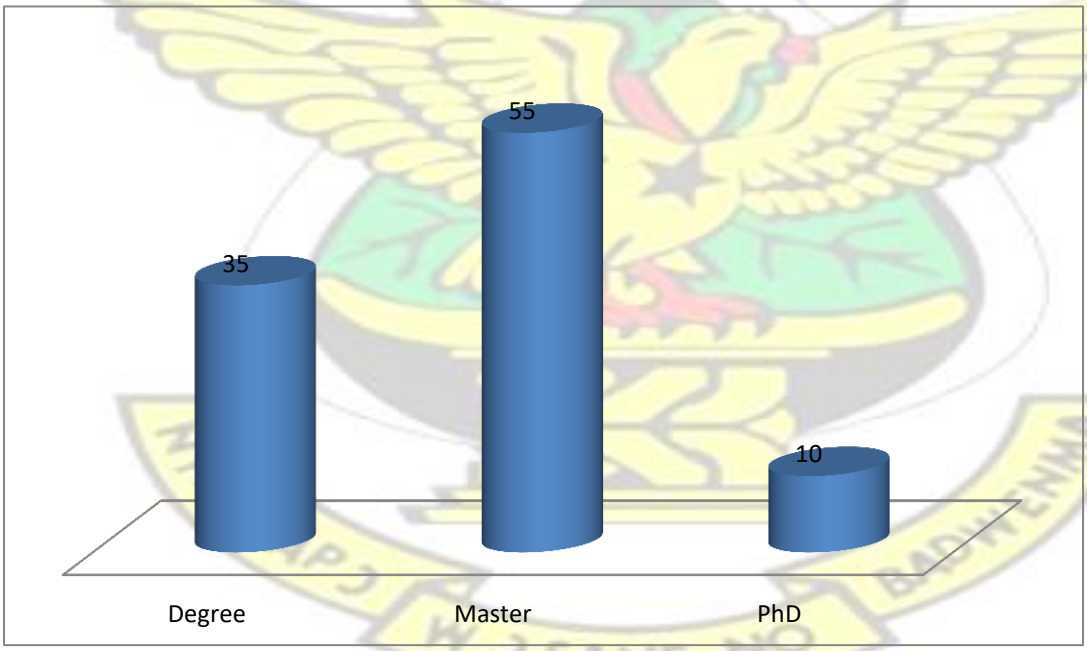

Figure 4.1 Academic qualifications of respondents

Source: Field Survey, September, 2015

Figure 4.1 indicates academic qualification of respondents. The study shows that most employees eleven (11) representing (55%) have completed some form of master degree.

Seven (7) representing (35%) of employee have degrees whilst only two (2) indicating 10% of the employees have PhD. The study shows a high level of education amongst employee at Tullow Oil Ghana respondents surveyed. This finding shows that respondents were well educated to provide relevant information on risk management framework for managing procurement risk in oil and gas industry.

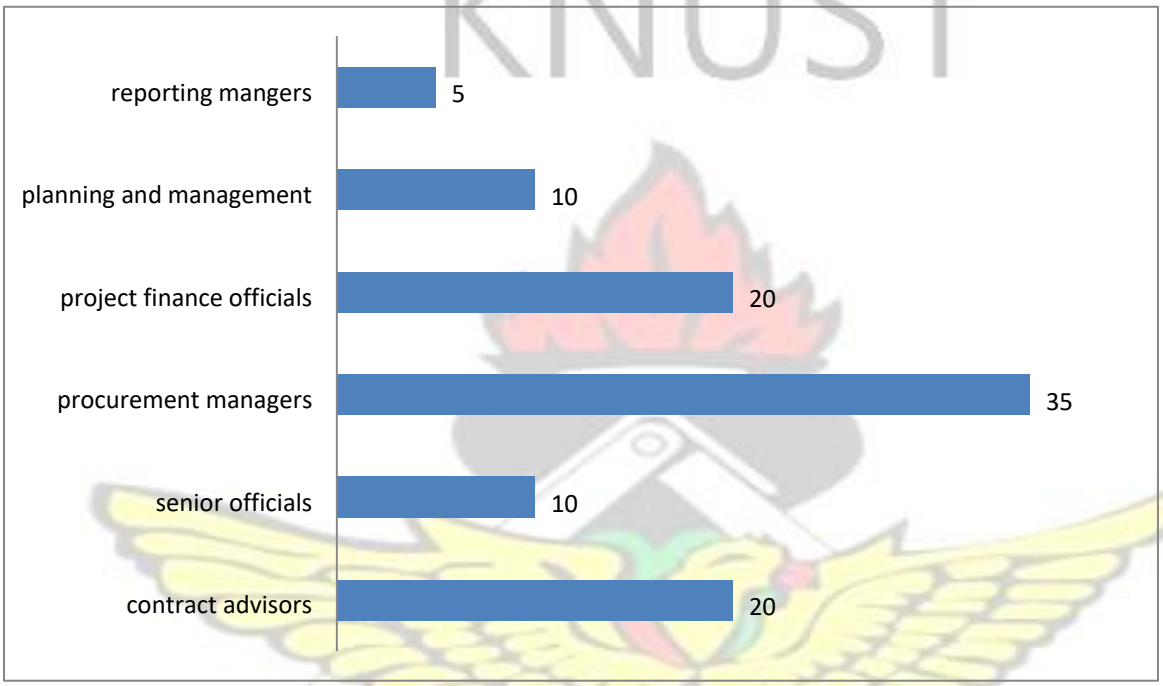

Figure 4.2 Distributions of respondents by position

Source: Field Survey, September, 2015

Figure 4.2 shows the positions of respondents within Tullow Group of companies Limited. The study discovered that majority of respondents 35% held significantly high positions therefore the study classified them as project procurement managers. 20% classified themselves as project finance officials and contract advisors, 10% were senior officials and planning and management and the remaining 5% were reporting manager. This findings show that the most, if not all the various levels of responsibility within the sampled case were included in the study.

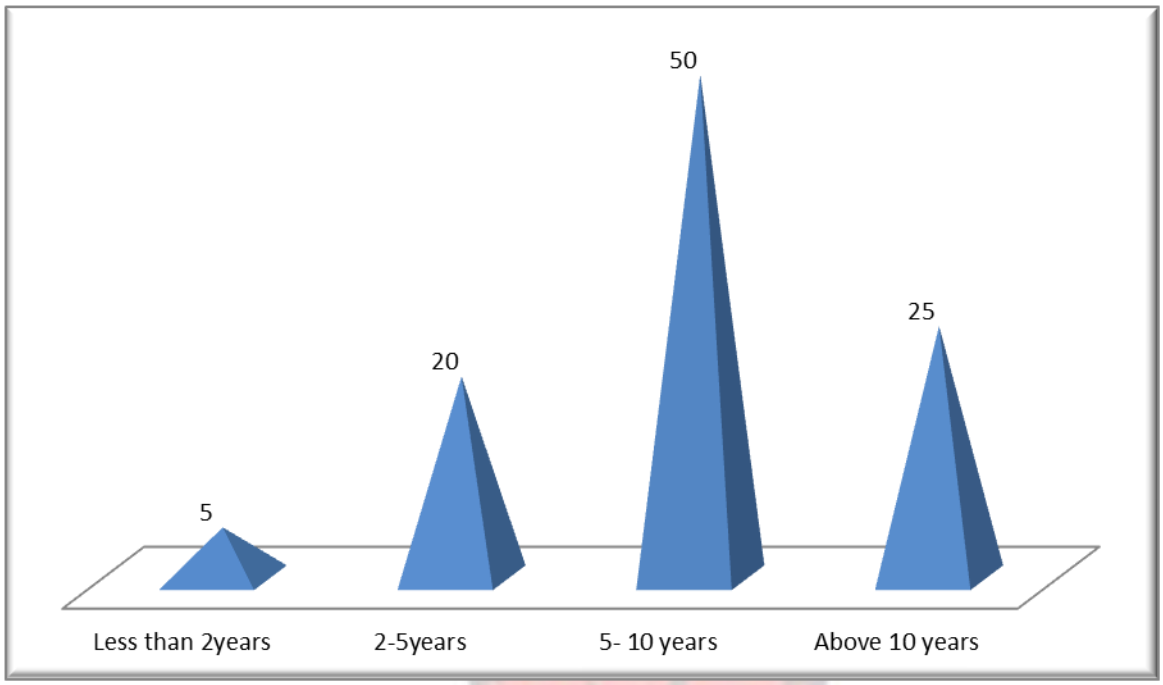

Figure 4.3 Distributions of Respondents by experience with TOG

Source: Field Survey, September, 2015

Figure 4.3 shows the distributions of respondents based on respondent's durations with Tullow Oil, Ghana. The study shows that (10)42.2% of the respondents have been with the oil company for periods between five to ten years, five (5) employees representing25% have been working with the oil company for ten years and above. However four (4) of the respondents representing 20% have worked with the oil 5 years and the remaining (1)5% have worked with the oil company for less than two years. This finding shows that the study respondents have enough experience to respond to the questionnaire instruments on risk management framework for managing procurement risk in oil and gas industry.

4.3 Examining the processes involved in procurement at Tullow oil Ghana (TOG)

Research question one (1) seek to identify processes involved in procurement at Tullow oil Ghana (TOG).

Table 4.1 stages of Procurement

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Planning	5	25.0	25.0	25.0
	Sourcing	3	15.0	15.0	40.0
	Contracting	2	10.0	10.0	50.0
	Management of Contract	2	10.0	10.0	60.0
	Execution of Works	3	15.0	15.0	75.0
	Payments for Works/Inspection	2	10.0	10.0	85.0
	Authorisation/Approvals	2	10.0	10.0	95.0
	Evaluation	1	5.0	5.0	100.0
	Total	20	100.0	100.0	

Source: Field Survey, September, 2015

From table 4.1 the study shows that, the processes involved in procurement were Planning Sourcing, Contracting, Management of Contract, and Execution of Works, Payments for Works/Inspection, Authorization/Approvals, and Evaluation. The finding show that, 25% were, Planning, 15% were Sourcing, 10% were Contracting, 10% were Management of Contract, and Execution of Works, 15% were Payments for Works/Inspection, 10% were Authorization/Approvals, and 5% were Evaluation

4.4 Examining the risk management frameworks used Tullow oil Ghana (TOG)

Research question two sought to establish whether Tullow oil Ghana has a procurement risk management. The study first sought to know if there is a difference between a Framework for Procurement Risk Management and a Plan for Procurement Risk Management.

Table 4. 2 The difference between PRMF Framework Procurement Risk

Management Plan

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	3	15.0	15.0	15.0
	Not sure	2	10.0	10.0	25.0
	Agree	3	15.0	15.0	40.0
	Strongly Agree	12	60.0	60.0	100.0
	Total	20	100.0	100.0	

Source: Field Survey, September, 2015

Table 4.2 shows responses to the questionnaire instrument on whether there was difference between a Framework for Procurement Risk Management and a Plan for Procurement Risk Management. The study shows that 60% of respondents strongly agree that there was difference between a Framework for Procurement Risk Management and a Plan for Procurement Risk Management. However 15% agree and 7% were not sure, and a significant 15% disagreed. The findings clearly showed that there was difference between a framework for procurement risk management and a plan for procurement risk management as majority of the employees were strongly agreed.

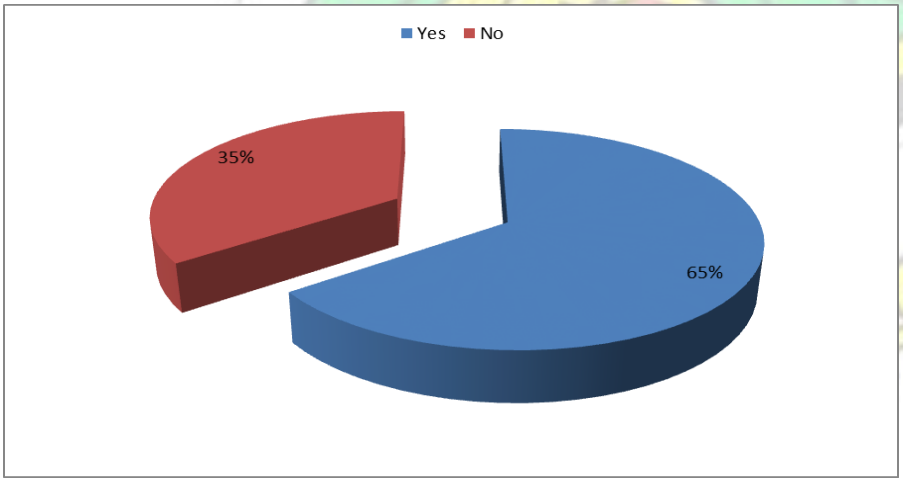

Figure 4.4 Response to kinds of Risk Management Frameworks in TOG

Source: Field Survey, September, 2015

Figure 4.4 shows responses to questionnaire item on whether there was Framework or a lay down Structure for Procurement Risk Management in TGC. The study shows that

there was Framework or a lay down Structure for Procurement Risk Management in TGC. This was attested to 65% of respondents.. This finding indicates that there was an existence of Framework or a lay down Structure for Procurement Risk Management in Tullow Group of Companies. Although response indicates that there is a Procurement Risk Management Framework, in actual reality, there is no such kind of document, as it was indicated in later response to questionnaire for agreeing with to the question which inquired of the need for a framework. Respondent might have mistaken this opposing view might mean that respondent might have misconstrue the general framework of the entire organization for the management of risk, as a framework for the management of procurement risk. TOG has a framework for the management of risk in the entire organization, but not at the departmental level.

4.5 Examining the challenges associated with the usage of TOG PRMF

Research question three sought to identify the challenges associated with the usage of TOG procurement risk management framework. Respondents were given the option to tick any and all aspects of four challenges associated with the usage of TOG procurement risk management framework. The four challenges identified are; Easy to work with; Difficult to work with; Contains detailed information; and Lack detailed information.

Table 4.3 Challenges Associated with the usage of TOG procurement risk management framework

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Lacks Detailed Information	8	40.0	40.0	40.0
Difficult to work with	6	30.0	30.0	70.0
Contains Detailed Information	4	20.0	20.0	90.0
Easy to work with	2	10.0	10.0	100.0

Total	20	100.0	100.0

Source: Field survey, September, 2015

Table 4.3 challenges associated with the usage of TOG procurement risk management framework. Lacks detailed information; this was overwhelmingly cited by 40% of the sample respondents. 30% of respondents also cited Difficult to work with, 20% cited Contains detailed information, and the remaining 10% cited Easy to work with.

The finding clearly shows that, the majority representing 70% of the employees cited Difficulty in the use of the available framework at TOG. This was the case because of the reason mentioned on for the lack of a Risk Management Framework for the individual departments, which the PU is part, although there is a general framework for the management of risk for the entire organization.

4.6 A Suggestive PRMF for Oil/Gas, at Tullow Oil Ghana

Research question four sought to develop a suggestive framework for charring risk management process of the oil / gas industry at Tullow Oil Ghana. The study conducted the mean analysis to identify the central location of the data (average). Standard deviation on the other hand was conducted to measure variability and the spread of the data set and the relationship of the mean to the rest of the data. The study calculated the relation of the standard deviation to the mean, otherwise known as the coefficient of variation (CV).

Table 4.4 Suggestive PRMF

	suggestive frameworks	Mean	SD	Sig.
1	Developing expected Monetary Value (EMV) for pre-determined decision making clues to aid in selecting the best response is necessary	4.23	0.351	0.001
2	The PU needs a PRMF	3.98	0.569	0.023
3	Projects have to be well defined considering all relevant existing information about the project by the PU	3.92	0.221	0.022

4	It is important to implement the best responses selected	3.88	1.021	0.085	
5	All the Procurement risk for the stages of the PC have to be determined for every project		3.69	0.225	0.001
6	For every Project the various stages of the PC have to be		3.49	1.452	0.321 determined
7	Need to identify SSPR in the PP and categorizing them into financial, technology, market, societal/institutional, etc	3.44	1.531	0.001	
8	Guessing estimated impact of time and cost for all the identified Procurement Risks for the various stages of the Procurement Cycle is necessary	2.52	1.001	0.021	
9	Determining the expected time and cost overrun of all the identified Procurement Risks for the various stages of the Procurement Cycle is essential		2.45	0.862	0.001
10	The PU understands how to use decision tree model	2.03	0.562	0.332	
11	The PU is able to Analysis risk using Analytical Hierarchical Process.	1.43	0.125	0.003	
12	It is necessary to derive possible decision making clues or responses to mitigate risks along with estimate for each SSPR		1.21	0.452	0.002

N =20; 1=strongly disagree; 2= disagree, 3= not sure; 4= agree; 5= strongly Agree

Table 4.4 presents the Proposed Suggestive Procurement Risk Management Framework for the Oil/Gas Industry, at TGC for the Procurement Unit (PU).Developing expected Monetary Value (EMV) for pre-determined decision making clues to aid in selecting the best response is necessary (M= 4.23; SD= 0.351; p< 0.001) came out to be the most significant in members agreement to the factors which are entailed in the Suggestive Procurement Risk Management Framework for the Oil/Gas Industry, at TGC for the Procurement Unit (PU) in the facilitation of carrying out an efficient Risk Management Plan. The PU needs a PRMF, had some significance (M= 3.98; SD= 0.569; p< 0.023), indicating members agreement to such factor. Projects have to be well defined considering all relevant existing information about the project(M= 3.92; SD= 0.221; p<0.022) also had some significance, indicating members agreement to such factor in a PRMF. It is important to implement the best responses selected was quite significant with the following score (M= 3.88; SD= 1.021; p<0.085). To some extent the variables;

It was necessary to derive possible decision making clues or responses to mitigate risks along with estimate for each SSPR; The PU understands the use of decision tree model; The PU was able to Analysis risk using Analytical Hierarchical Process; Guessing estimated impact of time and cost for all the identified Procurement Risks for the various stages of the Procurement Cycle was necessary; and Determining the expected time and cost overrun of all the identified Procurement Risks for the various stages of the Procurement Cycle is essential(3) were statistically not significant at the 0.05 confident interval. This indicates the PUs' disagreement of such factors in a suggestive PRMF, and the reason for such disagreement might emanates from their unfamiliarity with these variables, especially with the factors which asked of the Procurement Units' ability to Analysis risk using Analytical Hierarchical Process (M=1.43, SD=0.125, $p<0.003$), and the necessity to derive possible decision making clues or responses to mitigate risks along with estimate for each SSPR (M= 1.21, SD= 0.452; $p< 0.002$). These all were found not to be significant, which might be due to members' unfamiliarity to these variables.

4.7 Discussions and Details on Suggestive PRMF for Oil/Gas, at Tullow Oil, Ghana.

It is by reason of the need for every organization to have its own Risk Management Framework (RMF) and the various departments based on that to develop their own unique RMF as support by Chris Chapman et al (2003), that all organizations that intend to make extensive use of a risk management, need to develop a formal Risk Management Framework (RMF), that is tailored to the specific kinds of project and to the context that organization faces. As mentioned by Dey, 2012, most frameworks lack, integrating risk identification, analysis and response measures. This is evident in TOG's Framework for Risk Management which is shown in the figure below:

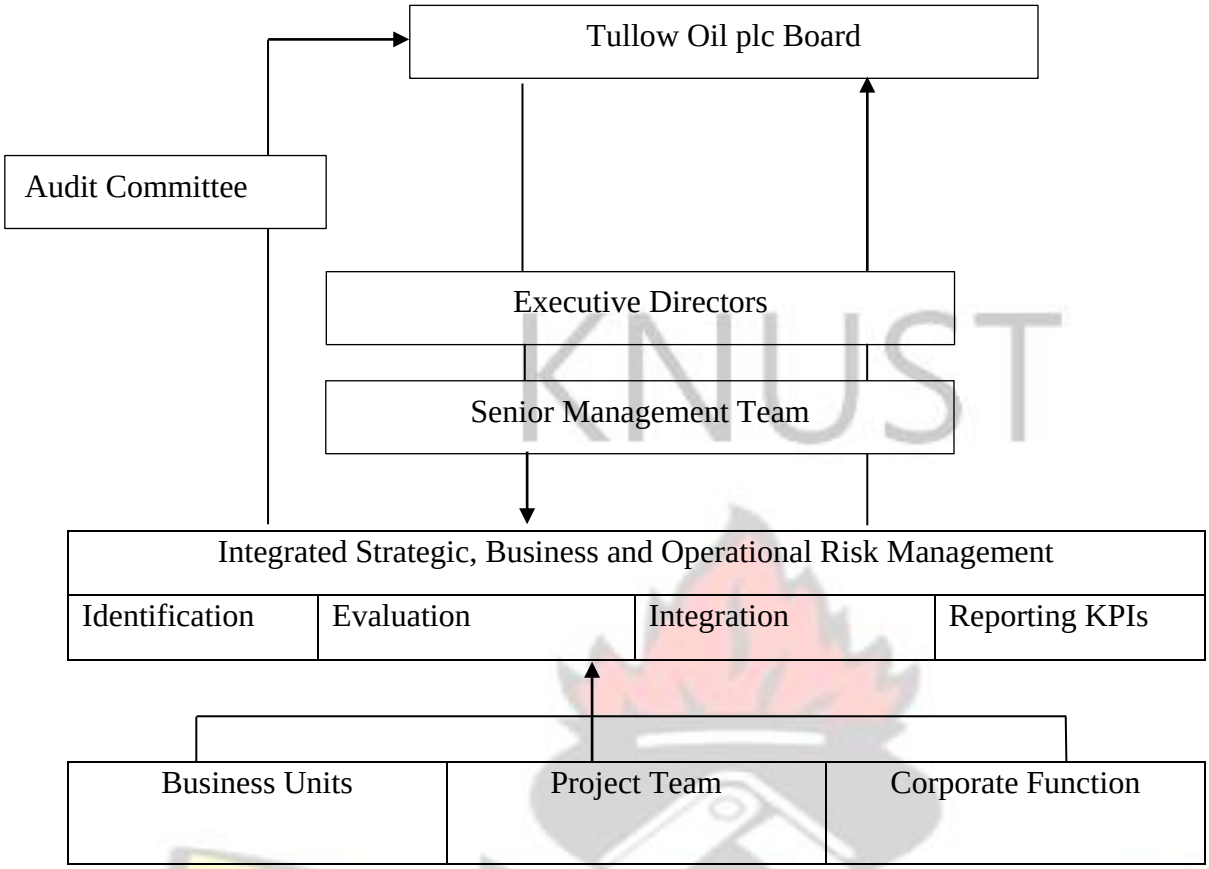

Figure 4.5 Tullow risk management framework

A close look at the framework above will reveal the challenges it lack details as to how to go about identification of risk, although it appears there how to carry out that is not mentioned anywhere, just as it was also evident in the results of the data, that there lack details in this framework, and also challenging in working with.

Although the above framework shows integrating of risk identification analysis (evaluation), and response measures in the form of reporting Key Performance Indicators (KPI), the framework lacks details in carrying out this, and thus proves challenging in its usage for members for which Procurement Unit members have shown that in their response to questionnaires. It is for this reason and the need for each department to have its own RMF aside the general one, as Chris Chapman et al was referenced earlier on as to pointing to this fact, that this work seek to develop a

suggestive PRMF base mostly on Dey(2012) work, with the support from the works of Government of Southern Australia-GSA (2015), Kalvet and Lember (2010) and Chapman and Ward (2003).

4.8 Details of Suggestive PRMF

Below is a modified RMF from Dey's work, with two (2) additional stages or processes and designed purposely for managing risk in the procurement process:

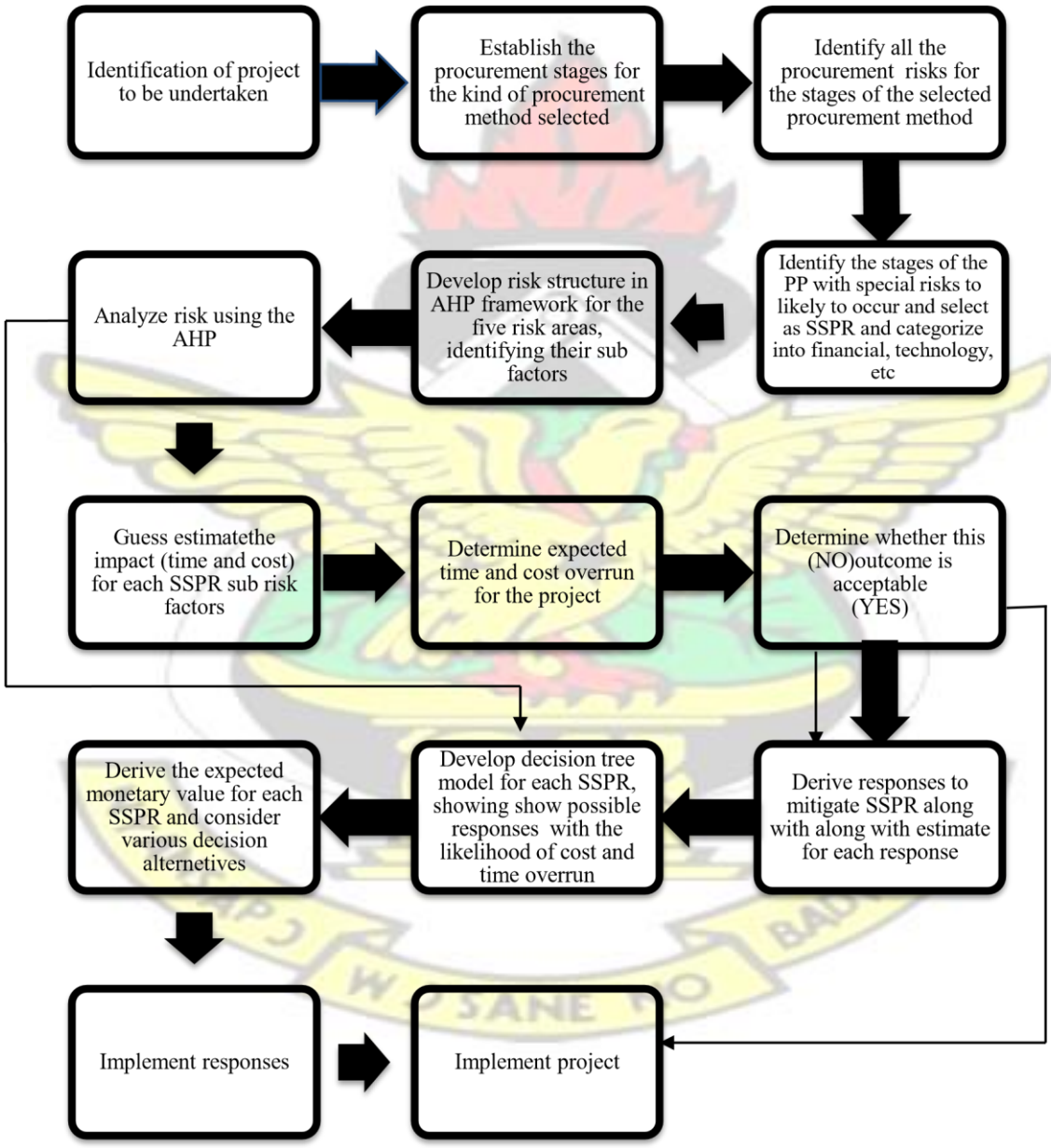

Figure 4.6: Suggestive PRMF

The various processes or stages of the framework are listed and explained as followed:

1. Identify the Project to be undertaken
2. Establish the procurement stages or processes (PS/PP) for the selected procurement method. This is necessary as different procurement projects demands particular kind of procurement method, and various procurement methods come with slightly distinguished processes to which is significant in the course of trying to manage procurement risk.
3. Identify all the procurement risks for the various processes of the selected procurement method
4. Identify the stages of procurement which comes with special risks which have a high rate of possibility of occurring, and take them as Special Selected Procurement Risks (SSPR), and categorize them into Technology, Societal/Institutional, Market, Financial, and other kinds or risks (ie constituting the five (5) risks areas).
5. Develop a risk structure in the AHP framework for the five (5) risks areas.
6. Guess estimate (time and cost) for each of the SSPR and their sub risk factors.
7. Analyze risk using AHP
8. Determine the expected time and cost overrun of the project
9. Determine whether outcome is acceptable. If it is acceptable, that is if YES it is acceptable you move down to implementing responses, but it is not, that is, if it is NO, then you continue with the processes.
10. Derive responses to mitigate SSPR along with estimate for each response.
11. Develop a decision tree model for each SSPR identified showing possible responses with likelihood of time and cost overruns.

12. Develop Expected Monetary Value (EMV) for each SSPR and consider various decision alternatives.
13. Implement responses
14. Implement Project

The developed RMF by Prasant a was applied to in the construction of a 7.5 million metric ton per annum capacity oil refinery in India, with a project cost of an estimated 600 million US Dollars, and was proven to be effective in the management of risk in the entire project.

4.9 Key Aspects of Suggestive PRMF which Needs Further Consideration

1. Identification of risks using cause and effect; For example in the PU such as TOG wants to procure a fishing vessel, what it needs to do after identifying the kind of project, and the kind of procurement method that will be relevant in the procurement of such a product, what it needs to do is to establish the all the processes involved in such a procurement method. Afterwards using the five (5) areas of risk, that is, Technology, Financial, Institution/Financial, Market and any other kind of risk, and cause and effect method, takes each stage of the process of the procurement method identified and asks question about the causes of technological risk challenges and its effects, for example on the planning stage of the procurement, with regards to the procurement of the fishing vessel. This will be done for the planning stage of the procurement method for all the five risk areas, before moving onto the next stage to do similar thing, after which greater part of all the sub risks for this procurement project might all have been discovered.
2. With the information generated from the cause and effect a risk structure in AHP framework is developed as below:

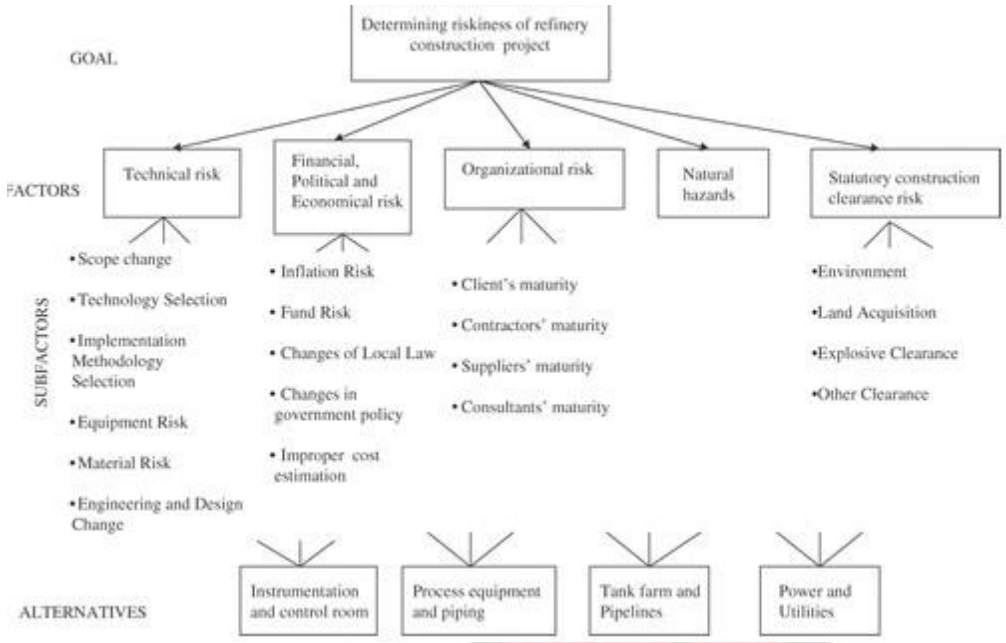

Figure 4.7: Risk structure in AHP framework

Source: Dey, 2012

3. Analysis using the AHP is done. Here the Procurement Unit (PU) has to determine the comparison of the pair of factors and sub factors in relation to the SSPR. Before doing the comparison the PU has to set up definition and explanation of how they are going to score their outcomes in the comparison: Example, using descriptions like equal importance, moderate importance, essential or strong importance, etc might mean, two activities contribute equally to the project, slightly favors one over the other, strongly favors one over the other, etc respectively. The PU considers for the five (5) risks areas which ones are very important in this particular project, and how much they want to score those ones which are of utmost importance, maybe using a five (5) point scale or whatever measuring scale it may find appropriate, and compare these with the sub factors, and does the same for the SSPR and compare that too with the sub factors. Using an Expert Choice (this can be found in: www.expertchoice.com), the result can be synthesized across hierarchy to

determine the likelihood of failure for all the SSPR, and a table of comparison matrix in factor level can be created as below:

Table 4.5: Comparison matrix in factor level

Factors	Technical risk	Financial and economical risk	Organisational risk	Natural hazards	Statutory clearance risk	
Technical risk	1	3	4	5	5	
Financial and economical risk	1/3	1	2	3	3	
Organisational risk	1/4	1/2	1	2	2	
Natural hazards	1/5	1/3	1/2	1	1	
Statutory clearance risk	1/5	1/3	1/2	1	1	
Column sum	1.9833	5.1667	8	12	12	
Normalised matrix to determine the likelihood of failure from each factor						
						Likelihood
Technical risk	0.504[a]	0.581	0.500	0.417	0.417	0.484[b]
Financial and economical risk	0.168	0.194	0.250	0.250	0.250	0.222
Organisational risk	0.126	0.097	0.125	0.167	0.167	0.136
Natural hazards	0.101	0.065	0.063	0.083	0.083	0.079
Statutory clearance risk	0.101	0.065	0.063	0.083	0.083	0.079
Notes: [a]1/1.9833 = 0.504 (each cell has been divided by the column sum to form normalized matrix); [b]likelihood of risk factors is then determined by averaging the numbers across each row: Average (0.504 + 0.581 + 0.500 + 0.417 + 0.417) = 0.484).						
$\lambda_{max} = 1.9833 \times 0.484 + 5.1667 \times 0.222 + 8 \times 0.136 + 12 \times 0.079 + 12 \times 0.079 = 5.0914$; Consistency Index, $CI = (\lambda_{max} - 1)/(n-1)$; $CI = (5.0914 - 5)/(5-1) = 0.02286$, where n = size of square matrix. Consistence Ratio = (Consistency Index/Random Index) × 100; Random Index = 1.12. Consistency Ratio: 2.04, which is less than 10%. Hence it is acceptable.						

Source: Dey, 2012

4. Another tricky area is the use of the Decision Tree model. Here a decision tree model is formed for the SSPR considering the probability and severity of failure and possible responses. There following decision alternatives or responses are example:

   i. Do nothing

   ii. Carry out detailed survey iii. Use superior technology iv. Engage expert project team

   v. Implement all responses as arrived at

These decision alternatives can be derived from risk analysis study for the SSRP, expert's opinion and through brainstorming.

4.10 The Implication of the findings of this study to Management

Risk management using a combined cause and effect diagram, the AHP, DTM and the suggestive PRMF provides an effective means for managing a complex project against time, cost and quality non-achievement. The following among other factors include the benefit of using this kind of framework:

1. AHP presents an easy way to analyse each risk factor to promote the achievement project goals.
2. AHP demands the participation of project stakeholders in risk analysis and provides a rational basis for probability of project failure.
3. Risk management using the AHP incorporates all project stakeholders, thus promoting team spirit and motivation.
4. The AHP has been identified to be a convenient way of reaching an agreement in controversial decisions, as it provides decisions based on a reasonable compromise or consensus.
5. In general, the AHP is achieves its purpose through the extensive use group discussion. The combination of both the AHP and the DTM has been proved to provide an additional value.
6. The collective judgements after group decision processes usually deviate from the preliminary individual judgements. This deviation has been identified to be an indicator for a high-quality collective decision (Sniezek and Henry, 1989).
7. Although the DTM in deciding a specific course of action is not a new method, but it logically structures the risk management philosophy by identifying alternative responses in mitigating risk and incorporate management perceptions (Dey, 2012).

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the conclusions of the study and the recommendations for trial, adoption and usage of the suggestive Procurement Risk Management Framework (PRMF), and for further studies.

5.2 Conclusion

The purpose of the study was to identify the procurement process of TOG, establish whether TOG has a PRMF, and if it has, the challenges associated with its usage, and to develop a suggestive, efficient PRMF for the management of risk associated with procurement in the oil/gas industry, using a study of Tullowoil, Ghana.

5.2.1 Examining the processes involved in procurement at Tullow oil Ghana (TOG).

Research question one seek to identify processes involved in procurement at Tullow oil, Ghana (TOG). The finding shows that, the processes involved in procurement were synonymous to Planning, Sourcing, Contracting, Management of Contract, and Execution of Works, Payments for Works/Inspection, Authorization/Approvals, and Evaluation, as TOG has reduced and simplified these stages to six (6) stages of; Identifying of need, Request for need, Approval of budget, Review scope of work, sourcing-tendering/request for quotation, and Tender evaluation.

5.2.2 Examining the risk management frameworks used in TOG

Research question two sought to establish whether Tullow oil Ghana has a PRMF. Findings clearly showed that there was difference between a framework for procurement risk management and a plan for procurement risk management as majority of the employees were strongly agreed.The finding went further to establish that there

was an existence of Framework or a lay down Structure for Procurement Risk Management. Although that was the response, in reality, TOR has a general risk management framework wherewith the various departments depend on for carrying out their risk management task, which the PU was not an exception, thus respondents misconstruing one for the other. But since its framework is general for the perusal of the entire organisation, it lacked details which individual departments can fall on to facilitate their task in managing their departmental risks.The research question three which was combined with the research question two, sought to identify the challenges associated with the usage of TOG procurement risk management framework. The finding clearly shows that, the majority representing 70% of the respondents mentioned the difficulty in following the general framework in carrying out their Risk Management Plan, as a result of the lack of details in the general framework, and even in relation to their area of operation, that is, procurement.

5.2.3 Developing a Suggestive PRMF for Oil/Gas industry at Tullow Oil Ghana

Research question four seeks to develop a suggestive framework for charring risk management in the procurement process of the oil / gas industry at Tullow Oil Ghana. The study conducted the mean analysis to identify the central location of the data (average). The finding revealed that Developing expected Monetary Value (EMV) for pre-determined decision making clues to aid in selecting the best response is necessary ($M= 4.23$; $SD= 0.351$; $p< 0.001$), was very significant, indicating its familiarity in usage with members in the Procurement Unit (PU). The averages mean to the other factors or variables such as the PU was able to analysis risk using the

Analytical Hierarchical Process (AHP) has a less significant score ($M=1.43$, $SD=0.125$, $p<0.003$) indicating members unfamiliarity with its usage to members' opinion on them were minimal indicating members unfamiliarity among these

variables.

5.3 Recommendations

Based on the findings from this study, is the recommendation in support of adopting, and using the developed suggestive PRMF.

5.3.1 Planning Procurement and Using of the Suggestive PRMF

After the PU has identified its need and requested for the need, and the budget has been approved, the next stage is sourcing for TOG. This stage should be used to determine the following:

i. All the relevant stages of the particular procurement method to be applied for that particular kind of project ii. The particular areas of this particular method of procurement where most risks are likely to occur, and take them as SSPR, and afterwards determine the sub risk factors under each of the SSPR, and categorise these sub risk factors into financial, institutional/societal, market, technology, and other kinds of risk areas. iii. After this, the rest of the suggestive PRMF can be followed in the order they appear.

iv. Officials in the PU have to be sensitised in the use of AHP and decisionmaking tree model techniques to help in the usage of the suggestive PRMF, in case it is adopted for use.

5.4 Suggestion(s) for Future Research

The limitations of this research present opportunities for future research. The ability to generalize the results of this study could be enhanced by replicating the study using a larger sample and applying other complex methodology that promotes confidence in the findings of this work.

Moreover, major stakeholders of procurement of Tullow such as contractors or vendors of Tullow should be involved in future study to strengthen the results or findings of this study.

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APPENDIX (CES)

Sample of Questionnaire

QUESTIONNAIRE

This questionnaire is designed to develop a Risk Management Framework for managing Procurement Risk in oil and gas industry using Tullow Oil, Ghana (TOG) as a case study with other supporting oil/gas industries in Ghana. Kindly complete this questionnaire as objectively as possible. The information given out is solely for academic purpose and would be treated as confidential. Thank you.

A. Personal Information

Write or tick (√) the appropriate response to each question

1. Level of education: Degree ☐ Master ☐ PhD ☐ Others……

2. Position of respondent……

3. How long have you been with TOG?

Less than 2years ☐ , 2-5years ☐ , 5- 10 years ☐ , Above 10 years ☐

A. Establishing the Procurement Process of TOG

From the various stages of Procurement listed below, indicate in order using numbers which one(s) you apply when procuring in your organisation. If there are other stage(s) used which is/are not stated below, can you please state them in the spaces provided?

Planning ☐

Sourcing ☐

Contracting ☐

Management of Contract ☐

Execution of Works ☐

Payments for Works/Inspection ☐

Authorisation/Approvals ☐

Evaluation ☐

Other known Stages: ☐

..... ☐

..... ☐

..... ☐

..... ☐

.....

B. Establishing Whether TOG has Procurement Risk Management Framework, and if they have, the Challenges it Faces in its Usage

1. There is a difference between a Framework for Procurement Risk Management and a Plan for Procurement Risk Management.

   Tick the appropriate box below:

   Strongly Agree ☐ , Agree ☐ , Not Sure ☐ , Disagree ☐ ,

   Strongly Disagree ☐

2. Is there a Framework or a lay down Structure for Procurement Risk Management in TGC? Tick the appropriate box

Yes ☐ , No ☐

3. If Yes, can you state below any kind of challenge(s) experienced in its usage?
   .....
   .....

4. Tick the box below for the challenges in using TOG Procurement Risk Management Framework:

   Easy to work with ☐ Difficult to work with ☐

   Contains Detailed Information ☐ Lacks Detailed Information ☐

C. **A Proposed Suggestive Procurement Risk Management Framework for the Oil/Gas Industry, at TOG Procurement Unit (PU).**

Statement	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
1. The PD/PE needs a framework for managing Procurement Risk					
2. Projects have to be well defined considering all relevant existing information about the project by the PU					
3. The various Stages/ Processes of the Procurement Cycle have to be determined for every new kind of project.					
4. All the Procurement Risks for the various Stages/Processes of the Procurement Cycle for a particular project need to be determined.					

5. There is the need to identify risk factors for Special Selected Procurement Risk (SSPR) areas in the Procurement Processes, and categorise them into Financial, Institutional/Societal, Market, Technology and Other kinds of risk.					
6. The PU is able to Analysis risk using Analytical Hierarchical Process.					
7. Guessing estimated impact of time and cost for all the identified Procurement Risks for the various stages of the Procurement Cycle is necessary.					
8. Determining the expected time and cost overrun of all the identified Procurement Risks for the various stages of the Procurement Cycle is essential.					
9. It is necessary to derive possible decision making clues or responses to mitigate risks along with estimate for each SSPR.					
10. PU understands how to use decision tree model.					
11. Developing expected Monetary Value (EMV) for pre-determined decision making clues to aid in selecting the best response is necessary.					
12. It is important to implement the best responses selected.					