KWAME NKRUMAH UNIVERSITY OF SCIENCE

AND TECHNOLOGY

COLLEGE OF ARCHITECTURE AND PLANNING
DEPARTMENT OF BUILDING TECHNOLOGY

RISK MANAGEMENT PRACTICES AT THE TENDERING AND CONTRACTING STAGES OF PUBLIC WORKS PROCUREMENT

By

KENNETH ATTA DANQUAH (BSc BUILDING TECHNOLOGY)

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A THESIS SUBMITTED TO THE DEPARTMENT OF BUILDING TECHNOLOGY, KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF SCIENCE IN PROCUREMENT MANAGEMENT

College of Architecture and Planning

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DECLARATION AND CERTIFICATION

I hereby declare that this submission is my own work towards the MSc Procurement Management and that, to the best of my knowledge, it contains no material previously published by another person nor material which has been accepted for the award of any other degree of the University, except where due acknowledgment has been made in the text.

Kenneth Atta Danquah…… ……..……..

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Dr Theophilus Adjei- Kumi …… ……..

(Supervisor) Signature Date

Prof. Joshua Ayarkwa …… ……..

(Head of Department) Signature Date

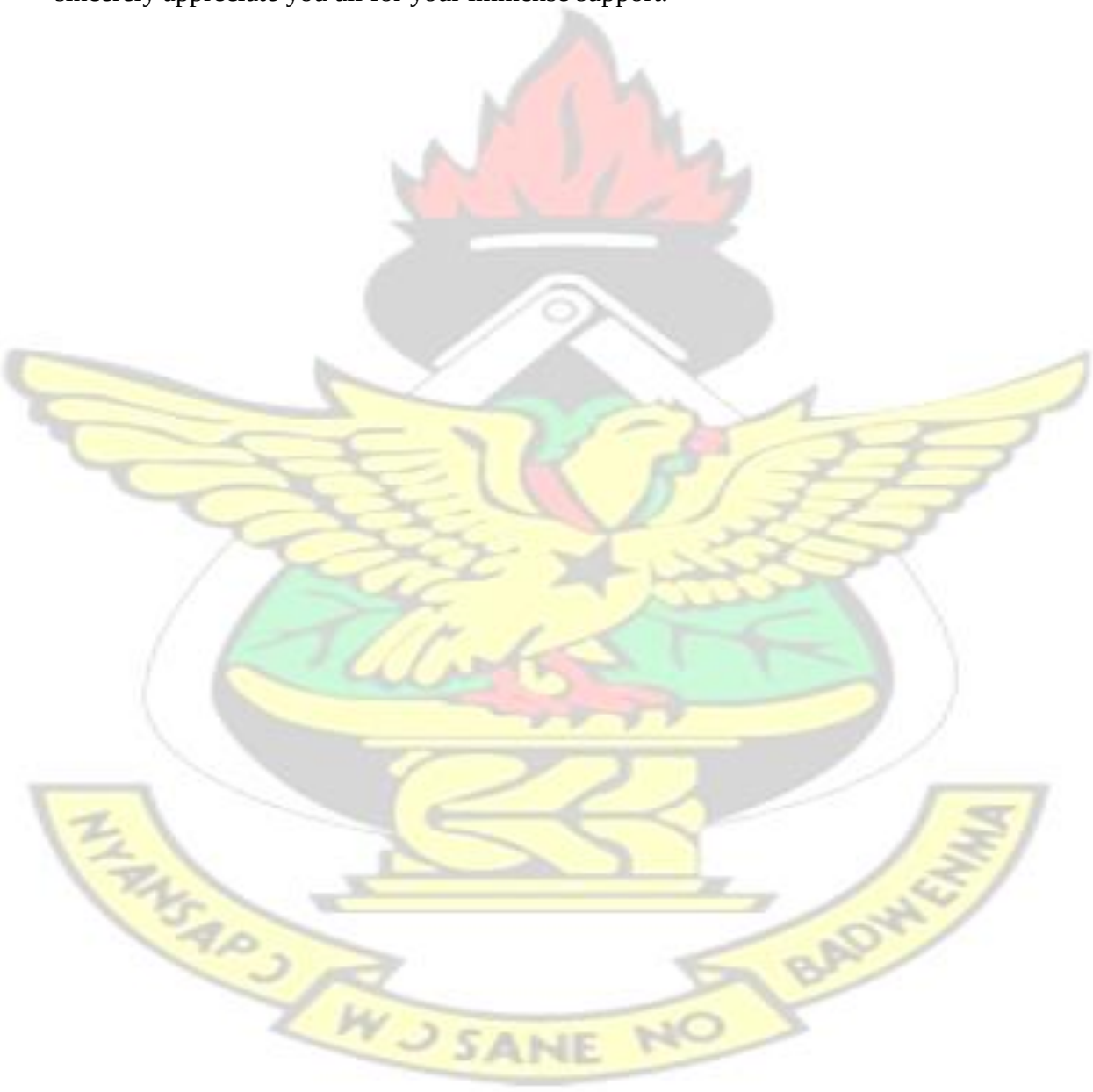
ABSTRACT

Procurement of construction works is an activity that is associated with different kinds of risks at various stages of the procurement process. This has necessitated the importance of risk management in every construction project. The purpose of the study is to identify the risk management practices adopted by public procurement entities in the procurement of works at the tendering and contracting stages (Needs assessment, Advertisement, Tendering, Tender opening, tender evaluation and award) and to assess the appropriateness to respond to timing of risks. The study adopted multiple research approaches including review of literature, interviews and questionnaire survey of Metropolitan and Municipal Assemblies and Public Consulting firms in the Ashanti Region. The findings indicated that current risk management practices depended on intuitions, judgement and experience of practitioners, most of the personnel did not have qualification in procurement. Formal risk analysis and management are rarely used due to lack of the required knowledge. The findings of the study will be of use to practitioner of procurement in especially the public sector, as well as service providers of infrastructural works. The findings of the study will provide procurement practitioners of the risks that are likely to be encountered at the tendering and contracting stages of the procurement process. From the study it is recommended that the public procurement officials in the Metropolitan, Municipal and District Assemblies be given the requisite training from time to time to get them abreast with risk management practices. In addition, the qualification of personnel to undertake the procurement process should be one that has training in risk management and also there should be a framework for risk management in the

MMDA‟s.

DEDICATION

I dedicate this work to the Almighty God for His abundant grace that He lavished on me throughout this work, and to my father and mother Mr. and Mrs. J.B.O Danquah, my family (Mrs Victoria Atta Danquah, J.B Danquah Jnr, Joshua Nana Danquah and Nana Darko) for the inspiring support, love and concern that they showed me. I sincerely appreciate you all for your immense support.



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ABBREVIATIONS

AHP	Analytic Hierarchy Process
CIB	Construction Industry Institute
CII	Construction Industry Institute
DA‟s	District Assemblies
DB	Design Build
DDB	Design-bid-build
GDP	Gross Domestic Product
GoG	Government of Ghana
ISO	International Standard Organisation
JRAP	Judgemental risk analysis process
MDA‟s	Ministries, Departments and Agencies
MMDA‟s	Metropolitan, Municipal and District Assemblies
MoF	Ministry of Finance
NCT	National Competitive Tender
OECD	Organisation for Economic Co-operation and Development
PMBOK	Project Management Book of Knowledge
PMI	Project Management Institute
PPA	Public Procurement Authority
PSSM	Procurement System Selection Model
RBS	Risk Breakdown structure

SHAMPU	Shape, Harness, and Manage Project Uncertainty
UK	United Kingdom

CHAPTER ONE

INTRODUCTION TO THE RESEARCH

1.1 INTRODUCTION

The Public Procurement Law, 2003 (Act 663) is a comprehensive legislation designed to eliminate the shortcomings and organizational weaknesses which were inherent in public procurement in Ghana. The government of Ghana, in consultation with its development partners had identified the public procurement system as an area that required urgent attention in view of the widespread perception of corrupt practices and inefficiencies, and to build trust in the procurement system.

According to Ameyaw *et. al* (2011) a study by the World Bank (2003a) reported that about 50-70% of the national budget (after personal emoluments) is procurement related. Therefore an efficient public procurement system could ensure value for money in government expenditure, which is essential to a country facing enormous developmental challenges.

The construction industry is characterized with a high risk exposure and is a field where risk management is crucial (Hastak and Shaked, 2000). The demand for risk management over the last decade, construction works has increased as a result of more complex projects. This development will continue to increase. Hence, the demand for risk management practices by both the buyer (Client) and the seller (Faber and Stewart, 2003).

1.2 Background

The level of risk increases in the beginning of a project and reaches its highest level during the tendering processes and contracting stage where the project uncertainty is at its peak (Smith *et al.,* 2008). There are various types of risks that are relevant to the

procurement process, and this indicates some governance and managerial challenges. The whole exercise builds up on the assumption that the cost of risk management cannot be exactly measured but procurers need to acknowledge in their budgets that it has a cost. It is therefore essential to get a better grasp of it, to make sure it is not excessive in terms of information and delays and to keep in mind that the cost of no risk management may be a lot higher.

The message from this exercise is that for the procurement of works someone takes responsibility for an additional cost, which leads to private and/or social returns on investment when the cost is in a reasonable relation to the benefit of the works.

Risks can be characterized by (a) their nature and origin, (b) the likelihood of them occurring and (c) the potential consequences. Risk management therefore is a process that has to deal with all these properties. It needs to be understood as a risk reward management, and that risk is to be assessed not only against the likelihood of its occurrence and the negative effects once they occur, but also weighed against the benefits out of the procurement. This conceptualization relates to the procurement cycle.

Risks are either actualized or expire the moment production starts and consequently the level of risk decreases as the project progresses. This has placed much importance on risk management at the tendering process and contracting stages (Agerberg & Ågren, 2012). Elkington and Smallman (2002) emphasized this in his claim that there is a strong relation between an early risk management and the success of a project. The large amount of resources spent in risk management activities is a fundamental factor to project success. Its therefore imperative to have early involvement of risk

management practices in both the tendering process and in the execution phase so as to create better conditions (Agerberg & Ågren, 2012).

There are various methods of procurement provided under the law for use by public procurement entities. The choice of particular method is based on the amount involved (threshold) and the circumstances surrounding the procurement. In fact, the Act and Regulation endorse the use of competitive tendering method for standard high value procurement for goods, works and consultancy services.

The Client may adopt any of the tendering methods namely National Competitive Tendering (NCT) Prices Quotation Restricted Tendering, single (sole) sourcing but before the process of Tender Evaluation, the tenders have to be submitted and opened in accordance with the instruction to tenderers.

The term "Procurement entity" refers to any entity or person that is declared by the Minister in consultation with the Public Procurement Board. These include all Government agencies, ministries, sub vented agencies and parasternal bodies. It also includes local authorities, state owned enterprises, public universities, schools and colleges and the Bank of Ghana and other financial institutions in which the Government has a majority or controlling interest (Section 15-16 of Act 663).

Risk has been explained as an event that occurs with a certain probability in combination with a consequence in the case of occurrence. However McNeil *et. al.*, (2005) defined risk as:

Risk = Probability of risk occurring x impact of risk occurring

At each stage of the tendering process, risks are encountered and thus risk management in the tendering process involves identifying what the risks are, taking appropriate efforts to control them

and taking the necessary action to effectively mitigate the likely effects of the identified risk. Against this background, and on the basis of the above definitions of risk, there are three major tasks for risk management:

1. Define and assess risks and reward for all partners involved at the various stages of the procurement process, including nature (kinds) of risks (AIRMIC *et al*., 2002), which may change during the various procurement stages, causes and sources of risk, likelihood of risks to occur, potential consequences of risk occurrence (additional costs, reduced reward).

This list should not be confused with the procurement cycle. But illustrate the major issues when it comes to risk in procurement. For each risk, take action to avoid or reduce the likelihood of risk to materialize that is „the likelihood of an adverse project outcome" (Bannerman, 2007)

And allocate responsibilities to take action to reduce the likelihood, for each risk, define action to mitigate the potential consequences and allocate who bears the cost of mitigation and the reduced benefits (contingency plan, i.e. „having in place a corporate and systematic process for evaluating and addressing the impact of risks in a cost effective way" (NAO 2000, p.2)

In summary, efficient risk management entails that risk should lie with the party able to best manage it. In procurement what is relevant is not only the capacity to identify and bear the risks but also the relative attitudes to risk on the part of the government and the contractor. The nature of the risks and how best to deal with them would depend on the relative complexity of the project. Potential problems and threats associated with the processes involved in tender submission and tender Evaluation cannot be over looked hence there is the need for its implementation of risk management system in the

procedures on public procurements of works. The fact that risk management is important not only for a single project‟s success but for the entire Entity makes it vital to investigate further.

1.3 Problem Statement

There are many generalized processes involved in Tender Submission, Tender Evaluations and Contracting of which potential threats and risks are associated with. The processes and procedures outlined in the Public Procurement Act 663 of 2003 does not explicitly identify these risks therefore the need for this research.

Procurement of works projects can be divided into four sections namely:

i. Engineering design (E) ii. Procurement (P) i.e.

Tendering and Contracting iii. Construction (C) i.e.

Implementation iv. Use of products to derive benefits (U)

From Client‟s perspective, engineering and Procurement are to a large extent planning issues. Hence these need to be tackled carefully to the benefit of the project downstream (during construction). The Procurement stage is the only stage where external and independent firms are invited to participate in the process. These firms are individuals and because of their diverse background and mode of operation which introduce more uncertainty to the process. The number and uncertainty of external and independent firms increase at this stage i.e.

- Clients and their internal structure/representative
- Engineering Consultants on the project
- External bidders
- The Public, etc

Linkage between Engineering (handled by a well-coordinated Consultant) and Construction (handled by a single engineering contractor). Defective tendering and contracting may lead to

i. Troubled Construction ii. Defective output iii. Benefits of procurement not met iv. Abandonment of projects etc.

Moreover, many entities perceive this stage to comprise mainly of administrative procedures hence do not attach the required seriousness to the process. This research will serve a comprehensive risk management tool in the procedure of Public Procurement of works. It will also help to understand the various risks that public procurers are currently facing. Identify existing risk management practices adopted by procurement entities in Ghana regarding procurement practices and derive recommendations that could help overcome this key barrier.

1.4 Aim and Objectives

The aim of this research was to identify the risk management practices adopted by procurement entities in Ghana regarding procurement of works at the tendering and contracting stages.

1.5 Objectives

The objectives of the research are as follows:

1. To identify the current practices of risk management at the tendering and contracting stages of procurement and
2. To assess the appropriateness and the timing of risk management processes during procurement of works.

1.6 Significance of the Study

The research provided risk management tools of techniques for tender submission, evaluation and contracting processes through the use of a risk assessment method to plan, identify, design and implement controls at all stages. Furthermore it addressed and proposed measures for acceptable level of risk.

1.7 Research Methodology

1. Population MMA‟s in Ashanti Region are stratified into a) Metropolitan b) Municipal
2. Sampling a) Metropolitan - all
   b) Municipals - all
   c) Consulting firms - sample sizing

The study depended on primary and secondary data. The primary data consisted of first-hand data collection through the use of structured questionnaires to personnel and entities involved in public procurement particularly in the Metropolitan, Municipal as well as solicit views from professionals in consulting/Contracting firms also involved in public procurement activities. The secondary sources of data included all information provided from the review of literature relevant to the study.

1.8 Scope of the Study

The research was limited to Metropolitan and Municipal Assemblies (MMA‟s) in the Ashanti Region of Ghana. The region is one of the most populated regions in Ghana, according to 2000 and 2010 national population and housing survey report Ashanti Region has the highest number of MMDA‟s (Ghana Statistical Service, 2005 & 2011). The research also targeted and obtained comprehensive coverage of all personnel involved in procurement process in a given entity. In all, the total number of MMDA‟s

in the region amounted to twenty (27) in Ashanti, for the administration of structured questionnaires.

All persons directly concerned in the procurement cycle in the Procurement entities were contacted, with each respondent answering the respective questions in the questionnaire based on their area of specialty. The questions were intertwined with face-to-face interviews which aided in putting down peripheral comments that was helpful in the discussion of the results in this study. This mode of administering the questionnaire created an atmosphere of transparency and enhanced high credibility and reliability of the data.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Public Procurement

Public procurement has increasingly been used to promote objectives of an economic, environmental and social nature, such as the economic development of disadvantaged social groups etc. (Arrowsmith, 2010). Public procurement is defined as the process by which government departments or agencies purchase goods and services from the private sector (Frempong *et al.*, 2013). It involves the purchase of commodities and contracting of construction works and services if such acquisition is effected through resources of state budgets or foreign aid (Ambe & Badenhorst-Weiss, 2012).

Public procurement functions in an environment of increasingly intense scrutiny driven by technology, programme reviews, and public and political expectations for service improvements (Ambe & Badenhorst-Weiss, 2012). Public procurement plays a key role in the economy of a country (Ambe & Badenhorst-Weiss, 2012). In most countries procurement expenditure represents about 8 and 20% of national Gross Domestic Product (Payne, 2014). Governments are faced with the challenge to keep achieving maximum value in procurement, due to the fact that it accounts for about 10 to15 % of a country‟s Gross Domestic Product (GDP) and for up to 65 % of public sector budgets (Chesang, 2013; Kioko & Were, 2014).

The public procurement function has been noted with a number of challenges in developed and developing countries (Chesang, 2013). The ability to accomplish procurement objectives and policies is influenced very much by internal factors, right from need assessment to evaluation of the procurement process (Chesang, 2013). It‟s therefore imperative that the factors that affect the process be taken into consideration. Several factors contribute to the success of procurement. In order to achieve the

common goal of procurement, various parties to the contract interact and condition one another, enhancing one another (Osipova, 2008).

The proper management of risk has a significant impact on the procurement and performance of a project in terms of cost, time and quality (Osipova, 2008).

2.1.2 Characteristics of the Public Sector

The public sector is often described to operate at an institutional and project level much differently than the private sector. Relative to their private sector counterparts, the operating environment is one in which objectives and/or mission statements tend to change as per the changes in the governing political agenda and departmental funding decisions are often influenced by competition for funding, lack of available resources and compromises across departments. Also, the public sector is often seen as slow moving, rigid, operating in an environment of ever changing priorities directed by their political masters and responding to multiple stakeholders in hierarchical institutional management. Euske (2003) summarizes differences identified by scholars across public, non-profit and private sectors including "profit focus versus political focus, measurability of objectives, attitudes, accountability, the social good versus the bottom line, rational versus political decision making, contrasting personnel systems, the degree of control of the executive, time as available, duration of projects, and the concept of agency".

Euske (2003) follows with a comprehensive comparison of the differences across public, private and non-profit sectors at the institutional level categorized relative to the following factors**:**

1. *Environmental*: Markets, Revenues, Constraints, Political Influence
2. *Transactional:* Coerciveness, scope of impact, public scrutiny, ownership

3. *Organizational Processes:* Goals, Authority limits, performance expectations, incentives differences, at the institutional level as well as similarities may serve to inform and improve learning and processes carried out in infrastructure project delivery.

In the context of infrastructure project delivery, understanding the differences at the operational level in the delivery and management of a project across the public and private sector is important in understanding the context and complexity of the environment to which the thesis framework is developed.

2.2 General Project Delivery Phases

Infrastructural projects generally have a long life, averagely of years with multiple phases over the project lifecycle in which the project objectives, risks and stakeholders change (Nelms, 2012). The Project Management Institute (PMI, 2000) defined a project life cycle as "a collection of generally sequential and sometimes overlapping project phases whose name and number are determined by the management and control needs of the organization or organizations involved in the project, the nature of the project itself and its area of application". The PMI generic lifecycle structure includes four phases and associated project management deliverables:

- Starting the project (deliverable: project charter)
- Organizing and preparing (deliverable: project management plan)
- Carrying out the work (deliverable: Accepted deliverables)
- Closing the project (deliverable: Achieved project documents)

The lifecycle process implemented across organizations is similar on projects (i.e. that defined by the PMI), but the specific steps and tasks performed vary depending on the nature of the

organization and infrastructure type, procurement method selected and organizational approvals, oversight and governance requirements.

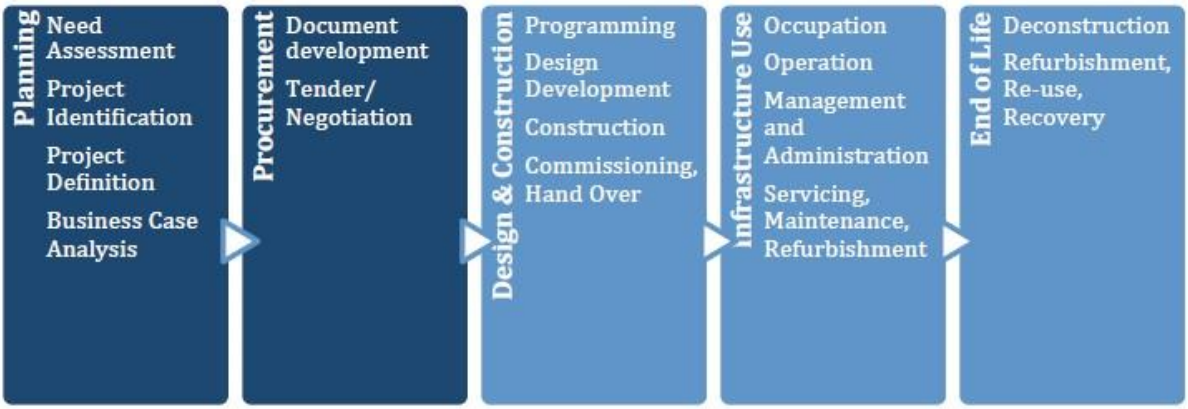

Figure 1: Project lifecycle phases and generic activities performed

Source: Nelms (2012), A risk identification framework and tool for large infrastructure public private partnership delivery.

There is no consistent use of terminology or definition of activities that are performed prior to the project Design and Construction phase. Generally, procurement mechanism adopted will varies depending on country of origin, industry sector and asset type. Broadly, Yu *et al*. (2006) the beginning stage for a building in the building sector is known as briefing process involving the gathering, analyzing and synthesizing of information needed. The Construction Industry Board (CIB, 1997) divides this "briefing process" into two stages. The first stage, strategic briefing, involves the definition of the scope and purpose of the project and its key parameters including overall budget and program.

The second stage, project briefing, involves the translation of the requirements set out in the strategic brief in performance, spatial and construction requirements on which the design is developed. Gibson *et al*. (2006) define the project delivery process between project initiation and the beginning of detailed design as the "Pre-Project Planning Process" involving four steps: (i) Organize for pre-project planning; (ii) select project alternative; (iii) develop a project definition package; and, (iv) decide whether

to proceed with project. Consistent with public sector terminology and drawing upon these definitions, the two phases of project delivery Planning and Procurement are used in this thesis to define the front end planning stage or what other authors define as the "briefing" stage.

The front end planning of a project is of great importance to the success of subsequent project lifecycle phases in the execution of an infrastructure project. Gibson *et al.* (2006) summarize findings of a number of authors and highlight that "poor scope definition in the early planning stage of a project results in final project costs tend to be higher because of changes that interrupt project rhythm, caused rework, increase project time, and lower the productivity as well as the morale of the field work force." Defining the activities that are performed in each phase is therefore important to ensure that roles and responsibilities of project team members are adequately performed. Other authors such as Samset (2008) break the project life cycle into the Front-end (commences when the initial idea is conceived and completes at the decision to finance), Planning and Implementation (commences upon decision to finance and includes planning, mobilization of resources, and implementation), and Operation (commences upon handover of outputs and operation commences) phases. Samset (2008) highlights, that there are different stakeholders with different interests and perspectives on the project in these project phases.

2.3 Public Sector Stakeholder Roles and Responsibilities in the Front End Planning and Procurement Phases

The roles and responsibilities of public sector stakeholders in infrastructure projects delivered by public sector entities through traditional mechanisms such as the DBB approach are relatively mute on collaboration across project participants and phases

(Guo *et al.,* 2010). Understanding the roles and responsibilities of stakeholders and required processes is critical as one considers the importance of project governance in the management and delivery of a project. Samset (2008) notes that, this issue has only recently become an issue in the project management community and highlights that understanding of these processes and governance regimes is of mutual benefit to both the public and private sector participants involved in Project delivery. The complexities of public sector infrastructure project delivery, in particular the activities, requirements and reporting protocol in the planning and procurement phases, are often not well understood by both public and private sector practitioners alike and construction research in this field is limited.

Application of a risk management process early in project planning and delivery is critical in meeting governance and accountability requirements for the complex public sector project decision making environment. The following descriptions of the typical public sector project delivery decision-making governance and reporting structure, key project activities in the planning and procurement phases and the associated tasks for one key project activity are provided to highlight the complex environment including the multiple stakeholders, their inter-relationships and activities which necessitate clear and structured support processes to improve the risk management tasks.

2.4 Procurement

2.4.1 Definition of Procurement

The term „procurement" is defined in various ways, for example:

- " The action of causing, compassing, accomplishing, or bringing about, esp. through the instrumentality of an agent; management, arrangement; authorization, instigation; prompting, contrivance:, or "The action or process

of obtaining by care or effort; acquisition, attainment getting, gaining", or "The action or process of procuring equipment and supplies" (OED 2002).

- "Procurement is a strategy to satisfy client"s development and /or operational needs with respect to the provision of constructed facilities for a discrete lifecycle" (Lenard and Mohsini 1998).
- "The framework within which construction is brought about, acquired or obtained" (McDermott 1999).
- "The amalgam of activities undertaken by a client to obtain a building" (Franks, 1998).

It is seen from different definitions that there are at least two common key assumptions within procurement; it is a process (involving strategy, method and/ or framework), and necessitates choices by the client (or its advisors) on the process type. Rowlinson (1991) considers this process to extend through the whole life cycle of a project: from initial inception to its realization and use; and divides the "project process" into three distinct processes of design, construction and use.

Within the concept of "design" there is a whole range of planning, funding, structural and architectural design and documentation – all of those activities which are necessary in order to commence working on a site. The "construction process" is seen as involving all of those activities, be it technical, managerial or strategic, which make up the realization phase of the project where the physical facility actually appears. On completion of this phase the facility is usually used and this is an important part of the whole process: the "use" phase of a project has a major impact on the client"s perception of whether the process has been successful or not.

2.4.2 Various Procurement Options

A multitude of large-scale and complex activities are involved in the "procurement process" as mentioned above. Those activities differ from project to project, which can be carried out in many different ways, i.e many different procurement options (within various procurement systems, methods, or routes) are available. "In the last two decades, there have been significant changes in the technical and economic conditions, prevailing in the construction industry. To overcome the shortcomings of the traditional procurement methods, the construction industry has developed a large number of different procurement systems" (Albazmi and McCafffer, 1996). Thus today"s construction clients enjoy several alternatives from among many procurement routes that are further expanded into different variants in most of those routes.

2.4.3 Selection of Procurement Routes

Each procurement route (e.g. traditional, design and build, etc.) points to a client"s temptation to use a more familiar procurement route rather than the most appropriate route. Moreover, Rowlinson (1991) points out that the source of advice to the client organization will have a major bearing on what procurement route is chosen. Researchers have mentioned that selecting the appropriate procurement system for a project will improve the chances of securing a successful project outcome (Kumaraswamya and Dissanayaka 1996, 2001; Abdel-Meguid and Davidson 1996). Accordingly, various researchers have studied ways of improving the selection of a suitable procurement route for specific conditions and the consequent impacts on the outcomes. Such examples include:

- Alhazmi and McCaffer (2000) present a multi-criteria multi-screening „Project

Procurement System Selection Model‟ (PPSSM) that combined an „alternative technique of value engineering‟ and the „Analytic Hierarchy Process‟ (AHP) in decision-making of procurement route selections.

- Cheung *et al*. (2001) proposed an „objective-subjective‟ procurement selection method, to improve the objectivity in the selection of a procurement route, where objectivity and reliability of the subjective decision-making element of procurement selection are enhanced through the AHP technique.
- Mclnnis (2003) proposed "relational" analysis; advocates inclusion of cooperation, good faith and fairness in flexible conditions of contracts (e.g. the New Engineering Contract); and emphasizes maintaining the relationships among contracting parties.
- Humphery (2003) proposed Supply chain Management approaches and emphasizes the client‟s knowledge and understanding of the construction process. He summarizes the "procurement selection process" as covering every aspect of the procurement process from the design stage and identification of the professional Consultant, through to the correct contractual arrangement and the associated form, and the best tendering formant – whether it be solely on price or a combination of technical ability and price, and finally the selection of the correct programme and quality standards for the project in question.

Several researchers such as Konchar and Sanvido (1998) compare different project delivery systems. The choice of a particular procurement route depends on many factors/criteria such as client requirement, project attributes, risks and responsibility assignment patterns. A cross-section of different criteria for selecting procurement routes, considered by different researchers, has been adapted from Cheung *et al*. (2001)

as shown in Table 1 Moreover, each route incorporate different risk allocation arrangements, demands and contractual relationships.

Table 1: A cross- section of procurement selection criteria

Researchers/ references	**Criteria considered***
Masterman and Gameson (1994)	Certainty, price competition, accountability
Skitmore and Marsden (1988)	Speed, certainty, flexibility, quality level, complexity, risk avoidance, price competition, responsibility, disputes and arbitration
Cheung *et al*. (2001)	Speed, certainty, flexibility, quality level, complexity, risk avoidance, price competition, responsibility
Hewit(1985)	Certainty, flexibility, accountability, innovative inputs from consultants

***Soruce:* Cheung *et al*., 2001**

***Speed**: the time taken to complete the project: **Certainty:** The certainty over the cost for completion of the project; **Flexibility:** The ability and authority for the client to effect change; **Quality level:** The quality level required of the completed project; **Complexity**: The suitability of the procurement method to tackle complex projects; **Risk Avoidance**: The transfer of risk to the contractor; **Price competition**: The degree of price competition pertaining to the procurement options; **Point of responsibility:** the clarity of allocation of responsibility.

2.4.4 Tendering Processes in the Construction

In the construction industry the most frequently used method of sourcing is competitive tendering. This serves as an appropriated tool help to decide who is going to be responsible for a projects execution (Winch, 2010). Generally the sequence of the process varies depending on the procurement method adopted.

2.4.5 Procurement Strategies

Potts (2008) indicated that the selection of a procurement strategy determines the level of risk in the construction project. He delineated four aspects namely: (i) organisational

method (how an organisation is designed) (ii) payment system (the payment system to be used for example lump sum and cost based alternatives; cost reimbursement) (iii) tender procedure (this can be open or selective) (iv) conditions of contract (that is the particular conditions of contract to be used)

There are two main types of procurement options in the Construction industry; these include design-bid build and design-build (Osipova and Eriksson, 2011). The difference in the two has been illustrated in the figure 2 below.

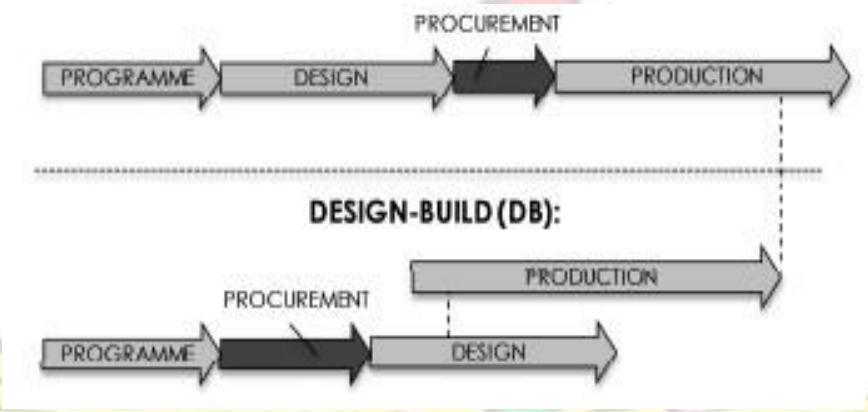

Figure 2: The structure of DBB and DB contracts

Source: Osipova, 2008

2.4.5.1 Design-Bid-Build (DBB) Method of Procurement

In this form of contracts, the client is responsible for construction design. This design then becomes a part of the tendering documents upon completion (Agerberg & Ågren, 2012). Generally in DBB contracts there is only one contract between the client and the contractor and it is the general contractor‟s responsibility to coordinate work between the involved subcontractors (Agerberg & Ågren, 2012).

According to Potts (2008) DBB contracts largely determine what the project cost is likely to be before the construction begins. However Murdoch and Hughes (2007) are of the view that projects with advanced design are the most suitable for DBB contracts. Osipova (2008) posited that DBB contracts are less risky for a contractor, because of the absence of construction design. Osipova and Eriksson (2011) assert that a DBB contract offers the

contractor a lower profit margin than a DB contract and as such it is a less expensive alternative for the client. One notable disadvantage with

DBB contracts is that they are more time consuming than DB contracts (Agerberg & Ågren, 2012).

2.4.5.2 Design-Build (DB) Method of Procurement

The contractor plays a wider role in this form of contracts than in DBB method of procurements, mainly because of the responsibility for the project‟s design (Agerberg & Ågren, 2012). The design can be done by an internal division within the contractor‟s setup or by an external body selected by the contractor. Usually the time for tendering in DB contracts is quiet longer but again it has an advantage of having the construction phase begin before the design phase is fully completed.

Under DB contract the contractor composes a contract with each subcontractor. However in many cases each subcontractor can be in charge of the design within its actual theme (Hughes *et al.*, 2007). DB contracts are increasingly being used by clients due to the less level of responsibility for the client Osipova and Eriksson (2011). In addition Ports (2008) indicated that the advantage of DB contracts is that client has an established contract or agreement by the party responsible for the design and construction. Secondly there is an increased level of communication between the client and the contractor.

Meanwhile Rahman, (2003) maintains that DB contracts are very successful construction and delivery speed. They advance in stating that DB contracts are more expensive to the client, due to less competiveness of the process and more so the wider range of the DB contractor‟s responsibility. The DB contractor takes a big risk by being both in charge and responsible for faults in design and construction (Rahman, 2003).

2.5 Problems in the Ghanaian Construction Industry

Inferring from the works of Crown Agents (1998) and Westring (1997), Anvuur and Kumaraswamy (2006), the performance of the Construction Industry in Ghana is poor and saddled with several problems ranging from contract administration, through complex, lengthy and bureaucratic payment procedure, delayed payments to that of project execution. This is because sometimes this delays run into several months and thus, these employers find it difficult to continue paying their staff. Ashworth (2004), claim that in Ghana, the construction industry is a regulator of the economy. According to Loosemore *et al*. (2003) the construction activity is extremely diverse, ranging from simple housing developments to highly complex infrastructure projects, it has some characteristics: unique one-off nature; tendency to be awarded at short notices; reliance on a transient workforce; increasingly demanding clients; and its male dominated culture, which are common to all projects irrespective of the size of the project as well as its location.

After the enactment of the procurement law, construction activities in Ghana (government projects) have taken a form which comprises the client, professional consultants and the contractor. The clients, upon taken a decision to build employs the services of a Consultant, usually, the Architect and the other consultants. These professionals are responsible for providing professional advice to the client. The next step is to produce a design, select the most qualified Contractor, supervise the execution, advice for payment and ensure contract closeout.

Table 2: Project Procurement in Ghana Using the Traditional System

Stakeholder	First Action	Second Action	Third Action	Fourth Action	Fifth Action
Client	Conceptualise	Initialise	* * * * *	* * * * *	Use the product
Practitioners (consultants)	* * * * * *	Design client's concepts	Manage the project	Manage the project	* * * * *
Contractor	* * * * * *	* * * * * *	Execute the project	Complete the project	* * * * *

* Stakeholder has no active role here.

Source: Gyadu-Asiedu (2009). Assessing Construction Project Performance in Ghana: *Modelling Practitioners' and Clients' Perspectives.*

Contracts for both works and Consultancy services take very long periods to reach financial closure and in most cases are susceptible to unnecessary delays Crown Agents (1998) and Westring (1997) as cited in Anvuur *et al.* (2006). Further project implementation has been noted to have extensive cost and time overruns and poor quality. For example, Anvuur *et al.* (2006) indicated that, the process for payment to Contractors and Suppliers is very long because of the long bureaucratic procedures especially payment processes undertaken by government clients. This is been characterized by fiscal constraints and poor procurement practices led to insecurity of funding for construction projects.

Both public and private sectors do not engage in long-term strategic as well as monitoring and control of procurement (Anvuur *et al*., 2006; Dansoh, 2004; Westring, 1997). In addition some of these procuring entities also resorted to making contractual payments before the due dates in order to prevent a budget allocation lapse.

A procurement system is a system used to describe the total process of meeting a client"s expectations for a project, starting at the point where this need is first expressed, inception to completion (Khan, 2005). He further states that this can also be described as the management

system that is used by the client to secure the design and construction services required for the execution of the proposed project to the required cost and quality within the required time.

In Ghana the main procurement method that has been used for public works in the country before and after the enactment of the Act is the traditional method. It"s worth noting that irrespective of the Act to ensure transparency, probity and accountability in public construction procurement (Anvuur *et al.,* 2006). Notwithstanding there are enormous challenges in the industry as have been studied by various authors. The table below presents a summary of the notable problems influencing the industry with their respective authors that have noted them.

Table 3: Summary of researched problems in the construction industry

Authors	Problem	Causes
Westring (1997)	Delays and cost overruns	Extensive post-award negotiations, delays in the preparation of technical specifications and drawings, delays in evaluation, an extensive system of controls, reviews and approvals, and land ownership disputes,
Westring, 1997; World Bank, 1996;2003	poor quality	Service providers cutting corners to limit losses or abandoning the work altogether.
Eyiah and Cook, 2003; Westring, 1997	Delays	Long process of payment to contractors and suppliers – "over thirty steps from invoice to receipt of payment cheque", over-centralised.
World Bank, 1996; 2003	Insecurity of funding for projects	Fiscal constraints and poor procurement practices resulting in delayed payments and arrears to contractors and consultants; accumulated interest on late payments and the frequent price changes due to extensive renegotiation; difficulties by contractors and consultants in processing claims
Dansoh, 2005; Westring, 1997.	Contractual and procurement issues	Lack of respect for contract with neither party expects contracts to be fully binding; ad hoc approaches to economic-sizes project; difficulties in long-term strategic planning by contractors; poor monitoring and control of procurement.

Source: Anvuur, A., Kumaraswamy, M. (2006), "Taking Forward Public Procurement Reforms in Ghana".

2.6 Risk

Risk has been defined by most management literature as an event that occurs with a certain probability in combination with a consequence in the case of occurrence (Agerberg & Ågren, 2012). McNeil *et al*., 2005 simply defined risk as the probability of risk occurring against the impact of it occurring. Thus:

Risk = probability of risk occurring x impact of risk occurring

According to Samson *et al*. (2008) risk does not have a general definition, but instead a new definition would be establish whenever an organisation faces a new decision problem.

In conformity Grimvall *et al*. (2003) reiterated that to most peoples risk will to a high extent be dependent on the situation in which the risks may occur. More to the point they argue that this state of knowledge will have some impractical consequences in projects, especially where risks often occur in a number of different situations and with a lot of different actors on board Grimvall *et al*. (2003). Samson *et al*. (2008), posited that in many cases organisations adopt some of the existing definitions, however employees also come up with their own specific definition. In essences Grimvall *et al*. (2003) agrees that most importantly organisations should agree and adopt a definition that everyone is comfortable with. Some existing definitions or some researchers have been given in Table 4 below.

Most risk definitions include the ingredient of both positive and negative outcomes (Winch, 2010). This statement is in synchrony with definitions given in Table 4. Studies have indicated that project managers mostly use the term risk almost solely for the negative consequences of an event occurring (Agerberg & Ågren, 2012).

However, Winch (2010) argues about this approach can be beclouding as in many cases this attitude may lead to a lack of determination when it comes to managing the opportunities in a project. In his view use of the term risk for both positive and negative outcomes is very inappropriate. He adds that the use of threats and opportunities is more suitable. This will help in the efficient managing of risks and opportunities.

Table 3: Summary of risk definitions

Reference	Definition
PMI (2004)	"Risk is an uncertain event or condition that if it occurs, has a positive or negative effect on a project"s objective"
ISO 31000: 2009	"Effect of uncertainty on objectives -An effect is a deviation from the expected, positive or negative - Objectives can have different aspects and can apply at different levels
Jaafari (2001)	"Risk is defined as the exposure to loss/gain, or the probability of occurrence of loss/gain multiplied by its respective magnitude"
Alessandri *et al*. (2004)	"Risk represents the probability distribution of the consequences for each alternative"
Holton (2004)	"Risk is exposure to a proposition of which one is uncertain"
OED 2002	"Exposure to mischance or peril; the chance or hazard of commercial loss; the chance that is accepted in economic enterprise and considered the source of an entrepreneur"s) profit"

2.6.1 Uncertainty

There is no accepted definition generally for risk uncertainty Samson *et al*. (2008). Over the years that strategic managers and finance academics for decades have debated on the terminological differences between risk and uncertainty Alessandri *et al*. (2004).

Figure 3 below presents two general approaches to the differentiation of the definition between risk and uncertainty.

The first school of thought holds it that uncertainty is equivalent with risk whereas the other argues that risk and uncertainty are two different concepts. There are those that view risk and uncertainty as being dependent upon each other whereas other see them as being independent. Samson *et al*., 2008 concludes that projects are associated with both uncertainty and risk, and therefore need a management system that can effectively handle both simultaneously.

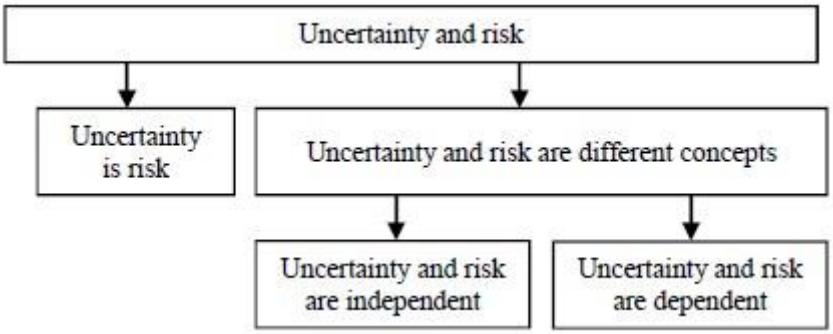

Figure 3: Relationship between risk and uncertainty

Source: Samson et al., 2008

2.6.2 Classification of risk

According to Agerberg & Ågren (2012) various studies have been undertaken to identify various risk categories to enable a design of an effective risk classification system for construction projects. Presently there are a number of allocation approaches which separate risks into categories.

Hastak and Shaked (2000) notes that some writers give the recommendation to allocate the risks based on its consequences on a project, as others suggest a categorisation based on the source of the risk. Winch (2010) iterated that a risk allocation approach based on the level of knowledge may be performed by using the following four categories; namely Known knowns, Known unknowns, Unknown known and Unknown unknowns. He explains that Known knowns is the condition of a risk where its source can be identified and a specific probability and consequence in the case of occurrence can be calculated. Known unknowns, is the condition of uncertainty where the risk

source can be identified but the probability will remain unknown Winch (2010). Unknown known, is the condition of an uncertainty where someone has knowledge of both the risk source and its estimated probability but the information will be unknown for most concerned parties. Unknown unknowns, is the condition of uncertainty where the risk source cannot be identified, therefore there is no possibilities to calculate its probability or consequence Winch (2010).

2.6.3 Risk Perception

According to Loosemore et. al (2006), the perception of risk varies at both industrial and organization levels because different people hold different views and have different understanding of a particular risk component, sources, probabilities, consequences and preferred actions. People‟s beliefs, attitudes, judgements and feelings are believed to influence risk perception to ascertain its extent.

2.7 Risk Management Process

Risk management is a process of systematically identifying, assessing and responding to project risk (PMI 2004). The primary objective of the risk management process is to maximise the opportunities and minimise threat. Literature contains a variety of risk management models with different numbers of stages.

IEC (2001) presents four steps to risk management namely: risk identification, risk assessment, risk treatment, and risk review and monitoring. Similarly PMBOK‟s model (PMI 2004) divides risk assessment into two processes of qualitative risk analysis and quantitative risk analysis. An additional step worth noting is added by Baloi and Price (2003) is risk communication.

Unlike Ward and Chapman (2003), they present the SHAMPU (Shape, Harness, and Manage Project Uncertainty) framework which takes into account nine stages, these include; (i) define the project, (ii) focus the project, (iii) identify the issues, (iv) structure

the issues, (v) clarify ownership, (vi) estimate variability, (vii) evaluate implication, (viii) harness the plans, and (ix) manage implementation.

Irrespective of the variety of models of risk management risk identification, assessment and response form the core of project risk management. In this study the model consisting the above mentioned three stages is used in this study as shown below in figure 4.

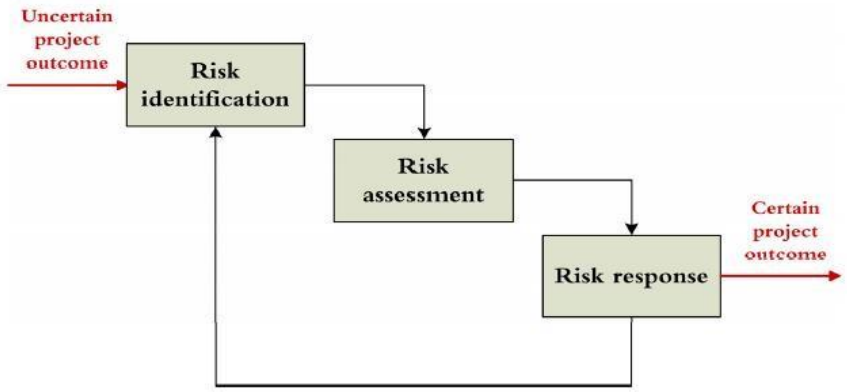

Figure 4: Risk management process

Source: Osipova (2008) Risk management in construction projects

2.7.1 Importance of Risk Management

According to Loosemore and McCarthy (2008) risk management provides a systematic and consistent approach to risk identification, assessment and control which is essential to effective risk allocation.

2.7.2 Risk Identification

This is the first step of the risk management process. It is aimed at determining potential risks, i.e. those that may affect the project. PMBOK (PMI 2004) suggests that as many project stakeholders as possible should participate in the risk identification process. There are a number of tools and techniques for identifying the project risks (IEC 2001). These are brainstorming, expert opinion, structured interviews, questionnaires, checklists, historical data, previous experience, testing and modelling, evaluation of

other projects. Uher and Toakley (1999), indicated that checklists and brainstorming are the most usable techniques in risk identification. Further they also mentioned that risk identification often relies on individual judgments of the project participants.

The uniqueness of every project makes it difficult to have a standard model for the identification risks for every project. Smith *et al*., 2006 discusses brainstorming technique as one important technique that enables people from different background and departments to bring their views on board regarding risks. They further noted that people with different background, gender and age is very in achieving best results. Interviews with practitioners with the relevant background information of the project are also an important tool for risk identification (Smith *et al*., 2006). During the risk identification processes all the potential risks are grouped in categories.

According to construction risk can be generally be categorised into three sources; these include internal or controllable risks (e.g. design, construction, management and relationships); external or uncontrollable risks (e.g. financial, economic, political, legal and environmental); and Force majeure risks (Agerberg & Ågren, 2012).

2.7.3 Importance of Risk Identification

The risk identification processes serves the purpose of generating a list of risks with both negative and positive consequences and are entered in the risk register (PMI, 2004). The primary aim of the register should be one that is comprehensive as possible and should include threats and opportunities whether or not their consequences are under control of the organisation (ISO 3100:2009). Bajaj *et al*. (1997) asserted that if a risk is unidentified it cannot be effectively controlled, transferred or more so be managed. Meanwhile, Potts (2008) say otherwise that it is mostly impossible to identify all project related risks. A contributing factor is the fact that any construction project is unique.

During **risk assessment,** identified risks are evaluated and ranked. The goal is to prioritise risks for management. The research literature offers a large number of models that use both qualitative and quantitative methods for assessment of project risks. Tah and Carr (2000) develop a formal model for qualitative risk assessment based on fuzzy estimates of risk components. Baccarini and Archer (2001) describe a methodology for risk ranking of projects, which allows an effective and efficient allocation of the resources for the management of project risks. The JRAP (Judgemental risk analysis process) model proposed by Öztas and Ökmen (2005) is a pessimistic risk analysis methodology, which is effective in uncertain conditions within construction projects. Zeng *et al*. (2007) propose a risk assessment methodology based on fuzzy reasoning techniques and aimed at dealing with risks in complex projects. A fuzzy system is also used by Motawa *et al*. (2006) to evaluate the risk of change in construction projects. Poh and Tah (2006) have developed an integrated model that takes into account both duration and cost risks and can be used for modelling risk impacts that affect the project. Dikmen and Birgonul (2006) propose a methodology for both risk and opportunity assessment of international projects. Empirical research on risk assessment practice investigates the use of the different risk assessment techniques in construction projects. A study by Baker *et al*. (1998), shows that the construction companies in UK use both qualitative and quantitative techniques for assessing the project risks. Personal and corporate experience, and engineering judgement are the most successful qualitative techniques, while quantitative techniques include break-even analysis, expected monetary value and scenario analysis. Several authors report rather opposite results on the usage of quantitative techniques. According to Akintoye and MacLeod (1997) studies of risk management practice in the UK construction industry show that the practitioners rely mostly on professional judgment, intuition and experience A

questionnaire survey conducted by Tang *et al*. (2003) shows that qualitative analysis is the most commonly used technique in the Chinese construction industry, while the use of quantitative methods is very low. The results of the study conducted by Simu (2006) show that the Swedish contractors mostly use professional experience and gut-feeling in risk assessment. The quantitative methods used in risk management have advantages in comparison with the qualitative methods but their use is limited due to difficulties that practitioners face. He also discusses the elements that contribute to development of a workable solution for quantitative risk assessment (Agerberg & Ågren, 2012).

The **Risk response process** is directed at identifying a way of dealing with the identified and assessed project risks. There are four main risk response strategies: risk avoidance, risk reduction, risk transfer and risk retention (IEC 2001, PMI 2004, Smith *et al*. 2006). Risk avoidance deals with the risks by changing the project plan or finding methods to eliminate the risks. Risk reduction aims at reducing the probability and/or consequences of a risk event. Those risks that remain in the project after risk avoidance and reduction may be transferred to another party either inside or outside the project. Risk retention or acceptance indicates that the risk remains present in the project. Two options are available when retaining the risk: either to develop a contingency plan in case a risk occurs, or to make no actions until the risk is triggered. Several studies (Baker *et al*. 1999, Lyons and Skitmore, 2004, Tang *et al*. 2007) have identified risk reduction as the most frequently used technique within the construction industry. The results of a questionnaire survey (Akintoye and MacLeod 1997) report that risk transfer is the most preferable strategy among the UK practitioners.

2.7.4 Risk Allocation through Construction Contracts

It is impossible to eliminate all potential risks in a construction project. Therefore, an appropriate allocation of risks among project actors is very important. Risk allocation influences the behaviour of project actors and, therefore, has a significant impact on the project performance in terms of the total cost. Unclear allocation of the project risks leads to disputes between the client and the contractor. One of the problems identified in the literature is the actors‟ different perceptions of to whom a specific risk or group of risks should be allocated. Usually, contractors indicate that they have to bear the majority of project risks and price these risks through adding a contingency to the bid price (Andi, 2006).

Using contingency funds has been identified by the researchers and practitioners as a significant source of the project‟s cost increase (Zaghloul and Hartman, 2003). Evaluation and conscious allocation of risks to the appropriate actor under the contract allows reducing the bid price by decreasing contingency funds and, therefore, leads to lower total cost (Zack, 1996). A number of models providing a framework for risk allocation decisions can be found in the literature (Lam *et al.* 2007, Li *et al.* 2005, Olsen and Osmundsen 2005). Smith *et al*. (2006) highlight the importance of considering the following issues when making risk allocation decision:

- who has the best ability to control risk events;
- who has the best conditions to manage risks;
- who should carry the risks that cannot be controlled;
- how much does it cost to transfer the risks.

Risk allocation strategy in construction projects is defined through the contractual arrangements. The contract is a written agreement between a client and a contractor where the liabilities and responsibilities of each party are assigned. The contract can

also be defined as a trade-off between the contractor‟s price for executing the project and his willingness to take the risks (Flanagan and Norman 1993).

2.7.5 Risk Breakdown Structure (RBS)

Hillson (2003) defined RBS as a source-oriented grouping of risks that organises and defines the total risk exposure of the project or business. He claims the RBS is the most effective tool for structuring and organising risks. It functions by hierarchically allocating risks. The method adopts a full hierarchical structure, where each level increasingly shows more details about the risk source (Agerberg & Ågren, 2012). Based on experience and similarities from previous projects a RBS is produced (Hillson , 2003).The RBS is also used in the risk assessment. RBS enables decision makers to know the impact level of risks be it critical or less critical. In addition it serves as a risk reporting tool and helps in the communication of risk to the organisation and the project team Hillson (2003).The information in the RBS can be used by the organisation to alert construction workers about potential risks they are exposed to during the course of the project Hillson (2003).

2.7.6 Risk Analysis/Quantification

The primary purpose of risk analysis is to quantify the effects of the identified risks. There are three types of risk analysis techniques: qualitative, semi quantitative and quantitative methods (ISO 31000:2009). At the most fundamental level, each recorded risk should be analysed and quantified independently from the other identified risks with regards to both its consequence and probability. Decision makers should consider the interdependences of the present risks in a more detailed analysis. This Ports (2008) says will require more resources and the analysis can in practice be rather complex.

The characteristics of the risk, project size and the available resources identified determine the choice of analysis technique to be used (ISO31000:2009). Flanagan *et al*.

(2007), opines that choice of technique should be made by an analyst with the request experiences and knowledge in risk analysis.

2.7.8.1 Qualitative Analysis

Qualitative risk analyses in risk management are techniques used to evaluate identified risks in a simple and rapid assessment. According to Lyons and Skitmore (2004) qualitative techniques are mostly used by contractors and consultants whereas clients tend to use the quantitative approach more regularly. A qualitative risk assessment generally generates a prioritised list of risks which makes it possible to identify those risks with the most negative impact, and then they are further treated. For small and medium sized projects quantitative analysis are often used, especially where there is low level of complexity (Smith *et al*., 2006).

The risk matrix analysis is one of the few qualitative methods of analysis that is mostly used (PMI, 2004). Potts (2008) discusses two types of qualitative methods namely expected monetary value and risk tree approach. The quantitative technique uses an evaluated method through which specific probability for each risk is assessed. The probability is often expressed in the risk‟s per cent of the likelihood of occurrence. On the other hand the risk impact is measured in a monetary value or a time unit. Maylor, (2003) stated that the impact interval ranges from events which have critical consequences to that which have minor consequences.

2.7.8.2 Quantitative analysis

The quantitative risk analysis of a project comprises priority list of the project. This provides a numerical knowledge about a project‟s risks characteristics as well as its consequences (Agerberg & Ågren, 2012). Quantitative techniques are noted to be time consuming and more so they require a high level of knowledge by the analyser. Data used for quantitative calculation is often based on a historical data or from a specialist‟s

estimate. However it‟s worth noting that there is a level of uncertainty in these estimates caused by subjective estimations (Agerberg & Ågren, 2012).

Smith *et al*., 2006 asserts that quantitative techniques are more suitable for large and medium-sized projects. Quantitative analyses are underpinned on mathematical probability theories, which can be complex and difficult to manage or handle manually. These techniques have been made easy with the use of available computer based software in doing calculations.

2.7.8.1 Risk Matrix

The risk matrix technique is often used in qualitative methods and is often used in organisations which perform a risk analysis based on negative risks which are known as static risks. In some cases organisations perform a parallel risk matrix analysis based on the identified risk with positive outcome (Flanagan *et al*.,2007). Risk matrix analysis is often the initial step to a more comprehensive risk analysis and also serves as a basis for a quantitative risk analysis. Different colours are used to indicate the level of risk exposure. Figure 5 illustrates a Probability and impact matrix.

	Negligible	Minor	Moderate	Significant	Severe
Very likely	Low-Med	Medium	Med-Hi	High	High
Likely	Low	Low-Med	Medium	Med-Hi	High
Possible	Low	Low-Med	Medium	Med-Hi	Med-Hi
Unlikely	Low	Low-Med	Low-Med	Medium	Med-Hi
Very unlikely	Low	Low	Low-Med	Medium	Medium

Figure 5: Probability and impact matrix

Source: Agerberg & Ågren, 2012; Risk management in the tendering process

Flanagan *et al*. (2007) opines that every organisation should design their own risk matrix‟s colours and establish criteria by which risks are accepted and which cannot. Risk matrix analyses are often designed in a qualitative manner whereas others are designed in a semi quantitative approach with numerical values. This helps provide as detailed information to decision makers about a project‟s risks (Radu, 2009).

2.7.7 Expected monetary value

In calculating the expected monetary value of risk Potts (2008) claims risk exposure can be calculated in three scenarios; the first optimistic, most probable and in a pessimistic manner. Further he presents a qualitative risk analysis technique that estimates the total risk exposure for a range of risks. Risk exposure is the generated product of a risk‟s estimated consequence and its probability of occurrence (Potts, 2008). A summary of all risk exposures results to the total risk this is also to 100%.

2.7.8 Evaluation/Treatment

The treatment process helps to decide which risks should be treated and which should be given a priority. The evaluation takes into account the results provided by the risk analysis with the established risk acceptance criteria, in context (Smith *et al*., 2006). The treatment process adopted includes methods which modify risks until they can be accepted or controlled. According to Agerberg & Ågren (2012) risks can be modified in two approaches; the first decreases the risk‟s probability of occurrence and the second decreases its consequence on the project. Smith *et al*. (2006) discusses fur types of risk treatment, in addition they claim that the basic methods are to avoid or reduce a risk, to transfer a risk to another party or to retain a risk. In other regards a combination of two or

more are applicable. The cost and the effort for the treatment ought to remain balanced coupled the benefits that they provide (ISO31000:2009).

2.7.9 Monitoring and review

The final phase in the risk management process comprised monitoring and review. It is worth noting that this phase is not the end of the risk management process, rather an end of a performed cycle (Agerberg & Ågren, 2012), see Figure 6. Tah and Carr (2000) describes this phase as one of the most important phases in the whole risk management process. After performed risk treatment activities, the remaining risks are documented and transferred to the next phase in the risk management process, the monitoring and review (ISO 31000:2009). The monitoring and review process will review the treatment activities to ensure that it has been effective and cost efficient. The risk status should be well documented and transferred to the risk register for further analysis and evaluation (Tah and Carr, 2000).

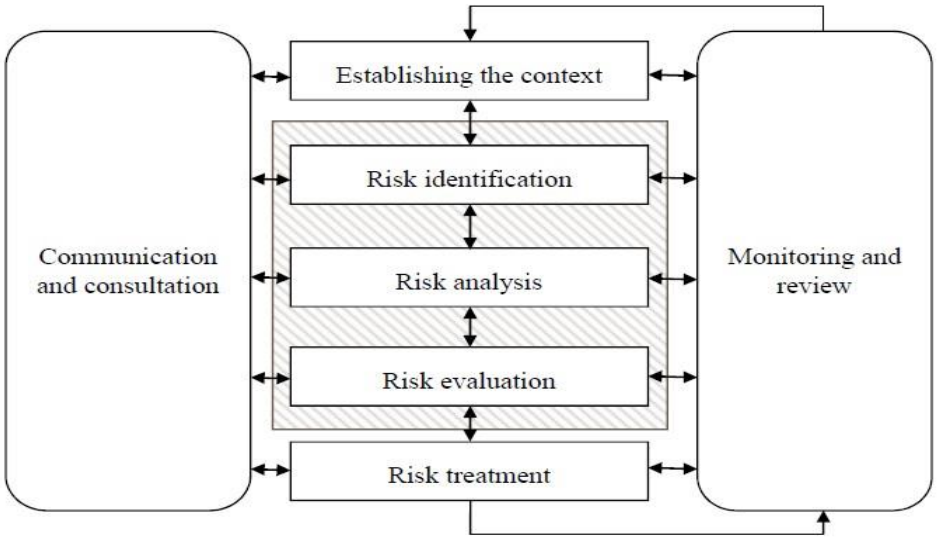

Figure 6: Risk management model

Source: Agerberg & Ågren, 2012; Risk management in the tendering process

2.7.10 Risk communication

A good communication with internal and external shareholders throughout the whole risk management process is ideal. There should be a good communication plan established at the contextual phase. The communication plan should clarify how risk related information should be transferred between involved parties and from one phase to another. The communication plan is needed to ensure effective implementation of the risk management process in an organisation. The difference in risk perception necessitates the communication plan to highlight the subject and ensure that all relevant views are appropriately considered when the risk criteria are defined (ISO 31000:2009).

2.8 Risk Management in the Tendering and Contracting Stages

There critical risks at all stages of the public procurement process, from the needs assessment through the bidding to contract management and payment. However for the purpose of this study emphasis will be on risks encountered from needs assessment to contract award.

2.8.1 Pre-Bidding Stage Risks

The following are risks that are encountered at the pre-bidding process of the procurement process. These include: The lack of adequate needs assessment, planning and budgeting of public procurement; Requirements that are not adequately or objectively defined; an inadequate or irregular choice of the procedure; and a timeframe for the preparation of the bid that is insufficient or not consistently applied across bidders (OECD, 2007).

The table below presents explicit detail of the risks encountered at the pre-bidding stage of procurement.

Table 4:Pre-Bidding Stage Risks

Pre-bidding	Risks identified
- Needs assessment, planning and budgeting	- The lack of adequate needs assessment, deficient business cases, poor procurement planning (e.g. in the Netherlands, New Zealand, Spain, Turkey); - Failure to budget realistically (e.g. in the United Kingdom), deficiency in the budget (e.g. in Spain); - Procurements not aligned with the overall investment decision-making process in departments (e.g. in Canada); - Interference of high-level officials (e.g. in the Czech Republic, Poland, the Slovak Republic) in the decision to procure; - Informal agreement on contract (e.g. in Brazil).

-Definition of requirements	Technical specifications: a) Tailored for one company (e.g. in Belgium, Canada, Poland, Spain and the United Kingdom); b) Too vague or not based on performance requirements (in countries such as Chile and Germany). - Selection and award criteria: a) Not clearly and objectively defined (in countries such as Poland and Slovenia); b) Not established and announced in advance of the closing of the bid (for instance in New Zealand); c) Unqualified companies being licensed, for example through the provision of fraudulent tests
- Choice of Procedure	Lack of procurement strategy for the use of non-competitive procedures based on the value and complexity of the procurement which creates administrative costs (for instance in Canada); - Abuse of non-competitive procedures on the basis of legal exceptions (e.g. in Belgium, Finland, Netherlands and Slovenia) through: a) Contract splitting on the basis of low monetary value contracts; b) Abuse of extreme urgency; c) Abuse of other exceptions based on a technicality or exclusive rights, etc; d) Untested continuation of existing contracts.
- Time frame for preparation of bid	- A time frame that is not consistently applied for all bidders, for example, information disclosed earlier for a specific bidder (in countries such as Belgium and Norway); - A time frame that is not sufficient for ensuring a level playing field (for instance in New Zealand).

Source: Integrity in procurement (OECD, 2007)

2.8.2 Bidding

At the bidding stage of the procurement process OECD (2007) delineated the following as the common risks associated at the bidding stage of the procurement process. These include; Inconsistent access to information for bidders in the invitation to bid; Lack of competition or in some cases collusive bidding resulting in inadequate prices; Conflict-of-interest situations that lead to bias and corruption in the evaluation and in the approval process; Lack of access to records on the procedure in the award that discourages unsuccessful bidders to challenge a procurement decision.

Table 5: Bidding and Award Stage Risks

Bidding	Risks identified
- Invitation to bid	Information on the procurement opportunity not provided in a consistent manner; - Absence of public notice for the invitation to bid (e.g. in Finland); - Sensitive or non-public information disclosed (e.g. in Belgium, Mexico, the United Kingdom, the United States); - Lack of competition or in some cases collusive bidding that leads to inadequate prices or even illegal price fixing (e.g. in Austria, the United Kingdom).
Award	- Conflict of interest and corruption (e.g. in Canada, Germany, New Zealand, Norway, the United Kingdom) in: a) The evaluation process (e.g. familiarity with bidders over the years, personal interests such as gifts or additional/secondary employment, no effective implementation of the "four-eyes" principle, etc.); b) The approval process: no effective separation of financial, contractual and project authorities in delegation of authority structure; - Lack of access to records on the procedure.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY AND DATA COLLECTION

3.1 Introduction

This section describes all the procedures that were undertaken in the collection of research data and its presentation to achieve the objectives set for this study.

3.2 Research Design

The methodology used in this study was the survey questionnaire. A mixed approach of qualitative and Quantitative methods was used. According to Naoum (1998) quantitative data are not abstract but consist of measurements of tangible, countable and sensate feature of the world.

The research was carried out using a three phase approach in order to achieve the aim and objectives of the research. The first was to undertake a literature search on previous publications on risk management practices adopted by Public Procurement Entities in the Construction Industry. The literature review was carried out throughout the whole research project, this was to compile and discuss information on risk management practices. Many literature sources were used as primary, secondary and references such as academic periodicals, research journals, government publications, dictionaries, past dissertations and internet resources.

In the second phase, questionnaires were developed basically on the project objectives. The project objectives were translated into specific questions. The questionnaires were in four main parts in order of sequence as follows:

a) General Questions – Collecting the background Information of the respondents, their personal data and experience in the construction industry.
b) Specific questions regarding risk managements at the tendering and contracting stages.
c) General perception of risk Management practice – collecting the respondent‟s familiarity with the concept of risk management in procurement of works at the tendering stages (i.e needs Assessment, advertisement, tender opening, evaluation and reporting/awarding)

Structured interviews (face to face based) were supplemented where necessary to help improve the quality of the information gathered.

The set of questions under this section was to ask respondents on the following;

Awareness about risk assessment and management in general

- The importance of risk management processes in tender evaluation activity.
- The identification of the impact or consequences of risks in tender evaluation
- The identification of the likelihood or frequency of risks occurrence in tender evaluation activities.
- The relevance of a risk assessment action plan the structured questionnaire comprised thirty-four (34) sets of questions.

In the third phase, the results of the questionnaire were analysed using statistical techniques.

3.3 Sources of Data/Data Collection

The study depended on primary and secondary data.

3.3.1 Primary Data

The primary data consisted of first, hand data collected through the use of structured questionnaires to personnel and entities involved in public procurement particularly in the Metropolitan and Municipal Assemblies as well as solicited views from professionals in consulting firms involved in public procurement activities.

3.3.2 Secondary Data

The secondary data consisted of information from published text such as academics periodicals, research journals, government publications, dictionary past dissertations and internet resources relevant to the study were used to compliment the primary data.

3.3.3 Sampling

A non-probability method of sampling was used. Questionnaires were sent to procurement officers. Engineers, Planning Officers, tender opening committee Head, Tender Evaluation Panel heads and other professionals in consulting firms.

3.3.4 Study Population

Metropolitan and Municipal Assemblies in Ashanti Region;

3.3.5 Sample size

Total number of:

a) Metropolitan Assemblies - 1

b) Municipals Assemblies - 8

c) Public Consulting firms - 4

3.3.6 Data Analysis

A descriptive statistics and qualitative analysis method approach to data analysis was employed for the study. The data collected was sorted and coded Microsoft excel was then used to analysis the survey response. Other statistical methods for data analysis such as Relative Important Index (RII) and frequency tables were used.

Relative Important Index RII $= \frac{E\,w}{AN}$

Where W = the weighting given to each variable by the respondent ranging from 1 to 5.

A = the highest weight

N = total number of sample.

This method was used because it yielded a final number (index), which was an overall estimate of the relative importance of a variable.

The bar and pie-chart were also used because of their ability to translate number of respondents into percentages of statistical analysis.

Following the studies of Kwok HCA and Skitmore (2000), Lyons and Skitmore (2002) A weighting of 1,2,3,4, 5 was assigned to represent „not occur‟ slightly occur „moderately occur‟ often occur and very often" respectively.

Using the Weighted Average Scoring (WAS) the sum of the products of the number of responses and the weighting was divided by the total number of responses. The higher WAS score would thus imply a more frequent risk response adopted by the Public entities.

CHAPTER FOUR

DATA ANALYSIS AND DISCUSSION OF RESULTS

4.1 Introduction

This chapter contains a systematic analysis of the data collected from respondents using tables, bar chart, pie chart and the relative importance Index (RII).

The findings would be compared with the data collected from secondary sources for meaningful conclusions to be drawn.

4.2 Survey Response

A total of one hundred and two (102) questionnaires were distributed to Professionals involved in public procurement activities at the Metropolitan and Municipal

Assemblies such as Works Engineers, Procurement Officers, Tender board Heads, Planning Officers and other professional in consulting firms.

Table 5: Overall Survey responds levels

	Issued	Returned	Percentage returned %
Metropolitan	10	8	80
Municipals	80	52	65
Consulting firms	12	10	83.34
Total	**102**	**70**	**68.63**

Source: Field Survey

4.3 Results Analysis and Discussion

In this section, an analysis of respondent understanding and news on risk assessment and management practices have been considered and discussed.

The responses of the various contact groups to the questionnaire were analysed and discussed as shown below.

4.3.1 Respondents Job Title

Table 6: Area of specialization

No	Area of specialization	Metropolitan		Municipal		Consulting Firms		Overall response %
		R	% R	R	% R	R	% R	
1	Works Engineers	1	12.50	8	16			12.86
2	Procurement officers	1	12.50	4	8	2	20	10
3	Planning officers	1	12.50	8	16			12.86
4	Finance officers	1	12.50	8	16			12.86
5	Quantity Surveyors	1	12.50	4	8	2	20	10
6	Structural Engineers	1	12.50	4	8	2	20	10

7	Architects					2	20	2.86
8	Project Manager					2	20	2.86
9	Budget officers	1	12.50	8	16			12.86
10	Internal Auditor	1	12.50	8	12			12.86
Total		**8**	**100**	**52**	**100**	**10**	**100**	**100**

Number of Response – R, Percentage Response - % R

Source: Field Survey

The purpose of the general question was to know the capacity in which respondents have undertaken risk Management. The questionnaire was to be completed by respondents who were involved in construction works.

To this end, categories of respondents targeted were Procurement officers, works Engineers, Planning officer Heads of tender boards, Architect Quantity Surveyors, Structural Engineers, budget officers.

The survey show that 12.86% of the respondent were Works Engineers, internal Auditor, Planning officers finance officers, budget officers 10% were procurement officers, Quantity Surveyors, and structural Engineers, 2.86% were Architects and Project Managers.

The percentage distribution of the various professionals indicates that majority of the questionnaires were completed directly by experts involved in construction.

4.3.2. Experience of Respondents

The data depicted that 11.42% of the respondents had 0-5 years working experience, 55.72% had 6 – 10 years working experience and 32.86% had more than 10 years" experience, this implies that the respondents have quite a reasonable working experience in the construction of works.

Table 6: Experience of Respondents

No	Experience	Metropolitan		Municipal		Consulting Firms		Overall response %
		R	% R	R	% R	R	% R	
1	0 – 5 years	1	12.50	6	11.54	1	10	11.42
2	6 – 10 years	4	50.00	30	57.70	5	50	55.72
3	10 years and above	3	37.50	16	30.76	4	40	32.86
	Total	**8**	**100**	**52**	**100**	**10**	**100**	**100**

Number of Response – R, Percentage Response - % R

Source: Field Survey

4.3.3 Understanding the concept of Risk Management Practices

From the analysis of the results shown in table 11.

The following picture emerged

i. All the respondents have some knowledge of risk management.

ii. An overall rate of 32.86% understands risk Management only through practice.

This is 25% from Metropolitan, 30.77% by Municipals, and 50% by consulting firms.

iii. An overall rate of 45.72% understands risk management through reading and practice.

This was depicted by 50% from Metropolitan 46.15% by Municipals and 40% from Consulting firms. iv. Only 21.42% of the overall percentage of the response rate understands risk management **only** through reading.

Most of the respondents have fair understanding or knowledge of risk management.

In spite of general awareness of the risk management process, implementing risk management systematically in the project is still limited in practice.

Risk identification is the most frequently applied element with checklist and brainstorming as the main techniques. The interviews revealed that formal risk assessment is not performed in the projects. Experience, feelings and intuitions are the main most commonly used tools for risk assessment. Risk response is a less frequently used element because not every identified and assessed risk is subject to risk management. These findings are very similar to several surveys conducted among the construction industry practitioners in the UK, Australia, Sweden and China (AKintoye and MacLeod, 1997; Lyons and Skitmore 2004; Simu 2006; Tang *et al*. 2007)

Table 7: Understanding the concept of Risk Management Practices

No	Understanding of Risk Management	Metropolitan		Municipal		Consulting Firms		Overall % responses
		R	% R	R	% R	R	% R	
1	Only read about it	2	25%	12	23.08	1	10%	21.42
2	No knowledge about it	0	0	0	0	0	0	0
3	Understand from practice	2	25%	16	30.72	5	50	32.86
4	Understand through reading and practice	4	50%	24	46.15	4	40	45.72
	Total	**8**	**100**	**52**	**100**	**10**	**100**	**100**

Number of Response – R, Percentage Response - % R

Source: Field Survey

4.4 Risk occurrence at each stage of the public Procurement

The life cycle of a construction project can be divided into five stages: feasibility, design, tendering, construction and handing and maintenance. Different types of risk arise at different stages in construction.

Because of the low level of certainty, higher levels of risks would normally occur at the outset of a project.

It is impossible to study risk management without understanding the perceptions of project Coordinators about risk and the risk management process. Most of the respondents see risk as a negative event that can affect the project and cause problem. Only few persons mentioned opportunity as an opposite side of risk. This confirms the results of study by Akintoye and Mcleod (1997) which show negative perception of risk among construction practitioners.

In response to the question of what types of risks the respondent dealt with in their practices the following risks were mentioned (financial, design technical contractual,

Political and regulation, quality time.
This indicates that the risks connected to design and productions were subject to risk management.

Below are the detailed risks identified under each operation of the Public Procurement Process.

Table 8: Risks identified at each stage

No.	Operations	Risks Identified
1	Need Assessment Planning & Budget	i)Lack of adequate needs assessment i) Poor procurement planning ii) Failure to budget realistically iii) Procurements not aligned with the overall investment decision making process in department iv) Interference of high-level officials

2	Choice of procedure	i) Lack of procurement strategy for the use of non-competitive procedures ii) Abuse of non-competitive procedures on the basis of legal exceptions through - Contract splitting on the basis of low monetary value contracts - Abuse of extreme urgency
3	Time frame for preparation of bid	i) A time frame that is not consistently applied for all bidders ii) A time frame that is not sufficient for ensuring a level playing field
4	Invitation to bid	i) Information on the procurement opportunity not provided in a Consistent manner. ii) Absence of public notice for the invitation to bid iii) Lack of competition or insure cases collusive bidding that leads to inadequate prices
5	Submission & opening of tender	i) Bid opening procedure flaws ii) Deviations from the correct bid opening procedure
6	Verification and post qualification analysis	i) Familiarity with bidder in time, manifesting personal interest. ii) Errors or omissions throughout the evaluation in favour of certain bidders
7	Award	i) Conflict of interest and corruption in evaluation process - Approval process ii) Lack of access to records on the procedure

Source: OECD, 2007

4.5 Tools and Techniques Used in Risk Management

The survey shows that SWOT Analysis is the most popular tool used in the construction Industry. Site observation comes second and checklist comes third. The use of Brainstorming amongst the project team was ranked No.4.

From the table it is clear that practitioner use SWOT Analysis, checklist, site observation and brainstorming.

In addition Practitioners tend to implement risk management informally without proper documentation of all risk imputs and outputs. This tendering undoubtedly reduces the effectiveness and efficiency of risk management.

Table 9: Tools and Techniques Used in Risk Management

No	Methods of Risk Identification	Score					Weighting	Relative importance index	Risk
		1	2	3	4	5	∑W	(RII)	
1	Brainstorming	21	14	10	11	14	193	0.55	4th
2	Risk Register	18	19	17	8	8	179	0.51	5th
3	Checklists	8	11	5	19	27	256	0.73	3rd
4	SWOT Analysis	1	8	10	23	28	279	0.80	1st
5	Site Observation	4	8	12	24	22	262	0.75	2nd
6	By the opinion of external consultant	24	16	10	10	10	176	0.50	6th
7	By the risk management department in the firm	26	18	16	4	6	156	0.45	8th
8	Tender reviewing management	22	17	18	8	5	167	0.48	7th

Source: Field Survey

Table 10: Risk Frequency and its impact on the project stages

No	Operations	Risks Identified	Score					Weigh. ∑W	Relative importance Index (RII)	Rank	Mean	Mode	Median	Standard Deviation
			1	2	3	4	5							
1	Need Assessment Planning & Budget	v) Lack of adequate needs assessment vi) Poor procurement planning vii) Failure to budget realistically viii) Procurements not aligned with the overall investment decision making process in department ix) Interference of high-level officials	10	16	12	14	18	224	0.640	1st	3.20	5	3	1.41
2	Choice of procedure	iii)Lack of procurement strategy for the use of non-competition procedures iv) Abuse of noncompetitive procedures on the basis of legal exceptions	10	14	10	20	16	219	0.626	3rd	3.12	4	3	1.39

		- Contract splitting on the basis of low monetary value contracts - Abuse of extreme urgency												
3	Time frame for preparation of bid	iii) A time frame that is not consistently applied for all bidders iv) A time frame that is not sufficient for ensuring a level playing field	19	12	13	16	10	196	0.560	6th	2.80	1	3	1.43

4	Invitation to bid	iv) Information on the procurement opportunity not provided in a Consistent manner. v) Absence of public notice for the invitation to bid vi) Lack of competition or insure cases collusive bidding that leads to inadequate prices	12	14	18	14	12	210	0.600	5th	3.00	3	3	1.34
5	Submission & opening of bids	iii) Bid opening procedure flaws iv) Deviations from the correct bid opening procedure	8	13	21	20	8	217	0.620	4th	3.10	3	3	1.18
6	Verification and post qualification analysis	iii) Familiarity with bidder in time, manifesting personal interest. iv) Errors or omissions throughout the evaluation in favour of certain bidders	15	13	18	13	11	202	0.577	7th	2.89	3	3	1.37

7	Approval of Evaluation & Award	iii) Conflict of interest and corruption in - evaluation process - Approval process iv) Lack of access to records on the procedure	13	12	13	16	16	220	0.628	2nd	3.14	4	3	1.44

Source: Field Survey

4.6 Rating scale

Table 11: Rating scale

Parameter	Probability of Occurrence	Level of severity
1	Not occur	No significant
2	Slightly occur	Slightly significant
3	Moderately occur	Moderately significant
4	Often occur	Very significant
5	Very often occur	Extremely significant

Risk matrix is a 5 x 5 matrix with probability of occurrence ranging from 1 to 5 along horizontal axis and level of severity also ranging from 1 to 5 along vertical axis.

The risk matrix is clarified into various zones represented with different colours where:

i) Green colour indicated that factors falling in this zone have low level which may be ignored.

ii) Yellow colour highlights that the factors falling in this zone have moderate level of risk. This means that these factors need some consideration and slight action.

iii) Red colour shows that the factors in this zone have high risk and must be considered critical. Those must be given high priority and serious action must be taken to solve those factors.

4.7 Appropriateness and the timing of risk

4.7.1 Risk Response Evaluation

In view of the unique characteristics of different risks, it is necessary to adopt different strategies in dealing with different types of risks, to assess its appropriateness and also manage them more effectively.

Table 12: Risk Response

Risk Response	Score	Weig-hting	RII	Mean	Mode	Median	Std	Rank

	1	2	3	4	5							
Risk Retention	2	2	2	2	4	40	0.67	3.33	5	4	1.56	2nd
Risk Reduction	2	2	3	3	2	37	0.62	3.08	3	3	1.38	4th
Risk Sharing	3	2	3	2	2	34	0.57	2.83	3	2	1.54	6th
Risk Control	2	3	3	2	2	35	0.58	2.92	2	3	1.37	5th
Risk Transfer	2	1	2	3	4	42	0.70	3.5	5	3	1.51	1st
Risk Avoidance	1	3	3	3	2	39	0.65	3.25	4	3	1.27	3rd

Source: Field Survey

The table shows that risk transfer is most preferred by practitioners obtaining the highest frequency of (3.5). This result was followed by risk retention of mean(3.33).

Risk avoidance (3.23), risk reduction (3.08), risk control (2.92) and risk sharing (2.83).

In risk retention, there are two types i.e. passive retention and active retention. Passive risk retention acknowledges the existence of risk without responding further and Active risk retention allocates an essential allowance to support a contingency strategy for projects whenever necessary.

4.7.2 Risk Response to manage Time Risk

Time risk, referreing to risks of tight scheduling, in appropriate time allocation and short bidding time is frequently triggered by other risk factors such as technical risk and design risk. The table shows the risk response to manage time risk.

Table 13: Risk Response to Time Risk

Risk Response	Weighting	Mean	Mode	Median	Standard Deviation
Risk Retention	39	3.25	4	3	1.27

Risk Reduction	37	3.08	3	3	1.38
Risk Sharing	33	2.75	3	2	1.49
Risk Control	34	2.83	2	2	1.42
Risk Transfer	41	3.42	5	3	1.52
Risk Avoidance	40	3.33	4	3	1.50

Source: Field Survey

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATION

The findings demonstrate that formal risk analysis and management techniques are rarely employed owing to lack of experience and knowledge in this area. The perception of risk by the practitioners is mostly based on their intuition and experience. The most utilized risk response measures are risk transfer, risk elimination and risk retention. However, the majority of the respondents have revealed that risk management becomes more important in the early phases for several reasons including:

i) Early risk identification makes the client aware of project risks and facilitates the choice of the optimal procurement option.

ii) Significant savings are possible in the early phases, since changes in the programme phase cost less money than in the production phase.

iii) The client cannot proceed with a project without taking into consideration all possible risks.

A client is a party that owns the project, and should therefore play an active part of the risk management process and demand active participation from the other parties.

In current practice, very limited interest and activity are found in the programme phase. The Architect and Design managers should be involved more in risk management because design is very significant risk source in a construction project.

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APPENDIX

KWAME NKRUMAH UNIVERSITY OF SCIENCE & TECHNOLOGY

COLLEGE OF ARCHITECTURE AND PLANNING

DEPARTMENT OF BUILDING TECHNOLOGY

MSC. PROCUREMENT MANAGEMENT – PROGRAMME

QUESTIONNIARE: TO PROCUREMENT OFFICERS, MUNICIPAL/METRO ENGINEERS, PLANNING OFFICERS, FINANCE OFFICERS, HEAD OF DEPARTMENT

STUDENT/RESEARCHER:

INSTITUTION:

DEPARTMENT:

Dear Sir/Madam

RISK MANAGEMENT PRACTICES AT THE TENDERING AND CONTRACTING STAGES OF PUBLIC WORKS PROCUREMENT

The questionnaire forms part of an Msc research being undertaken at the KNUST.

The purpose of the questionnaire is to enable the achievement of the following research objectives:

(1) To identify the current practices or procedure of risk management

(2) To assess the appropriateness and the timing of risk management processes/procedures

Your assistance in answering the questions set out below would be much appreciated.

Please do not leave any identification marks on forms in order that the replies remain anonymous. The information provided will be used solely for academic purposes will be treated confidentially.

Thank You.

INTERVIEW QUESTIONS

The aim with this interview phase is to create a general understanding of how the tendering process is executed in practice. The questions are divided into four sections, where each section is represented by questions relating to each of them. Questions are asked to understand the respondent‟s role in a tender and in the department. The tendering process will describe the entire process and explain the responsibilities in the tendering team.

A. General Questions

1. Name:

2. Company / organization:

3. Please kindly indicate your status in your organization _____

_____

4. How long have you worked in the construction industry?

5. What is your education? (Tick off your answer)

	Vocational training	Upper secondary school	University
Construction	☐	☐	☐
	☐	☐	☐
Economics	☐	☐	☐
Law	☐	☐	☐

Other:

6. Did you study risk management or/and project management courses?

Yes☐ No☐

If yes, what courses?

7. How do you evaluate your knowledge of risk Management? Low ☐ Fair ☐ Advanced ☐

8. Name of the project

8a.Your role in the project

- Client – representative ☐
- Client - project manager ☐
- Contractor – representative ☐
- Contractor - site manager ☐
- Contractor – estimator ☐
- Consultant ☐
- Design manager ☐
- Other, namely: ☐

How long have you been in practice?

(i) 5 years or less (ii) from 6 to 10 years (iii) 10years and above

Indicate your level of understanding of the concept of risk management practices

Only read about it □ Understanding from practice □ Understanding through reading and practice □ No knowledge about it □

Indicate your areas of specialization as far as practicing in the procurement of works is concerned. _____

The Tendering Process

9. Can you describe a general tendering process? From the announcement of the tender until the tender is submitted to the client?

_____

9a. Is the tendering process affected by a project's characteristics? (size□, contract form□ and type of project□)

_____

9b. Can you describe how the tendering team is assembled?

_____

9c. Do you perform a market analysis to investigate the competitors? (Analyzing their available resources etc)

_____

9d. Is there any audit which checks if the internal documents and policies are complied with? Yes □ No □

B. Risk management in the different phases of the project

Any construction process can be divided into four main phases: programme, design, procurement and production. This section of the questionnaire explores the aspects of the risk management process through the different phases. Risk management in the project consists of risk identification, risk assessment and risk response. The aim of risk management is to maximize opportunities and minimize consequences of a risk event.

At what stage of the project so you start practicing risk management?

Briefing stage □ Design stage □ Tendering stage □ Construction stage □

Section A – Tender Opening

No		Yes	No
10	Do you consider the preparation of a Tender Register necessary during Tendering process for comparison of submitted Tenders to those purchased?		
10a	Do you consider the preparation and signing of Minutes during Tender opening stage necessary?		
10b	The Tender Closing principles giving in the Instruction to Tenderers (ITT) as stipulated in the Tender Documents are not adhered to during Tender submissions?		
10c	Should the Tender Evaluation Panel continue to be an Adhoc Committee?		
10d	Should the Tender Evaluation Panel continue to be a Statutory Committee?		

10e. What is the duration of the tender closing/ opening period when undertaking public procurement of works, goods and services?

_____

Which of the following methods and tools do you often use to identify risks associated with a project? Rank them on the scale of 1-5 (from 1-least to 5 = most used)

Item	Methods	1	2	3	4	5
1	Brainstorming amongst a project team.					
2	Risk Register					
3	SWOT Analysis					
4	Checklist					
5	Site observation/visit to site					
6	By the opinion of external consultant					
7	By the risk management department in the firm					

Section B – Tender / Bid Evaluation

No		Yes	No
11	Should each stage of the Tender Evaluation Process up to the Recommendation for Award be disclosed to all Tenderers?		
11a	Are the verification of the authenticity of submitted Tender Documents such as Statutory Certifications, Commercial, technical and Financial capacities done in Tender Evaluation Activities?		
11b	Is the time allowed for verification of the authenticity of tender		
	documents as mentioned in question 11a enough?		

11c	Do you check compliance of signatories with the submitted power of attorney?		
11d	Do you undertake physical visits to cross check references during documentary analysis of submissions such as projects undertaken by Tenders / Bidders?		
11e	Do you know of other ways to identify and correct errors during tender evaluation apart from manual means?		
11f	Correction of Errors is not done fairly and is it used to manipulate the Tender Evaluation outcome		
11g	Which of the following Evaluation Method do you recommend to be used as a Standard tender Evaluation Format for all Public procurement of works?		
11h	Minutes for each stage of the Tender Evaluation must be taken and should form part of the Tender Evaluation Report		
11j	Enough time is not normally allocated by Clients for reviewing of Contract Documents by Contractors before Signing.		

Section C – Approval of Tender Evaluation Report / Contract Agreement

No		**Yes**	**No**
12	Approval of the Tender Evaluation Report in your Organization is done through the Decentralized Procuring Entities-Thresholds under schedule 3 of the Public Procurement Act, 2003 (Act 663)		
12a	There is no notification of Award of Contract to unsuccessful Tenderers / Bidders in Public Procurement of Works		
12b	The Tender Review Board on its own has been modifying any Submissions or Change the Recommendation in any tender evaluation Report		
12c	Before the award letter is written, is negotiation over minimum deviations from tender requirement met by Tenderers?		
12d	Are minutes of negotiation meetings attached to Contract documents?		
12e	Enough time is not normally allocated by Clients for reviewing of Contract Documents by Contractors before Signing		
12f	Are signature checks done with the power of attorney before signing of contract documents?		

13. How do you evaluate the project implementation in terms of the following parameters?

(Tick off the most appropriate alternative for each parameter)

	Very bad	Fairly bad	Fairly good	Very good
Functionality	□	□	□	□
	□	□	□	□
	□	□	□	□

Cost
Time

14. In what phases of the project did you participate? (Tick off your answer)

Programme □
Design □
Procurement (Bid/Cost estimate) □
Production □

15. Were the following risk management processes carried out systematically in the project?

	Yes	No
Risk identification	□	□
	□	□
Risk assessment	□	□
Risk response		

16. In what phases of the project were the risk management processes performed? (Tick off one or more alternatives that are suitable in every process)

	Programme	Design	Procurement (Bid/Cost estimate)	Production
Risk identification	□	□	□	□
Risk assessment	□	□	□	□
Risk response	□	□	□	□

17. Did you participate in risk management? Yes □ No □

If yes, what was your role in risk management?

_____

18. What types of risk did you assess in the project?

19. How large influence did the project actors have on risk management? (Tick off the most appropriate alternative for each actor)

	Insignificant	considerable	serious	severe
Client	□	□	□	□
Contractor	□	□	□	□
Consultant/Design	□	□	□	□

Manager

20. Assess the importance of risk management in the different phases of the project.

(Tick off the most appropriate alternative for each phase)

	Unimportant	Not so important	fairly important	very important
Programme	□	□	□	□
□	□	□	□	□
	□	□	□	□
	□ Design			
Procurement				
Production				

21. Were there deviations in the project in terms of the following parameters?

(Tick off the most appropriate alternative for each parameter)

	Yes, positive deviations	Yes, negative deviations	No
Functionality	□	□	□
Cost	□	□	□
Time	□	□	□

22. Have identified risks that resulted in problems occurred in the project?

Yes□

No□

22a. If yes, what impact on the project cost did they have?

Insignificant □ Considerable □ Serious □ Severe □

22b. If yes, why did the risks occur? _____

22c. If yes, how the problems were solved?

_____

23. Have unforeseen risks that resulted in problems occurred in the project?

Yes□ No□

23a. If yes, what risks?

_____

23b. If yes, what impact on the project cost did they have?

Insignificant	Considerable	Serious	Severe
□			
□	□	□	

23c. If yes, how the problems were solved?

_____

24. How were unforeseen risks caught in the project?

_____

25. Who did carry out the following risk management processes in the project's different phases? (Tick off the most appropriate alternative for each process in every phase)

	Client	Contractor	Consultant	Jointly	Someone else
Programme					
Risk identification	□	□	□	□	□
Risk assessment	□	□	□	□	□
	□	□	□	□	□
Risk response					
Design					
Risk identification	□	□	□	□	□
	□	□	□	□	□
	□	□	□	□	□
Risk assessment					
Risk response					
Procurement (Bid/Cost estimate)					
Risk identification	□	□	□	□	□
	□	□	□	□	□
	□	□	□	□	□
Risk assessment					
Risk response					

Production

Risk identification	□	□	□	□	□
	□	□	□	□	□
	□	□	□	□	□
Risk assessment					
Risk response					

Section D – Risk Management in the Tendering process Activities

Risk management in an early project phase

26. How and who identifies risks in the initial risk assessment?

_____

Risk management and tendering board

26b. What do you think the main purpose is of having a risk management and tendering board in the company? _____

26c. Does the board have competences that your department lacks? Yes □ No □

26d. Do you think that the board contributes to an overall better risk management?
Yes □ No □

26e. Can you come up with suggestions that would improve of the board"s function?

_____

Identifying risks

27. How do you identify threats and opportunities (t&o) during the tendering process?

_____

27a. Are there any t & o that are easier/more difficult to identify?

_____

27b. How big share of risks that actualizes in the project are identified in the tender?

_____

27c. Do you have any proposal on how your department can be better at identifying t&o?

_____

27d. How do you categorize risks?

27e. Does this change between projects? _____

27f. How do you analyze the relationship between two risks? _____

- How is this documented in the systems? _____
- Are you satisfied with the way you structure risk today? _____

Risk quantification

28. How do you quantify the risks you have identified? _____

28a. How do you quantify the risks you have not identified? _____

- What t&o are included in the contingency cost? _____
- How do you quantify the contingency cost? _____

28b. Are there t&o that are easier/ more difficult to quantify? _____

28c. Is it possible to compare the value of t&o with the actual value when the project is completed?

- Are there any differences? Yes ☐ No ☐

If so, how big? _____

28d. Is there something in the risk analysis/quantification that you can do better?

_____

E. Relationships between the project actors

This section investigates relationship between the project actors, i.e. client, contractor and consultant.

29. Did you earlier collaborate with other actors in the project?

No one ☐ One Actor ☐ Most of the actors ☐ ☐ All actors

30. How do you evaluate collaboration between the actors in the project?

Very bad ☐ Fairly bad ☐ Fairly good ☐ Very good ☐

Comments:

31. Was there collaboration between the actors in managing project risks? Yes ☐ No ☐

31a. If yes, in what processes? (Tick off one or more alternatives)

Risk identification □
Risk assessment □
Risk response □

31b. If yes, in what phases? (Tick off one or more alternatives)

Programme □
Design □
Procurement (Bid/Cost estimate) □
Production □

31c. If yes, how do you evaluate collaboration in risk management?

Very bad □ Fairly bad □ Fairly good □ Very good □

32. To what extent did the client communicate known risks and opportunities in the procurement phase?

Not at all □
□ Little extent □ Some extent □ Great extent

33. To what extent did the contractor communicate known risks and opportunities in the procurement phase?

Not at all □
□ Little extent □ Some extent □ Great extent

34. Assess how important the following factors were in the project. (Tick off the most appropriate alternative for each factor)

	Unimportant	Not so important	Fairly important	Very important
- Open communication between the actors	□	□	□	□
- Understanding of other actors' goals	□	□	□	□
- Effective coordination	□	□	□	□
- Joint responsibilities	□	□	□	□
Opportunities for future cooperation	□			

- Personal responsibilities
- Established process for dispute
- Frequent meetings
- Readiness for compromises
- Effective information exchange between the actors
- Fair and open allocation of identified risks
- Fair and open allocation of unforeseen risks