KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI, GHANA

COLLEGE OF ART AND BUILT ENVIRONMENT

DEPARTMENT OF BUILDING TECHNOLOGY

RISK MANAGEMENT PRACTICES OF BUILDING CONSTRUCTION PROJECT STAKEHOLDERS IN TAMALE

BY

ADJEI YAW PODIEH (BSC. BUILDING TECHNOLOGY)

A DISSERTATION SUBMITTED TO THE DEPARTMENT OF BUILDING TECHNOLOGY IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF DEGREE OF MASTER OF SCIENCE IN CONSTRUCTION MANAGEMENT

NOVEMBER, 2015

DECLARATION OF AUTHENTICITY

I hereby declare that this submission is my own work towards the MSc 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 acknowledgement has been made in the text.

Adjei Yaw Podieh	.. ..……	…. …….
Student Name	**Date**	**Signature**
Dr Kofi Agyekum	. ……	…….
Supervisors Name	**Date**	**Signature**
Dr Bernard Baiden	. ……	…….
Head of Department	**Date**	**Signature**

ABSTRACT

Risk management is an emerging issue in the construction industry. Within the past two decades series of studies have been carried out to ascertain the practices adopted in various sectors and the construction industry as well. The aim of this study sought to examine the nature of risk management techniques among building construction project stakeholders in the Tamale Metropolis. The objectives of the study were to; identify risks factors associated with construction projects in Tamale; assess the awareness of risk among project stakeholders; and finally identifying the risk management techniques adopted. A questionnaire survey was used for data collection and both descriptive and statistical analysis were employed for analysis. Risk identification, risk treatment and risk monitoring and control were the practices of risk management mostly observed by the respondents. Moreover, it was realised that forty (40) out of the forty-one risk factors were significant such includes contractor financial difficulties, delay in payment, weather condition, price fluctuation, social and culture factors, vandalism amongst others. Finally, insurance, retention, bond were also identified as the most used risk mitigating strategies used in the Tamale Metropolis. Recommendations were made to Project Stakeholders to have a round table discussions and brainstorm the likely risk associated with a project before handing over site to the contractor; Project stakeholders should organize an in-house workshop for their workers to help them understand the risk management process so that they will know when a tagged risk is about to happen; Personnel with risk management background should be employed by Project Stakeholders to oversee the risk management process; and also further studies should be carried out in the two other Regional Capitals and specific projects to identify risk factors.

Keywords: Risk management, delay in payment, risk identification, insurance, contingency.

ACKNOWLEDGEMENTS

Many are those who have contributed in diverse ways to make this long essay possible. I am highly grateful to all for the contributions made. While I cannot mention everyone's name here, it is important for me to acknowledge the contributions of few but not the least, the contributions of those whose help has made this work possible.

To the Almighty God, for bringing me this far on this academic journey and granting me the enabling environment, good health and strength as well as all the needed resources – to God be the glory and honour.

I also wish to express my profound gratitude to Dr. Kofi Agyekum, my project supervisor for his untiring support, expert guidance, valuable comments, suggestions, assurances and hope for me.

My sincere thanks go to all the members of my Construction Management class, especially Bernard Tuffuor Atuahene who assisted me in getting some of the much needed information for my literature review and data analysis and Yaw Appiah for his kind support and sincere words of encouragement.

Finally, I would like to express my profound appreciation to my family and friends especially my sister, Dorinda.

DEDICATION

To my Lord God Almighty who gave me strength, my mother and siblings for their support and encouragement.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

APM: Association for Project Managers

GDP: Gross Domestic Product

ISSER: Institute of Statistical, Social and Economic Research

PM: Project management

PMI: Project Management Institute

PRM: Project Risk Management

RAMP: Risk Assessment Management and Planning

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Understanding the risk management processes and practices in the construction industry is necessary because it helps in identifying the obstacles in the implementation of risk management in Ghana and other developing countries in Africa. It also helps developers, planners and stakeholders to recognise the pressing risk factors and their likelihood on construction sites.

According to Berke and Conroy (2002) and Chan and Lee (2008), the developmental policies of most countries place much emphasis on the need of developing their construction industry to stop companies from sudden collapse. It however requires the technical knowledge and understanding of risk management policies to help develop the construction industry. It is a well-established fact that every process and stage of the construction process, from initial investment appraisal through to construction and use of the built facility, is subject to risk for all the parties involved. The type and impact of risk in construction have become a topic of interest because of its effects on quality, time and cost of construction projects. Risk is not just a major component of the overall cost of projects and significant effect on project financial plan, but a mixture of activities that affect project goals in the construction industry.

Edward and Bowen (1998) opined that risk is the probability that an adverse event occurs during a stated period of time. By definition and classification, Risk is

defined as the probability that an unfavourable outcome will occur (PMI, 1996). It could also be classified as an uncertainty and the result of the uncertainty or is lack of predictability about structure, outcome or consequences in a planning or decision situation. This means that the definition of risk is relative to people and association but it has a common similarity as quoted by Barkley (2004), that the difference between risk and uncertainty is the fact that, risk is uncertainty and has a probability component whilst such cannot be said about uncertainty. Conversely to the view shared by Holmes (2002), risk is not the problem itself but the probability of its occurring and the severity of its impact should it happen. In similar situation, Baloi and Price (2003) describe risk as the probability of an unfavourable event occurring on a project. It can also interpreted as any event or events, either it is motivated by the internally settings of the project or the external environment of the project, that it occurrence may have a negative impact on the project objectives (Devripasadh, 2007). It is commonly accepted across the construction management society that risk management is important to all the parties to the contract however, the risk management process is complicated and highly misunderstood by project stakeholders (Zou et al., 2006). Ashworth and Hogg (2002) expressed similar sentiments that risk is inherent in construction activities and such includes the project environment, the design of the project, its construction and even during the operation of the project. However, the essence of identifying risk is for management to mitigate it so that it does not defray from the set of objectives of the project.

Risk management is methodological way of recognising, assessing and treating the risk in order to meet the objectives of the project (Banaitiene and Banaitis, 2012; Kremljak, 2004). Boehm (1991), proposed a two phase process of risk management, like many other researchers who had proposed various project management

processes for project risk management. Risk assessment phase consist of three steps; risk identification and risk analysis; and risk response phase, and risk tracking and corrective actions.

Klien and Ludin (1996) proposed a four step process of risk management, which involves identification, analyses, control and reporting. Their proposal parallel Deming's four steps of quality management – plan, do, check and act.

In 1994, Fairley, suggested seven steps of project risk management which was identical to the theory by Boehm three years back. Fairley's concept involved risk identification; risk probabilities and effect assessment; creation of strategy to mitigate identified risks; monitoring risk elements; invoking a contingency risk plan; treatment of the risk; and recovering from the risk.

1.2 Statement of the problem

As mentioned earlier, the Construction sector is instrumental in the economic fortunes of Ghana. However, the industry is stagnating in its growth especially in the Northern sector of the country. The consistent depreciation of the Ghanaian Cedis against the giant foreign currencies such as the US Dollar also affects the industry externally. Moreover, the sudden rise of utility charges The rising cost of fuel, increasing cost of electricity together with a high level of inflation also contribute to the poor performance of the industry. Worse, there is an inadequate skills available in the industry especially the Northern because of the prevailing circumstances there. According to the 2012 Infrastructure Sector Research, 74% of companies are hard pressed to find appropriate engineering skills (Network, 2013), Tamale is no exception, and most projects in the said region undergo various processes with little to no satisfaction to the resident consultants and clients. The research study was

designed to identify those practices in the construction industry that hinder smooth operation and ways to manage them.

1.3 Purpose /Aim of the study

The purpose of this study was to explore the nature of risk management practices of construction project stakeholders in Tamale

1.4 Objectives of the study

Specifically this study sought to address the aim by achieving the following objectives:

1. To identify the risks associated with construction projects in Tamale;
2. To assess the awareness of project stakeholders regarding risk management techniques; and
3. To identify risk management practices adopted by construction project stakeholders in Tamale.

1.5 Research questions

In every research work, the research questions must answer the research objectives.

In view of this, the research questions for this study were;

1. What are the risks associated with construction projects in Tamale?
2. What is the awareness level of construction project stakeholders regarding risk management techniques in Tamale?
3. What are the current practices regarding Risk Management Practices in Tamale?

1.6 Significance of the study

While the importance of risk assessment has been substantiated in various studies, there have been little to no attention to the measurement of the benefits that might accrue in the implementation of risk management in construction industries.

The focus of this study, despite identifying the benefits to be gained, was buttressed by the assertion of Bajaj et al. (1997) that lack of incentives to carry out risk analysis as one of reasons for ad hoc approach adopted by some construction organisations in assessing project risk.

There had been various studies by numerous researchers to measure project risk management practices in the developing countries to such as the study by Kululanga and Kuotcha (2010), however the limitation of this study is that the sample was drawn only from the contractors, engineers and related stakeholders. Previous literature on similar topics, most often has been on tools and techniques for project risk management and effects on cost estimation in the northern region of Ghana. The few publications and journals were basically focused on diverse industries with little to no mention of the construction industry. More so, the focus was on identifying the extent of risk management practices rather than measuring the benefits to be gained from adopting project management practices in general. This research study however, focuses on the construction industry in a developing country using Northern Ghana as a case study. The research study was conducted to fill in these gaps in knowledge. Thus, there are emphasis on the development of mechanisms or tools to enforce its awareness, usage and benefits derived from practicing Risk management. The researcher involved three major stakeholders within the construction process, namely the clients, contractors and consultants. The major

premise of the study is that, for construction organisations to be able to formally adopt RAMP, they need to be sensitized on the benefits of carrying out such processes on projects and be encouraged to ensure that it is carried out effectively on their projects.

The findings of this research will contribute to knowledge in project risk management and assist practitioners, researchers and investors in future proposals and selection of tools and techniques for project risk management and project management in general. The construction sector in Tamale and Ghana as a whole is projected to grow at a record rate of 13% with the recent discovery and production of crude oil in commercial quantities (ISSER, 2008).

1.7 Scope of the study

The study focused on the nature of risk management practices, its sources, nature, structure and ways to improve it in the Tamale Metropolis in Northern Region of Ghana. Consultants, Contractors (D1K1) and Clients within the Tamale Metropolis were the respondents of the study

1.8 Methodology

The research strategy adopted for the study is the quantitative approach. Moreover the study made use of questionnaire as the data collection instruments. Collected data were analysed in the form of pie charts, tables and mean score ranking analytical tool of the Statistical Package for Social Scientist.

1.9 Limitations of the study

This study must be seen as an effort to examine the issue of risk management practices in Tamale. There were some constraints encountered during the time of the research especially in the phase of gathering data. Some of these constraints are time, money and delays in getting feedback from the respondents. One of the constraints is financial constraints which comprised of cost involved in acquiring relevant materials for the research such as textbook, internet cost and printing cost. Another constraint is delays in getting feedback from the respondents. For instance there were times that the researcher spent much time waiting to get response from the respondents as they were busy at the time the researcher visited. Finally, since this research was done using Tamale as a case study, it was not fair to generalize the information obtained from this study to all risk management practices in all industries. Recommendations or conclusions made in this study could only be limited to the institution under study.

1.10 Organizations of the study

This research work was made up of five (5) chapters. Chapter one was the introduction of the study. The sections under this chapter was the background of the study, statement of the problem, objectives of the study, significance of the study, research design, data collection and data analysis. Chapter two looked at the literature review whiles chapter three presents the method of study and chapter four was presentation and analysis of the results. Lastly, chapter five also covered the conclusion, summary and recommendations based on the findings.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter involves the review of literature from published works. Some references are also made from the internet and other on-going study work on risk management, more especially on – "How to define, identify, assess, mitigate and control the principal risks in construction projects by stakeholders in the industry especially, construction companies and practitioners".

2.2 Risk defined

By definition, risk is generally uncertainty circumstances or events which can produce a positive or negative impact on a project, if it occurs. Jaffari's definition in the year 2001 was however complex, as it considered loss/gain and magnitude. In other words, risk is the exposure to gain or loss, or the probability of its occurrences multiplied by their respective magnitude. A certain event is 100% if their probabilities of occurrences are achieved and conversely an uncertain event is when the probability of occurrence is zero. There are wide variations in between the two stated extremes opined by Jaffari. A simpler definition by the Project Management Institute (1996), described risk as separate and unconnected occurrences that positively or negatively affects a project. There are emphases on the major objectives of survey on risk management actions, risk may be defined as the probability of occurrence of some unpredictable, uncertain and even undesirable events that may change the profitability on a given investment's prospects (Kartam, 2001).

Any situation or thing that can cause harm may be defined as hazard and the likelihood that a recipient of harm could be influenced by hazard as the extent of

exposure. Exposure is taken to imply notions of frequency and probability while hazard relates to damage, injury, loss of performance and finance. Risk is the triple characteristic of any project decision in the situation of uncertainty. The existence of a number of possibilities that has unknown occurrence is termed as uncertainty. (Yoe, 2000) affirms that not all uncertainties are risks but some risks are uncertain. Risks and uncertainties however share similar characteristics in services, production and exchange. Planning, monitoring, implementation, adjustment, behaviour and explain choices are the fundamental variables that are influenced by risks and uncertainties according to Okema in 2001. The nature of the risk and its application are the basis to define risk with a common element of subjectivity. The specification of correctly predicting the exact period during a project in the construction industry where certainty exists or assured is very uncommon (Flanagan and Norman, 1993). Some researchers based their definitions on the outcomes and probability of a project outcome been realised. Risk may exist when a decision is expressed in terms of range of possible outcomes and when known probabilities of the outcomes are attached, while as uncertainty is when there is one possible outcome of a course of action. There are unknown outcome of the probability of each outcome and in some occasions there are no reference to the chance of bad consequences on risk. Thus, good consequences should be relevant in the definition of risk. (Education and Learning Wales (2001).

Some renowned writers like Flanagan and Norman (1993), clearly distinguished between the definitions of risk and uncertainty. For risk to occur, the main dependent is probability which could be expressed quantitatively. Uncertainty, however, might be defined as a situation in which there are no historic data or previous history related to the situation being considered by the decision maker. Risk is an element

subjected to empirical measurement, while uncertainty is of a non-quantifiable type as stated in the findings of a research conducted by ADB (2002). Thus, a situation where are indication of its likelihood of the realized value of a fallen variable within stated limits is risk related and can be described by the fluctuations around the average of a probability calculus. If the fluctuations of a variable are such that they cannot be described by a probability calculus, the situation is described as uncertainty. The Royal Society (Greene, 2001) viewed risk as the probability an adverse event that occurs during a stipulated time period, or results from a particular challenge. They also opined that the probability that statistical theory obeys all the formal laws affecting probabilities. However, the main disadvantage about these statistical theories is that they depend mostly on guess work or the approximation of what is to occur. In summary, a systematic way of dealing with hazards can be considered as risk. The assumption that there are uncertainties with predictions of hazard affirms that there are only uncertainties simply because there are only ever a prediction of likely. For risk to exist there should be hazard, hence their correlation but hazards are entirely subjective and centered around previous experience, specialist training in an area of field of expertise, and cultural values to which the hazard relates (Greene, 2001).

According to a research conducted in 2007, the findings proved that the government of Ghana is the biggest client in the industry (Agyakwa-Baah, 2007; Tuuli et al., 2007).

Frequent delays and cost overruns on a lot of projects are some of the challenges of the construction industry despite its contribution to economic development and growth (Frimpong et al., 2003; Agyakwa-Baah, 2007; Berko, 2007; Agyakwa- Baah, 2009; Chileshe and Berko, 2010; Fugar and Agyakwah-Baah, 2010) There are the

need for serious measures and the right risk management processes to be put in place to prevent these cost overruns and delays as opined by Ahadzie et al.(2008), who observed that overall project cost and quality should be viewed as the most important criteria of success in the project performance in Ghana.

Rapid growth in most construction industries around the world brings about infrastructural development. The growth in the construction industry leads to increases in GDP of a nation and it is very essential to prioritize infrastructural development and make the necessary provisions in most governments' budgets to finance such operations (Odeyinka et al., 2007). Most at times new challenges are faced considering the risks involved in the design and production in construction projects. By nature, risk management in construction industry allows for a lot of scope for many environmental and socio-political problems dating from pre contracts, contract up to post-contract stage leading to completion time problem, cost overruns and poor quality work (Okuwoga, 1998). In as much as project managers try to limit cost overruns, it is inevitable and will definitely affect project especially when it involves large amount of money (Odeyinka et al., 2007). In order to avoid or reduce the losses, management of the risk involved in the construction project is required. The components and materials needed for assembling, designing and producing by different suppliers from diverse disciplines and technological disparities so as to develop a build environment is the construction process.

The activities include design, project planning, work regulation, construction, maintenance and commissioning of the structure. The complexity and size of activities determines the construction firms to be engaged in the project work, i.e. international construction firms or local builders who engage in simple/complex/high

risk projects. New construction project helps in the provision of a structure or building or infrastructure which develops the economy, a societal improvement or service or provision for direct need. Constructions are means of economic development for a nation and accounts for a certain percentage of a nation's annual fixed capital formation. It helps in the delivery of goods and services from other parts of the economy. These risks are then examined based on stakeholder's perspectives and project life cycle perspective. The stakeholders include clients, contractors, designers, sub-contractors, government bodies and external bodies.

PMBOK, a renowned project management body of knowledge describes any temporary endeavour with the aim to create unique service or product as a project (PMI, 2008). The difference between project and an organisation's normal operation is that project eventually comes to an end. Projects are temporary in existence and therefore have a fixed lifeline and according to PMI, 2008 every project must fulfil its explicit objective with a one-time effort within a specific time. Projects may vary within levels of an organization, while a project may be about one department of an organization, others might cut across all departments within the organization. Usually project might involve several or specific group of personnel in a team or a single person.

2.3 Risk Management

Deviation from a set target or plan or objective is expected in a world full of uncertainties and every step taken has elements of risk we need to properly address. The process and techniques that enables effective risk management associated with projects. According to The Association for Project Management is defined as project

risk management (APM, 2000). Thus risk denotes uncertainty with a recognized distribution probability (Barkley, 2004). It is rather a probable expected future problem but risk management does not assured against the problem existence (Holmes, 2002). (Augie and Kreiner, 2000) also defines it as the consequences of uncertainty either positive or negative on objectives and aims. There is always the tendency to link risk with uncertainty but Carpenter and Frederickson in a research conducted in 2001 revealed that there is distinction between the two. The lack of information often leads to inadequate misleading and knowledge which they classified as uncertainty, but another school of thought, Perry and Hayes (1985), recognized the distinction between the two but however it is unhelpful to construction projects. Risk could be financially related, failures in projects, legal issues or accidents as per a similar study conducted by Akintoye and Macloed (1997).

The possibility of foreseeing a problem is risk while the act of gathering human resources together to achieve set objectives efficiently is management. It involves identification, assessment, analysis, managing and avoidance, and reduction of risk the risk which gives higher loss are managed whenever there is a prior format, while the ones with less possibility of occurring are latter handled, but this is a difficult task to fulfil and highly misunderstood. The characteristics of the threat to risk is the first management process, next is evaluating its weakness to certain assets in order to determine the risk, that is taking into consideration the expected possibly of risk occurring of some assets. Furthermore, the methods of reducing risks are identified and possible solutions are taken to risk its influence. Normally, there are lot of time wasted trying to tackle risks but if it is properly assessed and prioritized it will not happen. Organization and planning satisfies risks identification at an early stage,

continual tracking it and evaluating and re-evaluating, actualization of actionable remedies, communication and coordination, according to (Kremljak, 2004). He structured risk management practices into four classes namely, planning, assessment, handling and monitoring. (Perry and Hayes, 1985) affirmed to this theory and added that in addition there should be identification of advantageous alternative action plan, increase confidence and improve chances of success in order to have a successful manageable risk

A rather simplified framework for risk management identified four (4) steps with many different project risk management process and tools used. They involve

a. Identification of risks
b. Quantification of risks
c. Planning for risks
d. Monitoring and control of risks

All the above four steps must be effectively and continuously followed in order to manage project risk. At each stage or whether there are deviations, it is important for those steps to be carried on from time to time at different levels. Managing risk is the most difficult part of project management and the project team should have recognisable and identification skills to trace the consequences of undertaking a particular project. However in the construction industry where designing and selection of construction method are influential, it is very essential to identify risk at an early stage of the project.

Risk assessment and management practices (RAMP) are well organized and implemented within the developed counties; however, there are insufficient quantities of studies which examined risk management practices within the West African context, and focusing on the Ghanaian construction industry. Lack of tools

and awareness of appropriate techniques are one of the possible reasons for low significance of risk assessment and management practices within Ghana.

2.3.1 Risk Management Planning

The act of creating an organized and detailed risk management is risk planning. This involves the practices, procedures, strategy development, setting of goals and objectives, control activities, resource identification etc. this initial stage of the process describes how risk will be managed and description of the management components. Products projects and process must have a much laid down plan to manage risk

2.3.2 Risk Identification

Events that affect the achievement of objectives and negatively cause problem, according to (Moavenzadeh and Rossow, 1999) are risks. Identification of potential threats follows the first step of risk planning, discovering and out ling those elements that affect the objectives of an organization. In addition to identifying the sources of risks and it is when the source of risk is identified that the consequences of that source are known. Investigation the consequences of sources or the problem it causes is very important under this very risk management process.

Identification of risk reveals two types of risks (controllable and uncontrollable). Controllable are voluntarily undertaken and its outcome is part of the direct control of a project while those risks which do not influence a project is termed as uncontrollable risks as observed by Chege and Rwelamila (2000). The identification the constituents of risks determines which risks are likely to affect the project and documenting the characteristics of each. Risk identification should be performed on a

regular basis throughout the project, it is not a one-time event according to (PMI, 1996). A thesis conducted in 1995 by Isaac defined the main constituents of risk identification as a method used to serve as a guide on what those risks should look like when written down to generate risks (Isaac, 1995). In every project there are internally and externally generally risks and it is the objective of risk identification to address these two elements. The elements or things that can be influenced by the project team, be it cost estimation and staff assignments, are internal risks. However, there are some things beyond the influence and control of the project team, typical example is the actions of government. In every project context, risk identification is not only concerned with positive outcomes or opportunities but also the negative outcomes or threats (PMI, 1996). This is a critical stage as a broader and clearer view is taken by the project team to ascertain the risks that are likely to impede the project in meeting its cost target without any constraint. The significance and criticality of this risk management project is affirmed by a study in 2001 which adds to literature that there should be proper recognition to the existence of one or more potential risks which may result in disaster or forgoing an event or opportunity for gain resulting from proper corrective action; failure to do so will lead delays or cost overruns (Enshassi and Mayer, 2001).

Identifying risk can be compared to mapping the world which is centred on the location of the map maker. Wherever one stand to mark the world from a map, may be entirely reveal the whole world to you and some places familiar to you may not be obvious to other project teams and vice versa. Every project when viewed from the top has complex layers of planning, multiple interactions of vertical and horizontal as well as sequential problems and it is the ability of the management team to influence the outcome of a project by what they see, though outcome of projects are limited.

There should be greater concentration on what could happen rather than attempting to focus on what should happen. Flanagan and Norman in the year 1993 again observed the first equipment of risk identification is focusing on the effects of the risks and its sources. There can be a catalogue of extensive risk devised; however, they could be incomplete and inadequate leading to decision failing simply because most decision makers do not consider the full spectrum of the potentially events or things that may harmfully affect a project. One way of catering for this is by proper identification and categorization of risks so as to minimize the risks embodied in projects (Enshassi and Mayer, 2001).

2.3.3 Risk Assessment

The damage or loss evaluates the extent of a risk effect, and also involves an analytical relation of risks to life cycle. Risk assessment leads to implementation of plans, so it is only prudent that the most refined decisions are valued at this very stage. The level of risk should be estimated and a better understanding drawn from the identification of the sources, causes and nature of risks. Assessment of risk involves developing a performing supporting analysis, probability consequences scale, determining probability, documentation of results and significance levels or ratings. It is a common practice to compare the risk analysis with the criteria for risk to determine whether the risk level is tolerable for the project or not. Estimation of risk by identifying undesired events; the likelihood of occurrence of these events and the result in case of occurrence or consequences are the primary objective of assessment. However the main problem has to do with the determination of possibility of occurrence due to lack of statistical information for some occurrences.

2.3.3.1 Risk Analysis

Risk management process is a crucial field of project management process in the construction industry. It is the process of risk management where the effects and causes of events which might cause havoc are identified and dealt with. A defined and accurate estimation of risk events is the aim behind such analysis and to some extent makes the decision making of the process to be specific and definite (Estate Management Manual, 2002). The significance of analyzing risk is not far-fetched as it analyze the various outcomes of any decision and captures all feasible options. Clients more often are interested in the likely price of a building project, but however, projects mostly and consistently experience cost overrun, too most often the more important questions of 'what if' are not asked by clients (Flanagan and Norman, 1993).

According to the Estate Management Manual published in 2002, assessing the identified risks is the main principle risk analysis. Risk analysis are done by assessing values on the effect risk have on time and cost. The economic processes or parameters of their respective effects could be analysed and three generalized kinds of risk treatment can be applied: that is, transfer, avoiding or reducing and accepting or retaining risk. Flanagan and Norman (1993),opined that reveals the likely situations if a project is terminated or does not follow the initial plan, the use of risk analysis comes into play. There will be clearer vision of the risks when active minds are applied to the best available data in a systematic and structured way rather than the achievement it would have gained by intuition alone. There is recognition of uncertainty that surrounds the best estimate in risk analysis approach by generating a probability distribution based upon an expertise judgment. This therefore improves the effects of uncertainties and offers a better understanding of projects. Risk

analysis is not a standalone activity; rather they are components of all decisions continually made to respond to project dynamics as stated by (Jaafari, 2001).

Evaluation of risks and interacting of risks are also critical to risk (PMI, 1996) and it assesses the potential results on the project. Although, it is complicated in nature but it is not limited a number of sequences or factors including: Threats and opportunities can interact in an unexpected way, for example, scheduling delays may force adopting new strategies which reduces the duration of the overall project. Multiple effects may also result from a single risk event as when there is late delivery of key materials. This leads to schedule delays, cost overruns, penalty payments and a lower quality product. According to a study conducted by Bender and Ayyub in 2001, the use of mathematical techniques protect project managers control cost but some over rely on these techniques creating false impression of reliability and precision. These techniques are used throughout the whole life span of the project and most importantly the experience of construction experts throughout the construction project

2.3.3.1.1 Methods of Risk Analysis

The methods devised to risk analysis are qualitative or quantitative in nature on a assumption of the availability of information (APM, 2000). An assessment of risk as well as identification of risk together form the basis for qualitative analysis, while quantitative analysis solely concentrates on the evaluating and assessing risk events (Chapman, 2001). However, there are occasions where there will be little to no information about certain risks making analysis highly impossible. The Table 2-1 below identifies the mechanisms devised for purposes of analyzing risk.

Table 0-1Risk Analysis Techniques

Risk Analysis	
Qualitative	**Quantitative**
Direct judgment	Probability analysis
Ranking options	Sensitivity analysis
Comparing options	Scenario analysis
Descriptive analysis	Simulation analysis

Source: (Ward and Chapman, 1997)

2.3.3.1.1.1 Qualitative Risk Analysis

Lowe (2002) indicated that, a qualitative analysis of risk aims at identifying risk in order of severity and the factors that causes them to happen, their scope, and possible relations. This order of severity is related to the impact on the project and the probability of the event. According to Kuismanen (2001) risk analysis aims at identifying and registering the characteristics or features of the risk event. There is a further assessment to examine the importance of the identified risks and developing a list according to preferences for analyses and mitigation. The objectives of the project are weighed against the identified and registered risk events based on their effects on the project objectives and likelihood of its occurrence by the project team. In situation where the management team could not assess the risks, there should be a proper soliciting of an expert assessment of the risks (Office of project management process improvement, 2003). The activities undertaken in the analysis of risk includes registering all the potential risk events. Secondly, the potential events should be identified and devising or developing a risk-ranging scale for each of the identified risk factors. Ranking and corresponding risks to activities is very crucial step of this qualitative risk analysis. This process is concluded by documenting the

results and identifying a risk-reduction action to tackle the risks (Kindinger and Darby, 2000)

2.3.3.1.1.1.1 Uses of Qualitative Risk analysis Results

According to search conducted by Kindinger and Darby (2000), they concluded that risk analysed qualitatively are very helpful to the project management team as it provides them with assistance in three important ways.

Qualitative analysis prioritize various risk factors in order of its severity before if possible the risk treatment approach adapted is applied. Additionally, the most important reason for adapting the qualitative approach of analyzing risk is the privilege of identifying the risk factors of the project by evaluating the possible risk reduction actions. After the risk issue is identified, risk reduction recommendations are usually straightforward. Finally, appropriate input distributions for quantitative and qualitative risk models are developed and integrate in order to analysis risk.

2.3.3.1.1.2 Quantitative Risk Analysis

The main difference between quantitative and qualitative risk analysis is that the latter estimates the probability of meeting the objectives of the project numerically or not. The simultaneous evaluation of any quantitative analysis assesses the impact of all quantified and identified risks. As per briefing and discussion by the office of Project Management Process Improvement in 2003 most project's completion date and costs are dependent on the probability distribution of every project. This method lays emphasis on probability distribution and result in a positive result in achieving a project's objective than qualitative methods. Whiles as quantitative methods depend on the sufficiency of current data been available, qualitative depend on past

experiences and personal judgement of the investigator which makes the subjective in nature because it differs from one investigator to the other. To create a standardized form of analysing risk in construction projects, most contractors prefer the use of quantitative methods as opined by Ahmed et al. (2001). Analysing risk quantitatively consider a range of possible values for key variables and probability on their occurrences.

According to the Asian Development Bank (2002) there are considerations for simultaneous and random variations which lead to a combination of possibilities that the project will terminated. Thus, quantitative analysis of risk requires statistical methods and analytical tools employed for the purposes of risk analysis (Office of Project Management Process Improvement, 2003). The likelihood or probabilities are assigned to events and as well as its impact before identifying the severity of each event to analysis risk quantitatively (Abu Rizk, 2003). Kuismanen however, proposed two alternative approaches that aids in assessing risk quantitatively. A bigger picture of quantifying risks as individual entities and thereby ascertains accuracy by cumulatively considering the effects of each individual risk. This approach considers the net value of the risks and thus makes it more accurate in estimations of risk (Kuismanen, 2001). The second approach, alternatively, by considering the mathematical properties of risks and modelling an interrelated approach to assess these variables from bottom up. This approach similar to the former also is dependent on the calculation of the impact of risks and the relationships of its effects.

2.3.3.1.1.2.1 Basic Steps of quantitative risk analysis

Risk analysis, as previously discussed, is the likelihood in determination of event that would occur and its associated effects should it happen. Quantitative risk analysis attempts to use numerical terms in its description. Kelly in 2003 defined some number of steps which helps in analysis risk quantitatively. To begin with, there should be a clear defining of the consequences, that is, definition of the required numerical estimate of risk. This paves the way to develop a guide which considers all potential events that might happen sequentially for an event to happen (Kelly, 2003). According to Kelly, collection of data and considering each step on the pathway and their respective variables are essential in building a model. Estimation of risk is next which basically considers the effects of changing model variables to reflect strategies for a risk management. This step follows after the model had been construction and data also collected so as to enable in estimating the risk. The concluding step of quantitative analysis is undertaking a scenario and sensitivity analysis. More information are required when undertaking a risk analysis than when undertaking a sensitivity analysis.

2.3.4 Risk Handling or Control

This stage discusses how to implement identified techniques in order to overturn known risks. Planning and execution is a core component of this stage, the mind-set is to tackle risk at different levels. The effectiveness of the knowledge of whether there will be decrease or increase correctly identifies risks and reduces the amount of it purposefully. During the other stages of the management process, there might be errors, but this stage of the RMP requires careful execution not to repeat the same

errors identified or analysed. Kremljak (2010), identified four ways of handling risk and they are risk avoidance, risk reduction risk sharing and risk retention.

Risk avoidance involves eliminating and stopping any activity or process that may carry risk towards the achieving of goals. Reduction of risk, on the other hand, means reducing the extent of possibility of loss. It is important to find a correlation between negative effect of risk and benefits. The use of technology helps in carrying out this process. The third way of handling risk is sharing through insurance. When a project is insured it reduces the loss burden as another party handles the risk factor of the project. In any case if there is any default the risk will surely revert to the first party. Risk retention concludes the fourth method of controlling risk, according to Kremljak, in situations where the cost incurred in managing the risk far over cedes its negative effects. The approval of losses or gains of a specified risk revolves around this particular method of risk control and some cases such risks cannot be insured against because of its magnitude. A typical example is ethnic or tribal wars.

2.3.4.1 Risk Response Strategies

The Project Management Institute in 1996 highlighted three ways of risk responding in projects: avoiding is eliminating a specific threat by removing the cause. Most at times specific risk can be eliminated as not all risks can be eliminated by project management teams; mitigation is the introduction of new technology or buying insurance, for example, to reduce the expected monetary value by reducing its probability of occurrences; accepting as the name implies is accepting whatever the consequences of the risks might be. Dealing with a lower profit of some activity is

passive while developing a contingency plan executable when risks occur is active PMI (1996).

There had been suggestions as to how to respond to residual risks by reducing uncertainties by obtaining additional relevant information leading to a re-evaluation of risk impacts. Another school of thought is the elimination of the risk factor through complete or partial re design. There were suggestions of transferring the risk to other sub-contractors and insuring the occurrences of the risks factors. Abu Rizk in 2003 added to the assertion above that a further abortion of these project when the risks are intolerable and no favourable mechanisms could be taken to mitigate the damages. (Abu Rizk, 2003)

Four identifiable and discreet appropriate methods of treating construction related risks are avoiding, reduction, transfer and risk retention as buttressed by the findings of similar studies (Ahmed *et al*,2001; Akintoyne and MacLeod, 1997; Enshassi and Mayer 2001; Education and Learning Whales, 2001).

2.3.4.1.1 Risk Avoidance

Risk avoidance at times is called risk elimination is not a generalized risk response practice in construction industry as the avoidance of placing a bid or the reluctance in project funding, for example, terminate the life of the project even during the earlier days of the project. In a bid to totally eliminate risks in construction industries, the above cited examples are impracticable and lead to delays and cost overruns. A rather constructive approach/condition could be adopted in order to avoid risk. A contractor may tender for a contract with a higher bid, or place conditions on the particular bid, or signing a pre-contract or negotiating a favourable pre-contract

condition, for not bidding on contracts that harbour higher risks as observed by Flanagan and Norman in their research conducted in 1993.

2.3.4.1.2 Risk Transfer

As the name denotes; this risk response practice employs the transfer of risk from one management team to another or from one project to the other. The introduction of insurance premiums in construction projects are beneficial, however, it does not discharge all the identified risks of the project but covers a portion of risks (Tummala and Burchett, 1999). Moreover the transfer of risk essentially can be done in two ways: transferring the risk from the responsible entity for by hiring sub-contractor on the hazardous projects; and retention of the property or activity but transferring the financial risk through surety and insurances packages.

2.3.4.1.3 Risk Retention/ Acceptance

This risk response practice involves an internal management mechanism channelled at reducing controlling risk (Zhi, 1995). Akintoyne and MacLeod (1997) suggested that, it is conducive when avoiding the risk been handled by a particular company is impossible, there might be a small or insignificant financial loss and the probability of its occurrences are insignificant, making it uneconomical to transfer. The foreseeable or unforeseeable risks are financed and controlled by the contractor or company and there are two methods devised to retain risk in construction projects. A passive retention method occurs when the contractor performing the work borne all the risks which may occur through ignorance, negligence, or absence of decision. Passive retention method is non-insured.

On the other hand, a self-insurance is a deliberate management mechanism devised to handle risks upon making a thorough analysis of the likely losses to be encountered and finding alternative strategies. In 2007, Agyakwa-Baah, identified that risks are mostly handled by construction companies by adding a contingency of 10% to the cost of the project cost to address any risk. Moreover, the importance of the industry is seen in its contribution to GDP and the percentage allocated to construction works in the national budget of Ghana (Agyakwa-Baah et al., 2010).

Akoi-Gyebi (2009), also noted the contribution of the construction industry ranging from the direct importation of buildings and components to supplemental domestic production and to the use of design and implementation expertise provided by foreign consultants and contractors. He identified other areas of contribution which were within road transportation, as it was the widely available form of transport in Ghana: it carries in excess of 97% of all passenger and freight traffic. Aside linking agricultural production areas with local, regional and national markets, road transportation links all major cities, towns and villages. There has been abundant changeling of funds into the road sector in recent time by Governments with the goal of maintaining or improving the state of the roads. Risk contingencies are a result of past experiences concealed within the bidding process, according to Mills (2001), and furthers elaborates that contingencies protect the contractor's interests in the event that a risk occurs.

In the construction industry, the simple use of contingency sums to deal with risk is unlikely to encourage more effective management of projects, nor to lead to greater efficiency. Rather there should be a more comprehensive understanding of the nature of risks they encounter, their chances of occurrence and impact on a stakeholder's organization

2.3.4.1.4 Risk Reduction/ Mitigation

This is a general terminology used to signify the reduction of probability its adverse on the project. There might lead to an entirely elimination of risk events as observed in risk avoidance. According to Piney (2002), it is only prudent to not stress on the impact of the risk because it becomes unacceptable when the promising effect reaches a level. The adoption of one of these approaches will work in reducing the potential risk impact on a project (Piney, 2002).

2.3.5 Risk Monitoring

Checking on identifiable risks and new risks as well as monitoring of residual risks are expected as the project progresses. This stage of the management process ensures that implementation of risk schedule and evaluation how to reduce it and special reports prepared often to ascertain the possibility of new risks and ways to handle them. This is a life time cycle as well as the project is existent and managers in industries, according to Kremlijak (2010), should have a complete data on future events by providing contingency plans based on the system in question objective Kremljak (2010). In the developing construction sectors, this phenomenon is common and experimental tools should be tried to bring acceptable solutions.

Many research works have been done on risk management practices in construction industry; a common similarity among all the studies is the significant outcome of risks influencing the delivery of a construction project. Chen et al., (2004) identified 15 risk factors on the basis cost of a project. Chen found escalation of material price and inaccurate budget as the highly ranked risk events. Shen (1997) study also revealed eight significant risk events accounting for delay in construction projects

using construction professionals as respondents. Shen also suggested that, the most important as of risk is the ability to treat it and constantly monitor how measures are been effected.

Tam et al., (2004) also conducted a study in a study with the aim of identifying factors affecting safety dimension of construction performance, the study also revealed management and project managers inability to create the awareness of satey on construction sites, lack of capacity building workshops and managers unwillingness to inject resources in safety related issues. Other studies have been done on risk management on phases of a project to ascertain the prevailing risk factors and their effects on the project objectives.

Uher and Toakley (1999) also studied on the social and cultural issues affecting the implementation of risk management practices on a project life cycle, it was discovered that, there is relatively low risk at the conceptual phase of the project. And according to Abdou (1996), classified risks in construction under financial, time, design phase, contractual, organizational and the construction itself. The signification step in undertaking risk management exercise is risk classifications which involve structuring diverse risks factors affecting a construction project. Perry and Hayes (1985) presented a critical approach in managing risks effectively and divided them in terms of risks retainable by the three main parties to the project, thus the client, contractor and consultant. They combined a general approach backed by a system showing the levels of the work.

Some researchers classified risks under four main classes; industry, client, project and the project environment (Chapman (2001), while Shen (2001) also grouped it under market, political, institutional policies, management, legal and financial.

2.4 Factors contributing to Risks in Ghana

External and internal factors could be attributable to risk in the construction industry. These factors drive the project and should be regarded as a strategic planning for the project. Ayirebi-Dansoh (2005), posited that, Ghanaian Construction Companies are going through series of challenges as it is confronted with competition from both foreign and local firms, political interference and hard economic environment.

Ahmed et al., (2007) established in their study that, there is an association on the procurement approach and economic situation of the project. On similar studies, Gunderman and Applegate (2005) recommended that, firms should develop their capacity by striking a balance between the opportunities that confront them and the possible negative consequences of risk and the ability to undertake such exercise places the firm in a higher pedestal to arrive at an acceptable conclusions.

2.4.1 External factors of Risk in Ghana

2.4.1.1 Financial

Financial failure and delay in payments in construction projects poses a major risk. Berko (2007) stated that, about 70% of infrastructure projects done in Ghana are not funded by the Government of Ghana but from foreign organizations and countries. Contractors are always complaining of delay in payment because of the unwinding bureaucratic system in governmental departments and agencies. Moreover, when

these foreign organizations and companies delay in the release of the required funds, the progress of the projects are slow down (Berko, 2007).

The construction stakeholders revealed that payments are major causes construction time overrun. Hassim et al. (2009), opined contractors in Malaysia have indicated earlier, financial related challenges are the risk mostly encountered by them.

2.4.1.2 Economic drivers

Poor financial markets, financial markets, inflation and price hiking are among of the variables associated with economic risk drivers which has a direct consequence on projects' overrunning (Agyakwa-Baah, 2007; Denini, 2009). Currency instability may result in cost overruns mainly because of inflation. The rapid increase in oil prices coupled with instability in the currency leads to high cost overrun. Berko (2007) opined that the cost of fuel in Ghana had increased by as much as 280% between 2001 and 2007, and fluctuation in price was about 300% between 2001 and 2007 in one project establishing a perfect scenario of oil fluctuations.

Edwards and Bowen (1998), identified economic risks in Ghana as exchange rates, material supply, labour supply, fiscal policies and inflation. Frimpong *et al*. (2003) added that, the rise in inflation should also be considered in risk studies.

2.4.1.3 Government

In developing countries like Ghana, Road projects are politically motivated and viewed by many as additions to satisfy public demand. Many roads are left at the mercy of politicians and according to Agyakwa-Baah (2009), it is the ultimate goal of government to lead and fast-track infrastructure project the society and moreover, the performance of the government is assessed in the developing countries by

developmental projects. This creates unnecessary pressure on government to start something which will be terminated because it is not accommodated in the government's budget.

Government in power has a role in the running of private and individual businesses. According to Tchankova (2002) the government system adopted by countries affect these organizations. It was argued by De la Cruz et al., (2006) that, winning political scores leads to unplanned infrastructure development which lacks the necessary funding and required coordination of such projects. Due to the loads on the government, government uses its power to influence negotiations between contractors and government institutions which then affect the project in a later day (Berko, 2007).

2.4.1.4 Natural environment

These risks associated with the natural environment has to do with the weather and this factor is hardly experience in Ghana such as harsh weather condition like typhoon or tornados but the two seasonal changes are witness in Ghana such as the wet and dry season seasons. Moreover, although extremely hot weather is not experience throughout the country but the geographical location of Tamale experience such weather in the dry season. De la Cruz *et al*. (2006) opined that, any time risk factors are to be considered, events such as the conditions of the ground and likely contaminants and site conditions should be notes as well as time restrictions imposed on the project by the client.

2.4.1.5 Technical

In a study conducted by Ofori (1994), there was the mention of technological development in Ghana requiring investment, sound economic environment, a physical infrastructure, top management support and assistance. However, it is difficult to credit these factors to the construction sector in developing countries including Ghana. Moreover, technical incompetence of designers has resulted to inaccurate design details or the inexperience of working on complex projects and risk prone projects. In addition, Oladapo (2007) identified that, variations is very profound in construction projects and its effect is inevitable on project objectives such as time and cost. To provide a simple understanding of variations, Baxendale and Schofield (1986) said the addition or subtractions made to the scope of the project amount to variation

2.4.2 Internal factors of Risk in Ghana

Inadequate and faulty Plants and equipment have been suggested to be an influential problem in construction firms, although local contractors mostly use labours for their works (Berko, 2007). Moreover, materials shortage, defective materials unavailability of the required skills and the abysmal performance of labour as well as the lack of technical expertise to operate plant and equipment have also been identified as risk most local contractors are experiencing internally (Berko, 2007; Agyakwa-Baah, 2009)

2.4.2.1 Project team relationships and communication

Team work, communication and positive human dynamics are intertwined as a result of their efforts in risk management on a project and their impact on the project goals.

Additionally, the inadequate flow of information amongst project stakeholders is an indictment on the health of the project. Earlier Lester (2007), observed that within the project environment, different kinds of relationships are established such as cordial or aggressive from the stakeholders which should be managed in a professional manner to offsite its ugly effect on the project. Communication and team work are very critical and should be endorsed by the coordinator of the project because the document that even govern the project is a form of communication and such has a bearing on the project. Santoso *et al*. (2003) evaluated 130 risk factors and found that, communication is the highly ranked factor and has a an average impact and probability of occurring.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

Upon identifying the purpose of a research and completing a comprehensive literature review, it is then prudent to proceed into the detail of the research (Naoum, 1998). This chapter deals with the approaches to be adopted for the study. It discusses the various research strategies and the various tools in gathering information for the study (Dawson, 2007).

3.2 Research strategy

The suitable methodology to address the identified research questions and hypothesis of a study is said to be research strategy (Bouma and Atkinson, 1995). Kothari (2004) suggested that, qualitative and quantitative researches are the recognized forms of research strategy. Quantitative or qualitative strategy is adapted based on the object of the study, the research aim and objectives and the information available. Qualitative research emphasize on the ways of understanding social theories by stressing on the linkage between the study area and the researcher in question. Berg (2001) opined that, qualitative is subjectivity in nature because it seeks the views of people by observation, descriptions and making implied meanings into a concept.

Creswell (1994), quantitative data is a numerical investigation into world issues by testing theories or hypothesis to know the viability and the trueness of such theories. Bouma and Atkinson (1995) opined that, it is better to use quantitative data if the study want to achieve objectivity, credible and real features of the world. Quantitative data are expressed with numbers and uses statistical tools for analysis (Burns and Grove, 2001).

3.3 Data collection method

Data simply means proof. Scientific educational researches need data to buttress its argument. Data serves as the foundation for any research (Singh, 2006). It is the data which direct the researcher towards his aim. Data collection was solely done using a closed ended questionnaire. The questionnaire was delivered to various respondents by the researcher. Questionnaires were administered to Construction Project Stakeholders in the Tamale Metropolis.

3.3.1 Design and development of structured questionnaire

A questionnaire is an instrument for soliciting information for statistical purposes with regard to a given topic. When properly constructed and responsibly administered, questionnaire become a vital instrument by which statements can be made about specific groups or people or entire populations. In designing the questionnaire, the objectives of the study were first established. This was done to help in determining what questions to ask and how to ask them. Again, very short and concise questions were fielded as questions that are long and wordy may appear confusing to respondents.

3.3.2 Research sampling

Due to time and financial constraints usually when the population is very large, it is tedious for a research to survey the entire population. Burns and Grove (2001) indicated that identifying and selecting something whether people or inanimate objects to represent their universal set. "A conclusion can be made about the population from the sample to achieve the research objective" (Saunders et al, 2007).

3.3.2.1 Sampling technique

To obtain thorough knowledge on the extent to which risks are managed in Tamale Metropolis, a convenient sample size of 50 Construction Project Stakeholders comprising Contractors, Consultants & Clients were selected for the study. The decision to use a convenient sample size was due to the fact there was no organized data on a list of Construction Project Stakeholders in the Tamale Metropolis for the study. All effort to obtain this information from the authorities that matters proved futile hence the decision to conveniently use a sample size of 50.

3.3.2.2 Sample Size calculation

The sample size of this study was calculated using the formula:

$$n=\frac{Z^2 \times PQ}{d^2}$$

Where:

n=desired sample size

Z= confidence level = 90% (1.67)

P= the estimated proportion of building contractors, consultants and clients within the Tamale Metropolis= 0. 04

Q= 1- P= 0.96

d= margin of error set at =0.05

So, $n = \frac{(1.67)^2 \times (0.04 \times 0.96)}{(0.05)^2}$

$n = \frac{2.7889 \times 0.384}{0.0025}$

n= 42

Therefore the sample size was estimated at 42 plus 20% of this estimate (about 8) to make up for any non-response, approximating to **50** participants.

3.4 Data analysis

The study used the one sample *t* test of the SPSS and Microsoft excel to analyze data. The results were analysed in percentages and figures using descriptive statistics and presented in the form of pie charts and tables. The Importance Index was also used to rank the risk management practices of building construction project stakeholders in Tamale. In order to generate the result, the researcher used the Statistical Package for Social Sciences (SPSS) version 16.0. The Relative Importance Index (RII) helped in determination of risk of factors. The Index is computed in Adnan et al. (2007) as:

$$\text{Importance Index} = \frac{\Sigma (1n1 + 2n2 + 3n3 + 4n4 + 5n5)}{5(n1 + n2 + n3 + n4 + n5)}$$

Where:

n1 - number of respondents who answered “very insignificant”

n2 - number of respondents who answered “insignificant”

n3 - number of respondents who answered “neutral”

n4- number of respondents who answered “significant”

n5- number of respondents who answered “very significant”

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter discusses the results of the study. The discussion starts with the general information of the respondents as well as their respective firms. Moreover the risk management practices are also discussed such as the risk management practices mostly used by firms. Risk factors witnessed in the Tamale Metropolis is also discussed together the risk response strategies adapted in the Metropolis.

4.2 Response Rate

A total of 50 questionnaires were issued to the target respondents and a total of 34 representing 68% were received.

4.3 General information

Thirty-four (34) respondents assisted in the study, fourteen (14) of the respondents were from contractors end, thirteen (13) were also from the consultants end and seven (7) were from the clients stream. The study was done in the Tamale Metropolis which is one of the developing Metropolises in Ghana, so it is not surprising that there are few construction firms in that area.

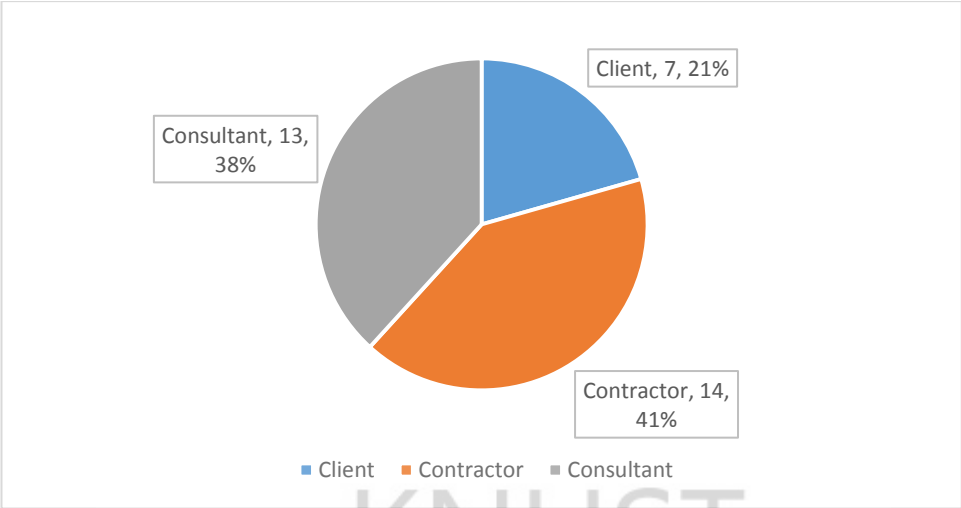

Figure 0-1Category of respondents

Moreover, the respondents were asked to indicated their years of practicing as professionals as shown in Figure 4-2, twenty-one of the respondents representing 62% have been practicing over the past years whilst thirteen (13) representing 38% have been in the industry within the last 5 years. Although the study did emphasize on the actual years of experience of the correspondent it was concluded that with at least a year experience is good enough to make an objective analysis of situation.

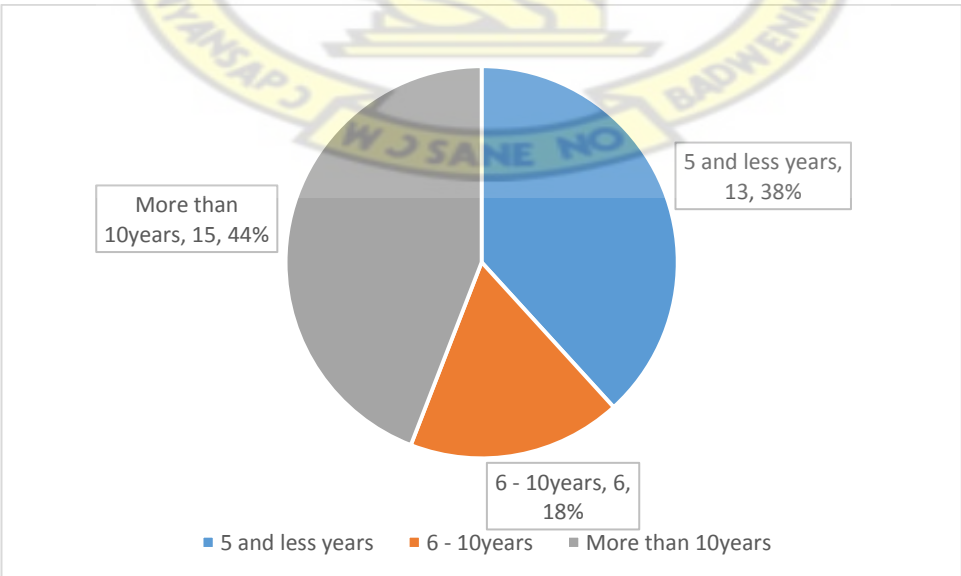

Figure 4-2 Respondents experience in the Construction Industry

In addition, the respondents indicated the projects their respective firms have been engaged on as shown in Figure 4-3, majority of the firms have worked on at least twenty-four projects representing 71% whilst 10 firms have worked on at one project. It could be that, because the Metropolis is a developing area, most companies might have started business just recently as well as clients.

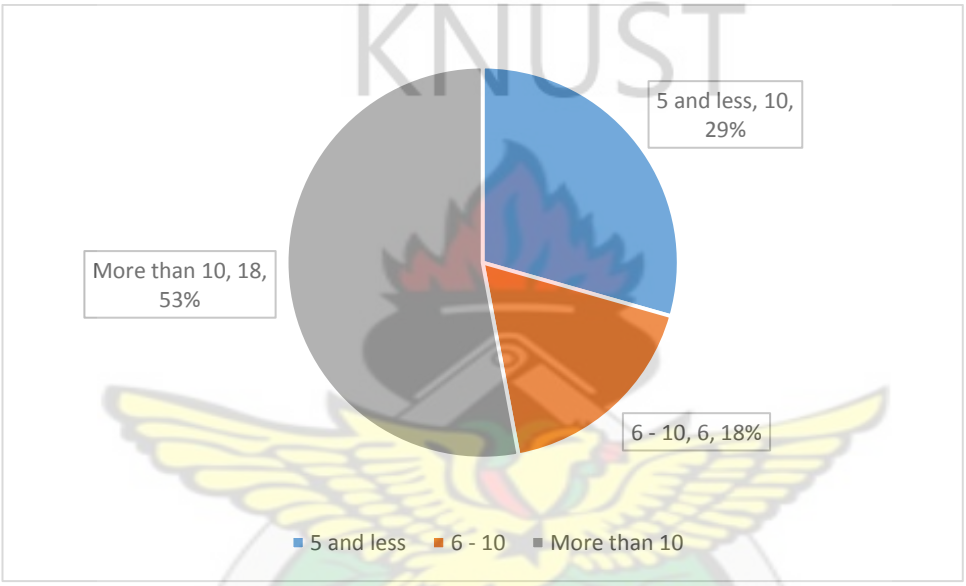

Figure 3 Projects undertaken by organizations

4.3 Risk Management Practices

Figure 4-4 shown, reveals whether or not the construction firms in the Tamale Metropolis have been undertaking risk management practices. The study revealed that seven (7) representing 21% of the respondents do not undertake risk management exercise whilst the remaining 27 representing 79% have been practicing it. The researcher can perceive that not all parties to a contract do undertake risk

management, no wonder most projects are left in a limbo during the gestation period of the project.

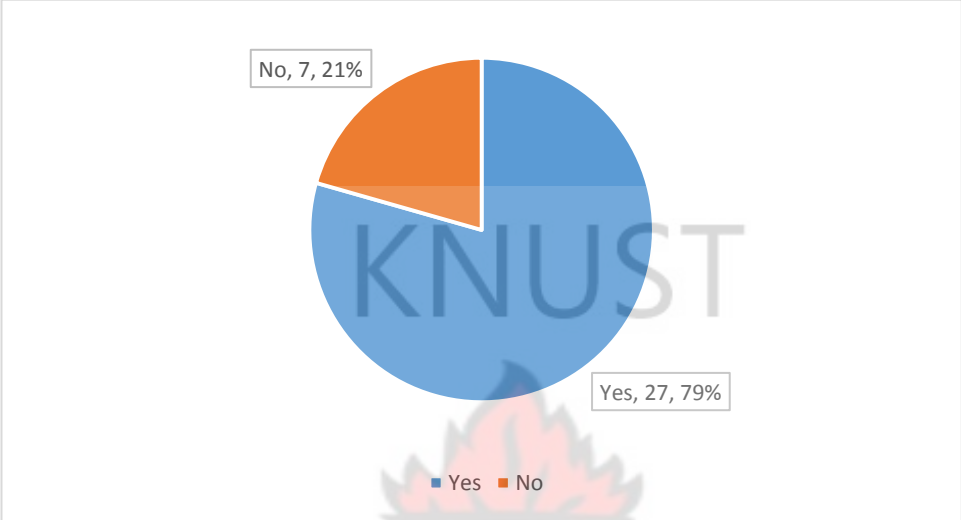

Figure 4 State of Risk Management Practice (RMP)

The twenty-seven respondents who indicated that, they have been undertaking the Risk Management exercise proceeded to assess how often they do undertake RMP exercise. A three (3) point likert scale was designed to assess the risk management process, with 1 representing *not at all*, 2 representing *once in a while* and 3 representing regularly. These values were subjected to the one sample *t* test with a test score of 2. Risk Monitoring and Control, Risk Identification and risk treatment were identified to be the exercise executed by the parties in the Tamale Metropolis but the risk assessment option failed during the test.

Table 1 Risk Management Practices in the Tamale Metropolis

Risk Management Practices	Mean	Std. Deviation	Ranking
Risk identification	2.15625	0.514899	2
Risk assessment	1.9375	0.669015	4
Risk treatment	2.032258	0.795147	3
Risk monitoring and control	2.40625	0.756024	1

Risk monitoring and control was the first ranked practice with a mean score of 2.40625, which shows that, such exercise is close to a regular exercise. It could be articulated that, the study concur with Kremljak (2010) opinion that risk monitoring and control is actively done in developing countries. Moreover, this study can conclude that because during the actual execution phase of the project things emerges that are welcome in the project, it also keeps the parties to a contract to use all means to meet the project objectives.

Risk identification is said to be the genesis of risk management. The study revealed that such exercise is conducted once in a while as it recorded a mean value of 2.15625 representing the second highly ranked exercise within the risk management practice as opposed PMI (1996) assertion that such exercise should be conducted on a regular basis because such exercise reveals the likely threat and opportunity to the project.

Risk treatment was the thirdly ranked exercise with a mean value of 2.032258. Actually, this is a crucial part of the risk management practice, this stage gives

whichever organization undertaking the risk management exercise to develop better solutions to the project. This stage underpins the reason for all the risk management exercise, if you are not ready to solve a problem there would not be the need to take the pain in identifying problems.

Risk assessment should have been part of the significant practices but failed the test because it recorded a mean value less than the set test value of 2. Although the researcher cannot pin point what have accounted to this but it can be said that, because parties are in a rush to be part of a project, they do not take time to ascertain the effects of some risk.

Moreover, the study required the respondents to indicate the officials who normally undertake such exercise, it was known that Architects and Quantity Surveyors are the people who undertake such exercise.

4.4 Risk Factors of construction projects in the Tamale Metropolis

Forty-one (41) risk factors were identified from literature to be associated with construction projects and they were left to the respondents to indicate how significant these factors were in the Tamale Metropolis using a five (5) point likert scale ranging from one to five with the label from Very insignificant to very significant. Using the one sample *t* test statistical analytical tool with a test value of 3.5, forty (40) out of the forty-one (41) were identified to be prevalent to the construction project in the Metropolis.

Contractor financial difficulties suggest to be the most highly ranked risk with a mean score of 4.5 and standard deviation of 0.662868. All construction projects need various forms of financial arrangement in order to realize the objectives of the

project. Ghanaian contractors are always left with the issue of financial challenges which the researcher believes it is as a result of high interest rate of loans acquired from the bank. This risk tend to cause the contractor to do works of lower standards which ends up indicting on the integrity of contractors in the construction industry.

Mistakes in soil investigation was also ranked as the second highly ranked risk with a mean score of 4.2647 and a standard deviation of 0.963228. Building construction activities mostly start with substructure works hence there is the need for a comprehensive soil investigation to make efficient and structural designs, without such credible reports could lead to extra financial burden to the client due to differential settlement of the building structure leading to a total collapse of the structure.

Price fluctuation was also ranked as the third ranked factor with a mean of 4.205882. most manufacturers of construction raw materials depends on foreign currencies in the transaction of business. A country where there is constant and consistent change in price upwards also affect the health of the project because contractors bid are accepted and approved upon thorough analysis of the units rate of items as priced in the bills of quantities.

Delay in payment was identified in a study conducted by Agyakwa-Baah and Chileshe (2010), Frimpong *et al*. (2003). It is the aim of government to provide infrastructure developments in every area of the country; this puts much pressure to allocate a portion of the national budget to address these projects. In terms of payment, private developers stand in a better position than the government. Notwithstanding that, approval of certificates to the government institutions goes

through a bureaucratic process which tends to elongate and distort the payment structure as established earlier.

Late delivery of materials was ranked the ninth risk factor and a mean score of 4.117647. It has been established in the construction management arena that, two different projects might have the same design but the project location makes each construction project unique. Manufacturers of construction products are predominantly based in the southern belt of Ghana, implying that most materials for construction projects are ordered from the south. This factor is of great significance because Contractors may order for the materials in time but other external pressures such as transportation issues such as vehicle breakdowns and accidents turn to delay material delivery to sites and also the security challenges encountered in the metropolis.

Weather condition was also identified by the study as a key risk factor which hampers the progress of projects in the Tamamle Metropolis. This also concur with Agyakwa-Baah and Chileshe (2010) identification of risk factors in the construction industry. The Metropolis experiences higher weather temperatures in most part of the year which makes workers not able to work for longer hours on the project hence reducing productivity.

Table 2 Risk factors of construction projects in the Tamale Metropolis

Risk Factors	**Mean**	**Std. Deviation**	**Ranking**
Contractor financial difficulties	4.5	0.662868	1
Mistakes in soil investigation	4.264706	0.963228	2
Price fluctuation	4.205882	0.808268	3
Impractical design	4.205882	0.913847	4

Accidents and injuries	4.147059	0.783634	5
inaccurate cost estimates	4.147059	0.925476	6
Delay in payment	4.147059	1.048299	7
Insufficient detailing	4.117647	0.879556	8
Late delivery of materials	4.117647	0.879556	9
Construction Methods	4.117647	1.037617	10
Poor communication amongst project team	4.088235	0.900089	11
Complexity of deliverables	4.060606	1.116339	12
Inflation	4.058824	0.85071	13
Organization and co-ordination	4.058824	0.85071	14
inaccurate time estimates	4.029412	0.797165	15
Planning and scheduling deficiencies	4.029412	0.904041	16
Design changes	4.029412	1.114241	17
Mistakes and discrepancies in contract document	4	1.073087	18
Weather condition	3.970588	0.758199	19
Competence of consultants and contractors	3.970588	0.999554	20
Quality and performance control	3.911765	0.865768	21
Project approvals	3.911765	1.264136	22
Vandalism	3.878788	1.053493	23
Defective Material and Material Shortage	3.870968	1.05647	24
Obsolete technology	3.806452	0.833441	25

Contract flaws	3.794118	0.769865	26
Lack of commitment	3.764706	0.818677	27
Theft on site	3.764706	0.889631	28
Productivity of labour and plant	3.764706	1.102582	29
Financial failure	3.764706	1.498663	30
Unrealistic client' initial requirement	3.757576	0.936426	31
Uniqueness of the project	3.757576	1.118881	32
Social and cultural factor	3.735294	1.332776	33
Bye Laws	3.71875	0.728869	34
Site availability	3.705882	0.970143	35
Availability of Labour and plant	3.705882	1.168511	36
Site conditions	3.647059	1.041047	37
Change of government policy	3.647059	1.097721	38
Change of government	3.617647	1.128547	39
Ground condition and contaminants	3.5	0.992395	40
Poor financial market	3.28125	1.224333	41

Vandalism was also tipped to be a major risk factor because of the volatile nature of security experienced in that environment. Chieftaincy disputes amongst political incited commotions also present a challenge to the project. Such risk prolong the duration of the projects because curfews are imposed most at times which leads to productive man-hours being lost.

Social and cultural factors were also ranked as the thirty-third risk factor. Professionals in that jurisdiction cannot comprehend that, workers in that jurisdiction

happens to report late or absent themselves to work due to observance of religious and social occasions like weddings, funerals and naming ceremonies which is the norm .

4.5 Risk Response Strategy

Figure 4-5 reveals that, the respondents were tuned into avoiding risk which represented 52%, followed by reducing risk 37% and accepting risk 11%. This outlook can be a subject of debate because instinctively contractors are anxiously waiting to register on a project implying that contractors mostly accept any projects without considering the risk component however, this figure rather thinks otherwise.

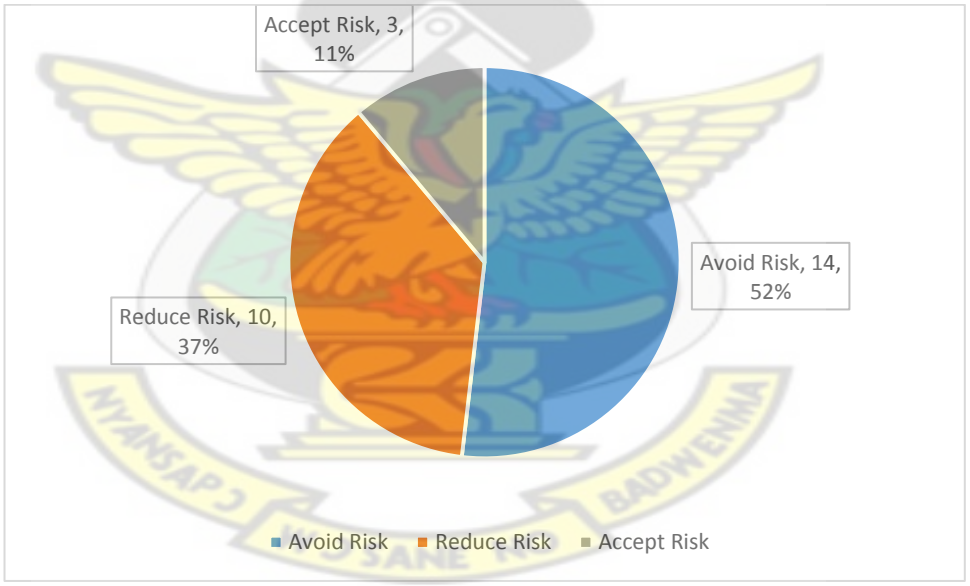

Figure 0-5Risk Response strategy

Fourteen (14) factors were identified to be risk response strategies adopted in risk management practices. A likert scale was adopted for the study with one to five points ranging from very insignificant to significant. Thirteen of the factors were significant because their respective mean scores ranged from 4.6 to 3.8.

Table 3 Risk Response Strategy

Risk Response Strategies	Mean	Std. Deviation	Ranking	Risk response
Insurance	4.617647	0.551291	1	Risk transfer
Retention	4.441176	0.785905	2	Risk transfer
Guarantees	4.411765	0.608906	3	Risk transfer
Implementing workable programme of work	4.382353	0.652023	4	Risk reduction
Liquidated Ascertain Damage (LAD)	4.28125	0.851351	5	Risk transfer
Bond	4.235294	0.780785	6	Risk transfer
Contingency sum	4.212121	0.819969	7	Risk retention
Budgetary control	4.205882	1.038046	8	Risk reduction
Warranties	4.147059	0.783634	9	Risk transfer
Adopting proper procurement method	4.147059	1.048299	10	Risk response
Eliminate scope of high risk impact	4.137931	0.639427	11	Risk avoid
Expenditure control	4.029412	1.058452	12	Risk reduction
Earned Value Analysis (EVA)	3.823529	1.113841	13	Risk reduction
No need to bid for project	2.941176	1.59433	14	Risk avoid

Insurance was ranked as the first response strategy adopted in the Tamale Metropolis. It could be realized that because most construction projects clients require insurance as a form of transferring risk to the contractor.

Moreover retention which was ranked as the second risk response strategy has been used in the construction industry for some time now. A percentage of the monthly work done is deducted by the client to release later in after the defect liability period stipulated in the contract documents.

Contingency sum is the seventh factor with a mean score of 4.212121. Most often than not, contractors are allowed to provide a sum in their bid to mitigate against any risk that might surface during the life of the project.

Interestingly, no need to bid for project was ranked as the insignificant response strategy suggesting that, this factor is not an objection in terms of treating risk.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATION

5.1 Introduction

This chapter presents the findings of the study, draws conclusion based on the findings of the study and makes recommendations for the study.

5.2 Summary of findings

The study was driven by the aim of evaluating the nature of risk management practices of construction stakeholders in Tamale with three supporting objectives, which are to identify to assess the awareness of project stakeholders regarding risk management techniques; identifying risk associated with construction projects in Tamale and finally identify risk management practices adopted by construction stakeholders in Tamale.

5.2.1 Assessment of risk management techniques

27 out of the 34 respondents have been involved with risk management practices. Risk identification, risk assessment, risk treatment and risk monitoring and control were identified from literature to be the main risk management techniques. However, risk identification, risk treatment and risk monitoring and control were the most practices adopted in the Tamale Metropolis.

5.2.2 To identify risk associated with construction projects in Tamale

Forty-one factors were identified from literature however forty were significant after running the one sample *t* test with a test value of 3.5. contractors financial difficulties, mistakes in soil investigation, price fluctuation, impractical design, accidents and injuries, inaccurate cost estimates, delay in payment, insufficient detailing , late delivery amongst others were the significant factors with the exception of poor financial market as shown in Table 4-2.

5.2.3 To identify risk management practices adopted by construction project stakeholders in Tamale

Fourteen factors were identified however only thirteen of them were significant such as insurance, retention, bond, contingency sum, Liquidated Ascertain Damage, warranties guarantees, budgetary control just to mention few however no need to bid for project was marked as insignificant.

5.3 Conclusion

Risk can result into positive or negative effects. Knowing the risk associated to a project is of utmost importance because it prevents wasting precious time as well as resources. Risk management practices are needed in building construction processes to help solve the challenges witnessed in the industry such as abandonment of projects, cost and time overrun and litigation issues. The study can conclude that delays of projects have a direct bearing on risk as well as performance related challenges because such issues are the same as risk factors. Risk management practice is a good thing which helps project stakeholders to brainstorm and even understand into details the construction process and its associated risks.

5.4 Recommendation

Based on the findings, the following are recommended;

I. Before the handing of the site to the contractor, the parties to the contract should have a round table discussion to brainstorm all the likely challenges the project might face and come out with workable solutions

II. The client, consultants and contractors should organize an in-house workshop for their workers to help them understand the risk management process so that they will know when a tagged risk is about to happen.

III. Personnel with risk management background should be employed by clients, contractors and consultant to oversee the risk management process.

IV. It is recommended that, similar studies should be conducted in the two other regional capital in the northern belt of Ghana to assess especially the risk factors.

V. It is also recommended that, risk factors on project specific should be undertaken in order to know the significant once based on type of projects.

REFERENCES

Abdou, O.A. (1996). *"Construction Risks"*, Journal of Architectural Engineering, 2(1), 3-10.

Abu Rizk S., (2003). "*Risk and uncertainty in construction"*: an overview, a presentation.(www.websrv.construction.ualberta.ca/PapersandPresentations/Riskanalysisandmanagement-SAbourizk.pdf) Accessed on 01/08/2015.

Adnan E., Sherif M., Ziad A. M., & Peter E.M. (2007), "*Factors Affecting Labour Productivity In Building Projects In The Gaza Strip"*, Journal Of Civil Engineering And Management,Vol. XIII, No 4, pp 245–254.

Agyakwa-Baah, (2007). "*Stakeholders' Perceptions of the Causes of Delay on Construction Projects"*. BSc dissertation. Kwame Nkrumah University of Science and Technology, Kumasi, Ghana.

Ahadzie, D.K., Proverbs, D.G. and Olomolaiye, P.O. (2008), *"Critical success criteria for mass house building projects in developing countries",* International Journal of Project Management, Vol. 26, pp. 675-87.

Ahmed, A., Kayis, B. and Amornsawadwatana, S. (2007). *A review of techniques for risk management in project.* Benchmarking: An International Journal, 14(1): 22–36.

Ahmed S., Azhar S. and Ahmed I., (2001). "*Evaluation of Florida General Contractors' Risk Management Practices",* Florida International University.

Akintoyne A.S., and MacLeod M.J., (1997). "*Risk analysis and management in construction"*, International Journal of Project Management 15, pp 31-38.

Akoi-Gyebi Adjei, E. (2009). *Motivational Strategies to Improve Productivity in the Construction Industry in Ghana.* MSc dissertation. Kwame Nkrumah University of Science and Technology, Kumasi, Ghana.

Ashworth, A., and Hogg, K. (2002). *Willis's Procedure for the Quantity Surveyors.*

Asian Development Bank (ADB), 2002. *Handbook for Integrating Risk Analysis in the Economic Projects*, ADB.

Association for Project Management, (2000). "*Project Management Body of Knowledge"*, 4th edition, APM. Buckinghamshire.

Association for Project Management, (2000). "*Project Risk Analysis and Management"*, a guide by APM. Buckinghamshire.

Augie, M. and Kreiner, K. (2000). *Rationality, Imagination and Intelligence*: Some Boundaries in Human Decision-making. Industrial and Corporate Change, 9(4), pp. 659-679.

Ayirebi-Dansoh, K. (2005). *Strategic planning practice of construction firms in Ghana.* Construction Management and Economics, 23(2): 148–163.

Bajaj, D., Oluwoye, J. and Lenard, D. (1997) "*An analysis of contractors' approaches to risk identification in New South Wales"*. Australia. Construction Management and Economics, 15 (5), 363-369.

Baloi D., and Price A., (2003). "*Modeling global risk factors affecting construction cost performance,*" International Journal of Project Management 21, pp 261-269.

Banaitiene, N., and Banaitis, A. (2012). *Risk Management in Construction Projects*. INTECH Open Access Publisher.

Barkley, B. T. (2004). *Project risk management*. McGraw-Hill, New York.

Baxendale, A. T., & Schofield, T. J. (1986). "*Planning and progressing project variations*". The Organization and Management of Construction: Shaping Theory and Practice, 2.

Bender W., and Ayyub B., (2001). "*Risk-based Cost Control for Construction*" Construction Management Department, Central Washington University.

Berg, B. (2001). *Qualitative Research Methods for Social Science*. Boston: Allyn and Bacon.

Berko, P. (2007). *Project Cost Overrun in the Road Construction Industry in Ghana*. Unpublished M.Sc. Project Management dissertation. Sheffield Hallam University, Sheffield, United Kingdom.

Berke P R, and Conroy M M, (2002). "*Planning for sustainable development: measuring and explaining progress in plans"* Journal of the American Planning Association 66 21 – 33.

Boehm BW. (1991) *"Software risk management: principles and practices"*, IEEE Software, 8(1), 32–41.

Bouma, G., and Atkinson, G. (1995). "*A Handbook of Social Science Research: A Comprehensive and Practical Guide for Students*." Oxford University Press.

Burns, N., and Grove, S. (2001). "*The practice of nursing research: conduct, critique and untilization"* (4 ed.). Philadelphia: WB Saunders.

Carpenter, M. A. and Frederickson, J. W. (2001). "*Top Management Teams, Global Strategic Posture and the Moderating Role of Uncertainty*." Academy of Management Journal, 44(1), pp. 533-545.

Chapman C. and Ward S., (1997). "*Project Risk Management: Processes, Techniques and Insights."* John Wiley.

Chapman R.J. (2001). "*The Controlling Influences on Effective Risk Identification and Assessment for Construction Design Management"*, International Journal of Project Management, 19, 147-160.

Chan Edwin H.W. and Lee Grace K.L., (2008*),"Applicability in Hong Kong of London's experiences on urban redevelopment practices"*, Property Management, Vol. 26 Iss 2 pp. 125 – 137.

Chege LW and Rwelamila PD,(2000). "*Risk Management and Procurement Systems – an Imperative Approach",* Department of Construction Economics and Management, University of Cape Town, South Africa.

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

Chileshe, N. (2004). *"The application of TQM within small and medium sized construction related organisations"*, PhD thesis, Sheffield Hallam University, Sheffield.

Creswell, J. (1994). "*Research Design: Qualitative and Quantitative Approaches*." Thousand Oaks: SAGE.

Dawson, C. (2007). "*A practical Guide to Research Methods: A friendly manual for mastering research techniques and projects (3 ed.)."* United Kingdom: How to Content.

De la Cruz, M.P., del Cano, A. and de la Cruz, E. (2006). "*Downside Risks in Construction Projects Developed by the Civil Service: The Case of Spain*." Journal of Construction Engineering and Management, 132(8): 844–852.

Denini, F. (2009). "*Delays on large construction projects in Libya*." In Abu Bakar (ed). Proceedings: The 3rd International Conference on Built Environment in Development Countries (Sustainable Built Environment: Tomorrow's Agenda Today). Universiti Sains Malaysia, Penang, 2–3 December 2009. Penang: School of Housing, Building and Planning, Universiti Sains Malaysia, 819–835.

Deviprasadh, A. (2007). *"Risk Assessment and Management in Construction Projects".* College of Engineering, Guindy, Anna University, Chennai- 600025.

Economy of Ghana Network (2013). "*Population Growth and Employment for Socio- Economic Development in Ghana".*

Education and Learning Wales, (2001). *Estate Management Manual; Risk management*.

Edwards, P.J. and Bowen, P.A. (1998). *"Risk and risk management in construction: a review and directions for research",* Engineering, Construction and Architectural Management,Vol. 339 -349.

Enshassi A. and Mayer P., (2001). *Managing risks in construction projects,* 18th Internationales Deutsches Projekt Management Forum, Ludwig burg, Germany.

Fairley R. (1994). Risk management for software projects. *IEEE Software*, 57-67.

Flanagan R., (2003). *Managing Risk for an Uncertain Future – A Project Management Perspective*, School of Construction Management and Engineering, The University of Reading, UK.

Flanagan R. and Norman G., (1993). *Risk Management and Construction*, 2nd Edition. Blackwell Science.

Frimpong, Y., Oluwoye, J. and Crawford, L. (2003). *"Causes of delay and cost overruns in construction of ground water projects in developing countries;Ghana as a case study"*, International Journal of Project Management, Vol. 21 No. 5, pp. 321-326.

Fugar, F.D.K. and Agyakwah-Baah, A.B. (2010). *"Delays in building construction projects in Ghana",* Australasian Journal of Construction Economics and Building, Vol. 10 Nos 1/2, pp. 103-116.

Greene A., (2001). *A process approach to project risk management*, Department of Civil and Building Engineering, Loughborough University.

Gunderman, R. B., and Applegate, K. E. (2005). *Managing risk: Threat or opportunity?*. American Journal of Roentgenology, *185*(1), 43-45.

Hassim, S., Jaafar, S.M. and Abu Hasan Sazalli, S.A. (2009). "*The contractors' perception of towers and industrialised building risk in construction projects in Malaysia*." American Journal of Applied Sciences, 6(5): 937–942.

Holmes, A. (2002). *Risk management*. Capstone Publishing, Oxford.

Isaac I, (1995). *Training in risk management*, International Journal of Project Management 13, pp 225-229.

ISSER (2008). *''The state of the Ghanaian economy''*, University of Ghana, Legon.

Jaafari A., (2001). *Management of risks, uncertainties and opportunities on projects: time for a fundamental shift*, International Journal of Project Management 19, pp 89-101.

Kartam N. and Kartam S., (2001). *Risk and its management in the Kuwaiti construction industry: a contractors' perspective*, International Journal of Project Management 19, pp 325-335.

Kelly L.A, (2003). *Quantitative Risk Analysis, Lectures' notes*, University of StrathClyde,www.stams.strath.ac.uk/classes/53.411/notes. (Accessed on 01/08/2015)

Kindinger J. and Darby J., (2000). "*Risk factor analysis – A new qualitative risk management tool".* Proceedings of the project management institute annual seminars and symposium.

Klien R. L., and Ludin I. S., (1996). "*Reducing Project Risk'',* Gower.

Kothari, C. R. (2004). *Research methodology: Methods and techniques*. New Age International.

Kremljak, Z. (2004). "*Decision Making Under Risk"*.DAAAM International, Vienna.

Kremljak, Z. (2010). *Risk Management*. Proceedings of the 21st International DAAAM Symposium, 21(1), pp. 253-254.

Kuismanen O. (2001). "*Risk interrelation management – controlling the snowball effects",* Proceedings of the 5th European Project Management Conference, PMI Europe.

Kululanga, G. and Kuotcha, W. (2010). *"Measuring project risk management process for construction contractors with statement indicators linked to numerical scores",* Engineering, Construction and Architectural Management, Vol. 17 No. 4, pp 336-351.

Lester, A. (2007). "*Project Management, Planning and Control"*. 5th Edition. Maryland Heights: Elsevier Ltd.

Lowe J., (2002). "*Construction and Development Risk"*, Unit 4, Glasgow Caledonian University.

Mills, A. (2001). "*A systematic approach to risk management for construction."* Structural Survey, 19(5): 245–252.

Moavenzadeh, F. and Rosow, J. (1999). "*Risks and risk analysis in construction management"*, In Proceedings of the CIB W65, Symposium on Organization and Management of Construction, US National Academy of Science, May, 1999, Washington DC. 1999. 19-20.

Naoum, S., (1998). "*Dissertation research and writing for construction student*," Reed Educational and Professional Publishing ltd.

Odeh, A. M. And Battaineh, H.T. (2002). "*Causes of Construction Delays": Traditional Contracts.* International Journal of Project Management, 20, pp. 67-73.

Odeyinka, H. A., Oladapo, A. A. and Dada, J. O. (2007). "*An Assessment of Risk in Construction in the Nigerian Construction Industry*." International Symposium on

Globalisation and Construction, Construction in Developing Economies, 107, pp. 359-368.

Ofori, G. (1994). "*Construction technology development:" Role of an appropriate policy.* Engineering, Construction and Architectural Management, 1(2): 147–168.

Okema J., (2001). "*Risk and uncertainty management of projects: challenges of construction industry"*, Department of Architecture, Makerere University.

Okuwoga, A. A. (1998). "*Cost-time Performance of Public Sector Housing Projects in Nigeria"*. Habitat International, 22(4), pp. 389-395.

Oladapo, A.A. (2007). "*A quantitative assessment of the cost and time impact of variation orders on construction projects."* Journal of Engineering Design and Technology, 5(1): 35–48.

Perry, J. G. and Hayes, R. W. (1985). "*Risk and Its Management in Construction Projects."* Proceedings of Institute of Civil Engineers, 1(78), pp. 499-521.

Piney C., (2002). "*Risk response planning: Selecting the right strategy*," the 5th European Project Management Conference, PMI Europe 2002, France.

PMI. (2008). "*A Guide to Project Management Body of Knowledge*." Project Management Institute (PMI).

Project Management Institute PMI, (1996). *Project Management Body of Knowledge*, PMI.

Santoso, D.S., Ogunlana, S.O. and Minato, T. (2003). "*Assessment of risks in high rise building construction in Jakarta"*. Engineering, Construction and Architectural Management, 10(1): 43–55.

Saunders, M., Lewis, P., and Thornhill, A. (2007). "*Research Methods for Business Students"* (4 ed.). Harlow: Prentice Hall.

Shen, L.Y. (1997). "*Project Risk Management in Hong Kong"*, International Journal of Project Management, 15(2), 101-105.

Shen, L.Y., Wu, G.W.C. and Ng, C.S.K. (2001). "*Risk Assessment for Construction Joint Ventures in China"*. Journal of Construction Engineering and Management, 127(1), 76-81.

Singh, Y. (2006.). "*Fundamental of Research Methodology and Statistics"*. New Delhi: New Age International Publishers.

Tam, C. M., S. X. Zeng, and Z. M. Deng.(2004). "*Identifying elements of poor construction safety management in China."* Safety Science 42.7 : 569-586.

Tchankova, L. (2002). "*Risk identification: Basic stage in risk management*." Environmental Management and Health, 13(3): 290–297.

Tummala V., and Burchett J., (1999). "*Applying a risk management process (RPM) to manage cost risk for an EHV transmission line project".* International Journal of Project Management 17, pp 223-235.

Tuuli, M.M., Baiden, B.K. and Badu, E. (2007). *"Assessment and enforcement of liquidated damages in construction contracts in Ghana",* Structural Survey, Vol. 25 Nos 3/4, pp. 204-219.

Uher, T.E. and Toakley, A.R. (1999). "*Risk Management in the Conceptual Phase of a Project"*. International Journal of Project Management, 17(3), 161-169.

Yoe C., (2000). "*Risk Analysis Frame Work for Cost Estimation"*, in association with Planning and Management Consultants for U.S. Army Corps of Engineers, Institute of Water Resources.

Zou, P. X.Y., Zhang, G. and Wang, J.Y. (2006). "*Identifying Key Risks in Construction Projects: Lifecycle and Stakeholder Perspectives"*. Proceedings of 12th Rim Real Estate Society Conference, Auckland, New Zealand.

Zhi H., (1995). "*Risk management for overseas construction projects"*, International Journal of Project Management 13, pp 231-237.

APPENDIX I - QUESTIONNAIRE

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY
DEPARTMENT OF BUILDING TECHNOLOGY

Informed consent

My name is Adjei Yaw Podieh , a graduate student of KNUST . I am conducting a research titled "***risk management practices of building construction projects in tamale"***. This research is design to examine the risk involved in the construction industry in the northern regional capital of Ghana. Your identity is kept confidential as I would not request for your name. Your participation in this study is entirely voluntary. It involves consenting to complete a demographic form and answering some questions base on your agreement or disagreement to the statements.

There are no risks or discomfort associated to your participation. However, you are free to withdraw from participating if discomforts occur. There are no tangible benefits associated to your participation.

Thank you

Yaw Adjei Podieh

podieh@live.com

020 883 7718

SECTION A: GENERAL INFORMATION

Please tick where applicable

1. Which of the following category of personnel best describes you?

[ ] Client

[ ] Contractor

[ ] Consultant

2. How many years of experience do you have in the construction industry?

[ ] 0-5 years

[ ] 6-10 years

[ ] More than 10 years

3. How many construction projects have you been involved in? (Please tick)

[ ] 0-5 years

[ ] 6-10 years

[ ] More than 10 years

4. What type of building projects is currently or recently executed by your organization?

[ ] Government project

[ ] Private project

[ ] Both

SECTION B: RISK MANAGEMENT PRACTICES

5. Does your organization under risk management exercise on your projects?

[ ] Yes

[ ] No

6. Kindly rank on a scale of 1 – 3, by indicating the regularity of undertaking risk management exercise by ticking in the appropriate cell using the scale below

1	2	3
Not at all	Once a while	Regularly

RISK RESPONSE STRATEGIES	Severity of undertaking risk management practices		
	1	2	3
Risk identification			
Risk assessment			
Risk Treatment			
Risk monitoring and control			

7. State the position of those who undertake risk management assessment in your organization …….

SECTION C : RISK FACTORS

8. Significant risk factor affecting risk management practices of construction works. Please use the following scales to answer the questions below. Please tick where appropriate.

1	2	3	4	5
Very insignificant	Insignificant	Neutral	Significant	Very significant

	RISK FACTORS	Level of significance in construction				
		1	2	3	4	5
RF1	Financial failure					
RF2	Delay in payment					
RF3	Productivity of labour and plant					
RF4	Availability of Labour and plant					
RF5	Defective Material and Material Shortage					
RF6	Design changes					
RF7	Construction Methods					
RF8	Poor financial market					
RF9	Inflation					
RF10	Price fluctuation					
RF11	Weather condition					
RF12	Ground condition and contaminants					
RF13	Site conditions					

RF14	Competence of consultants and contractors					
RF15	Quality and performance control					
RF16	Change of government					
RF17	Change of government policy					
RF18	Poor communication amongst project team					
RF19	Lack of commitment					
RF20	Organization and co-ordination					
RF21	Accidents and injuries					
RF22	Theft on site					
RF23	Vandalism					
RF24	Contract flaws					
RF25	Bye Laws					
RF26	Social and cultural factor					
RF27	Uniqueness of the project					
RF28	Complexity of deliverables					
RF29	Site availability					
RF30	Project approvals					
RF31	Contractor financial difficulties					
RF32	Obsolete technology					
RF33	Impractical design					
RF34	Mistakes and discrepancies in contract document					
RF35	inaccurate cost estimates					
RF36	inaccurate time estimates					
RF37	Planning and scheduling deficiencies					
RF38	Unrealistic client' initial requirement					
RF39	Insufficient detailing					
RF40	Late delivery of materials					
RF41	Mistakes in soil investigation					

SECTION D: RISK RESPONSE STRATEGY

9. Based on your experience, which of the following risk response strategy is mostly employed on your projects.

[ ] Avoid risk

[ ] Transfer risk

[ ] Reduce risk

[ ] Accept risk

10. On a Likert Scale of 1 – 5, kindly rank the various strategies in order of significance in addressing risk on projects, using the scale below

1	2	3	4	5
Very insignificant	Insignificant	Neutral	Significant	Very significant

	RISK RESPONSE STRATEGIES	Level of significance in construction				
		1	2	3	4	5
	Risk avoidance					
RPS1	No need to bid for project					
RSP2	Eliminate scope of high risk impact					
	Risk transfer					
RSP3	Insurance					
RSP4	Bond					
RSP5	Warranties					
RSP5	Guarantees					
RSP6	Retention					
RSP7	Liquidated Ascertain Damage (LAD)					
	Risk reduction response					
RSP8	Implementing workable programme of work					
RSP9	Adopting proper procurement method					
RSP10	Expenditure control					
RSP11	Budgetary control					
RSP12	Earned Value Analysis (EVA)					
	Risk retention					
RSP13	Contingency sum					

THANK YOU