

**KWAME NKRUMAH UNIVERSITY OF SCIENCE AND
TECHNOLOGY, KUMASI**

**Exploring Project Risk Management Practices of Ghanaian Building
Contractors.**

KNUST

by

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(Bsc Construction Technology and Management)

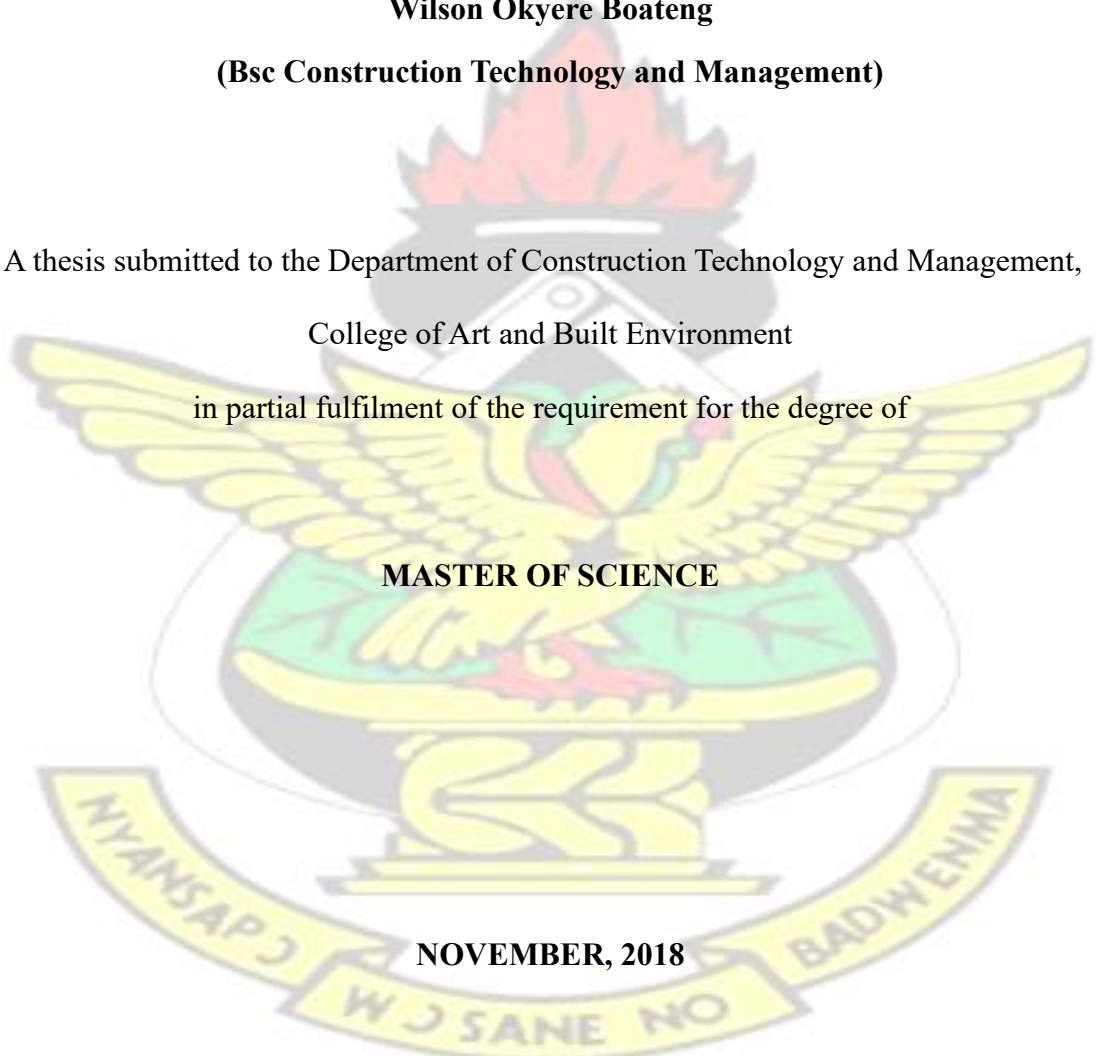
A thesis submitted to the Department of Construction Technology and Management,

College of Art and Built Environment

in partial fulfilment of the requirement for the degree of

MASTER OF SCIENCE

NOVEMBER, 2018



CERTIFICATION

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

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ABSTRACT

Risk management concept has been on the top of current research in the construction industry lately. Project managers are mostly concerned and being tagged to manage risks on the construction site. Hence, the gap in literature led to the aim of this study which is to explore project risk management practices of Ghanaian building contractors. Adopting quantitative research approach and purposive sampling technique, the targeted audience was sampled. The data obtained was analysed using Statistical Package for Social Science (SPSS) and Microsoft Excel 2016. After sending 52 questionnaires out, 41 of them were retrieved representing 78.5% response rate. The variables were strategically analysed using Relative Importance Index and descriptive statistics. After analysis, it was identified that financial risks are the highest identified risk with construction projects in Ghana, while legal risk was the least identified risk in construction projects. Effects of risk on construction projects were also identified to encompass making better decisions based on accurate information and risk enables contracts to be fairly negotiated, bids to be submitted at the right price, and sensitivity to be appreciated. More so, the study also identified referring to previous and ongoing similar projects for accurate, producing a proper schedule by getting updated project information as the best strategies for managing risk on construction sites. The study recommended that there should be training of the stakeholders in the construction industry towards risk and its management and also contractors should look at integration of various expert risk management system with other schedules and systems they are already operating. **Keywords:** Risk, Construction Project, Stakeholders, Ghana.

DEDICATION

I dedicate this work to the Almighty God and to my dear wife and kids with love.

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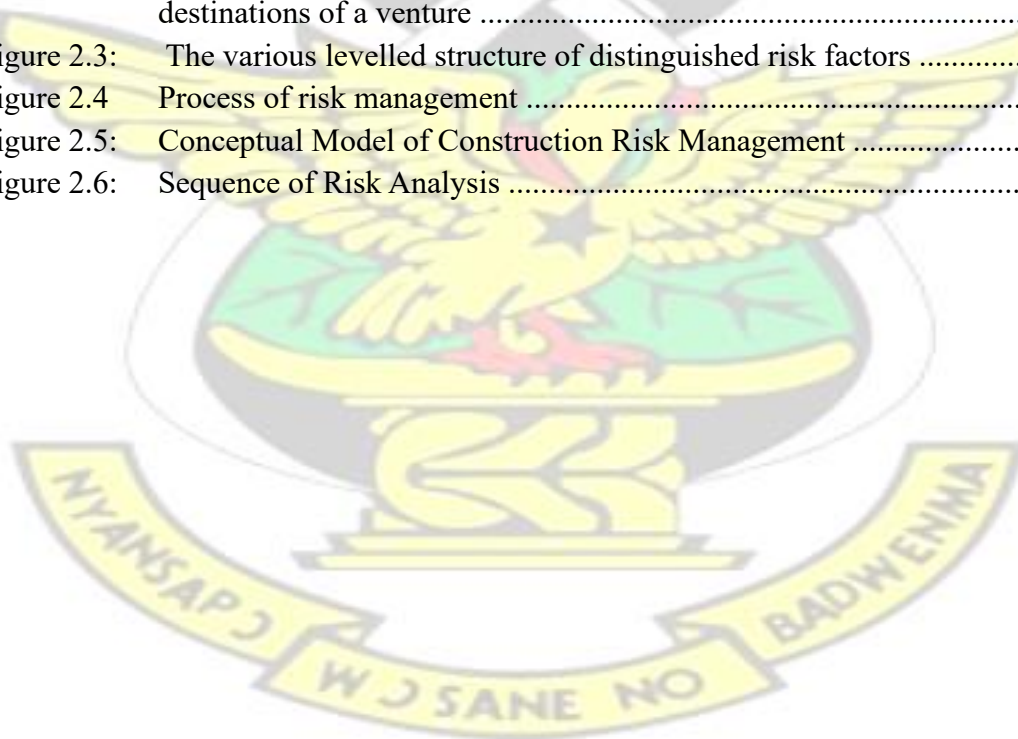
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CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND TO STUDY

Risk management (RM) is an idea which is utilized as a part all things considered, from IT related business, car or pharmaceutical industry, to the construction area. Every industry has built up their own particular RM models, however the general thoughts of the idea more often than not continue as before paying little respect to the segment. As indicated by the Project Management Institute (PMI) (2004), project risk management is one of the nine most basic parts of undertaking dispatching. This demonstrates a solid connection between overseeing dangers and a project achievement. While RM is portrayed as the most troublesome zone inside development management (Winch, 2002; Potts 2008) its application is advanced in all activities with a specific end goal to stay away from negative outcomes (Potts, 2008).

One idea which is generally utilized inside the field of RM is known as the risk management process (RMP) and comprises of four primary advances: recognizable proof, evaluation, making a move and checking the dangers (Cooper et al., 2005). In every one of these means, there are various strategies and methods which encourage dealing with the dangers or risks. Numerous enterprises have turned out to be more proactive and mindful of utilizing investigations in projects. In like manner, RM has turned into a convenient issue broadly talked about crosswise over enterprises. Be that as it may, with respect to the development industry, chance management isn't regularly utilized (Klemetti, 2006). More development/construction organizations are beginning to end up mindful of the RMP, yet are still not utilizing models and methods meant for overseeing risks. This negates the way that the business is attempting to be more cost and time proficient and in addition have more control over ventures. Risk is related to

any extend in any case the business and in this way RM ought to bear some significance with any project administrator. Risks vary between tasks because of the way that each undertaking is one of a kind, particularly in the construction business (Gould and Joyce, 2002). Anyway, there are as yet numerous specialists that have not understood the significance of incorporating risk management during the time spent conveying the project (Smith et al., 2006). Despite the fact that there is an attention to dangers and their results, a few associations don't approach them with built up RM strategies.

The development sector works in an extremely unverifiable condition where conditions can change because of the multifaceted nature of each task (Sanvido et al., 1992). The point of every association is to be effective and RM can encourage it. Anyway, it ought to be underlined that risk management isn't a device which guarantees achievement yet rather an instrument which expands the likelihood of making progress. Risk management is along these lines a proactive as opposed to a responsive idea. Numerous past examinations (Klemetti, 2006; Lyons and Skitmore, 2002; Zou et al. 2006) have been led inside the field of RM yet they present an alternate way to deal with this idea. The examination in this ace proposal centres around the development sector and how the subject is practiced in the ordinary task. The idea of RM is displayed in a systematized project life cycle (PLC) way to deal with demonstrate contrasts between components of RMP in various task stages.

Given the undertaking intricacy and changing circumstances of development extends, the part is defenceless to risk in which an atmosphere of extraordinary risk and uncertainty is made. The accelerating risk components to the development business flourish including different specialized, socio-political and business risks.

Generally, these risks have turned out to be hindering to the development of the construction sector. This circumstance affects development project members with the

outcomes being quality consistence troubles, overheads and undertaking particular necessities, cost acceleration and unexpected time invade of the task planned consummation date (Abu Mousa, 2005). Task management utilizes aptitudes, devices and systems to achieve project targets meant for meeting or surpassing the desire for partners. Risk management is an imperative piece of the procedure to recognize potential risk and react to such risks. It thinks about procedures adapted towards amplifying the impact of positive occasions whiles limiting the impact of negative occasions (PMI, 2013).

It is broadly considered that there is a decision in discovering risk in a specific domain and can't be diminished to insignificant destiny and that the satisfaction of undertaking and friend's business objectives can be influenced by the inborn vulnerabilities in the framework. Risks exist in all undertaking tasks, however the sum changes starting with one action then onto the next (Ehsan et al, 2010).

1.2 PROBLEM STATEMENT

In construction ventures, it is for all intents and purposes unrealistic to record a zero risk. Risk is characteristic in all development exercises. The inalienable idea of risk adds to the powerlessness in accomplishing the triple imperative components of time, spending plan, and quality targets (Loosemore, 2006). Development tasks can be extremely perplexing and loaded with vulnerabilities. The risks and vulnerabilities can have possibly hurtful impacts on ventures (Mills, 2001; Flanagan et al, 2006).

Keeping in mind the end goal to satisfy project with particular consideration on quality, natural supportability, time, cost and wellbeing, Construction Project Risk management has been distinguished as a key advance to embrace. In a touch of

occasions, most investigations led in the region of risk management have coordinated consideration on certain part of development project risk management to the disregard of an extensive and all-encompassing methodology with an engaged view meant for recognizing development risks, their likelihood of event and the effect on project completion (Abu Mousa, 2005).

The development/construction sector with its heap of exercises supposedly is installed more with risks and vulnerabilities contrasted and different enterprises. In managing risks, a few businesses have created reasonable risk management methods to make them more proactive in dealing with risk related with tasks. The use of these risk management methods isn't mainstream inside the development sector and subsequently not for the most part utilized. Risk is innately part all things considered, independent of territory of task and greatness of undertaking. There isn't any total risk-free task or project and along these lines if the risks are not deliberately distinguished, appropriately broke down and useful risk management techniques set up, at that point the probability of the project frustration will be high (Mahendra et al., 2013).

From the previously mentioned bits of knowledge on risk and its management, it can be called attention to that players inside the development sector are looked with a test of a viable risk evaluation and management framework expected to help in the risk management process. Development/construction Risk management is exhibited to help in recognizing project dangers, efficiently dissect them and utilize fitting devices and methods in overseeing them. Subsequently, with a specific end goal to disentangle project intricacy and diminish development risk, there is the requirement for orderly risk management (Al-Bahar, 1990).

From the above prior difficulties and issues identifying with risk in the development sector and utilizing the Ghanaian Construction part, this study tried to distinguish risks

in the present development sector and assess the seriousness through a broad investigation of literature and to look at the risk management procedures and practices if any being utilized by the Contractors.

1.3 RESEARCH QUESTIONS

Drawing from the exploration issues, the accompanying inquiries were postured:

1. What are the risks encountered on sites?
2. What is the degree to which the recognized risk influences the Construction Industry?
3. What are the risk management systems and procedures being utilized to control the distinguished risks?

1.4 AIM AND OBJECTIVES

1.4.1 Aim

The aim of this study is to explore project risk management practices of Ghanaian building contractors.

1.4.2 Objectives

The following objectives are articulated to help achieve the stated aims:

1. To identify the risk factors encountered in construction projects
2. To examine the probability of occurrence and impacts of the risk factors on construction projects
3. To identify the strategies for the management of risk on construction sites.

1.5 SIGNIFICANCE OF STUDY

Risk Management Practices have been basic issue experienced by development experts in their works. There is the need to give a viewpoint of the different risk management studies as it is being done on projects.

This study is opportune as it looks to give information about development firms and how to viably oversee risk on project. It will encourage managers and different experts locate the most ideal method for arranging and executing projects through the suitable risk management tools. This exploratory work will likewise furnish the Ghanaian development firms with rules of best risk management techniques.

To alternate players in the development business, for example, the customer, specialists, subcontractors and so forth, it will give them the imperative thoughts concerning the risk management of development firms. This will see how the risk management practices of development firms prompt the execution of undertakings.

This bit of work will likewise be of massive advantage to people in the scholarly world. This will incorporate Lecturers and understudies of different tertiary establishments, where it can be utilized as an instructing and learning tool. Last yet not the minimum, this work will fill in as a reason for additionally investigation into the branch of knowledge of risk and gives more understanding into the risk management practices of development firms.

1.6 METHODOLOGY

In completing the plan of this overview, the philosophy utilized is the quantitative strategy. This was started through optional information acquired through course books, diaries, past research works and the web, organized polls were regulated to key

management staff of Construction firms and some in cases interviews were directed nearby.

Investigation of the accumulated information was finished with the assistance of Statistical Package for Social Sciences (SPSS) PC programming and Relative Importance Index (RII). This assessed and examine the outcomes, from which conclusions and suggestions were taken.

1.7 SCOPE OF STUDY

Despite the fact that this study is in light of a legitimate concern for every one of the members in the Ghanaian development industry, consideration was focused on key staff of top of the line building development firms who had continuous tasks at the season of the investigation and furthermore recorded with the Ministry of Water Resources, Works and Housing. The investigation was constrained to the urban areas of Accra and Kumasi.

The investigation is limited to the utilization of risk management practices and strategies to control the seriousness of distinguished task chance.

1.8 STRUCTURE OF THE REPORT

The introduction of the report has been assembled under five sections as takes after:

Part One: Contains the foundation of the investigation, issue proclamation, point and destinations together with the exploration questions. Part Two: Provides a standpoint with respect to looked into writing on the development business financial commitment, venture management, dangers and its management as far as practices and strategies utilized in the development business. Part Three: Provides data on the technique,

populace and test estimate thought, constraint of the investigation, information accumulation systems, instrumentation, and information examination methodology.

Part Four: Provides discoveries and the exchange on the discoveries of the examination. Section Five: Provides rundown of the discoveries, conclusion and proposal to the business players and for additionally look into.



CHAPTER TWO

LITERATURE REVIEW

2.1 OVERVIEW OF GHANA'S ECONOMY AND THE CONSTRUCTION INDUSTRY

The construction sector is a basic part of the economy of most nations (Ofori, 2006). For example, in different developing economies, construction exercises are in charge of around Eighty Percent (80%) of gross value resources, Ten Percent (10%) of Gross Domestic Product and more than Fifty Percent (half) of riches put resources into settled resources. Most likely beside horticulture, the construction business has been a noteworthy wellspring of gigantic work openings (Jekale, 2004).

As indicated by IMF (2014) Ghana accomplished a high construction of 15percent out of 2011 however it couldn't be maintained in the consequent years. Anyway, it is constantly over the normal for the sub-Saharan district. In 2012 and 2013 Ghana's construction rate was 7.9 percent and 5.4 percent individually, demonstrating a decay from the 2011 construction rate. Each segment of the economy is in charge of this construction and the construction business isn't an exemption. As indicated by the 2014 Revised Gross Domestic Product by Ghana Statistical Service, (2015), of all the mechanical exercises the Construction subsector recorded the most noteworthy construction of 7.4 percent in 2014, contributing up to 12.3 percent to the GDP, just second to the yield part of the Agricultural business with 15.2 percent. Thinking about the crucial position of the business in Ghana and other rising economies, opposite the poor execution of the construction division in these rising economies, attempting to accomplish the coveted construction pointers ought to be a noteworthy plan. (Ofori, 2006).

The construction business in Ghana flourishes through different projects, which must be figured out how to give the longing result or limit risk and augment benefits.

2.2 CONSTRUCTION PROJECTS

A construction venture is characterized as a physical structure that is started by the designers' illustrations and gets changed into completed item through an arrangement of strategies and procedures (Levy, 2000). Executing a construction project is characterized as a procedure of setting up a framework. Broad planning is key for a task to be executed effectively. Prior to the construction execution stage, the plan together with the planned cost and courses of events should be finished and affirmed. (Clough, 1979). As indicated by Levy, (2000) for construction tasks to be effective and accomplish the set target, the accompanying key criteria must be met: Complete Project inside the assessed time, Actual cost in executing the undertaking isn't more than the planned cost of venture, The undertaking ought to be claims/debate free amid and past the venture lifecycle, Good working compatibility amongst Contractors and different partners and The yield of work meets the coveted quality.

Construction projects have distinctive partners associated with it, yet the accompanying are the key players or members:

Customers/Clients: They give the money related assets expected to construction projects. The client's desire is to get the finished venture inside the planned cost and assessed time (Altoryman, 2014).

Consultants/Advisors: These experts are picked by the customer to speak to and ensure the enthusiasm of the customer. They are resourced and supported by their expert skill. They advisor might be a team of Designers, Project Managers or Specialist

Engineers. The customer looks for and get counsel on different segment of the task from the advisors and in doing as such, the experts set up management practices to deal with risks emerging from off base exhortation which may prompt claims and debate (Altoryman, 2014).

Temporary workers/Contractors: They are in charge of the execution of the composed work and their item runs from a working to shifting type of construction unit. Contractors work to boost benefit from any undertaking. Cases of temporary workers are: fundamental contractual workers, subcontractors, Suppliers, and so forth. (Altoryman, 2014).

More often than not, the failure of a Contractor to accomplish the task goal of finishing it within the planned cost and evaluated time length and required particulars might be because of ineffectual management practices (Flanagan, 1993). The fundamental linkage of cases and debate is followed to the interruptions and deferrals in Contractor's advance (Brimah and Ndekugri, 2008). Construction projects are assembled into four classifications (Gloud, 1997): Residential construction, Construction for organizations, Infrastructure and huge construction and Industrial construction projects.

This study is identifying with construction projects. Gloud (1997), related that construction projects are considered actually advanced than others, and customer inclinations decide the obligation of the field of construction management. That implies that the customers pick whether a consultancy firm or a contracting firm is in charge of dealing with the construction projects.

2.3 RISK OVERVIEW

By definition, risk is for the most part uncertainty conditions or occasions which can deliver a positive or negative effect on a project, on the off chance that it happens.

Jaffar's definition in the year 2001 was anyway intricate, as it thought about loss/gain and size. As it were, risk is the introduction to gain or misfortune, or the likelihood of its events duplicated by their individual magnitude. Jaffari (2001) additionally clarified that a specific occasion is 100% if their probabilities of events are accomplished and on the other hand an indeterminate occasion is the point at which the likelihood of event is zero. There are wide varieties in the middle of the two expressed extremes opined by Jaffari. A less complex definition by the Project Management Institute (1996), depicted risk as isolated and detached events that emphatically or adversely influences an undertaking. Kartam (2001), attested that risk might be characterized as the likelihood of event of some capricious, indeterminate and even bothersome occasions that may change the gainfulness on a given investment's prospects (Kartam, 2001).

Any circumstance or thing that can cause damage might be characterized as risk and the probability that a beneficiary of mischief could be affected by risk as the degree of introduction. Introduction is taken to infer thoughts of recurrence and likelihood while risk identifies with harm, damage, loss of execution and fund. Risk is the triple normal for any undertaking choice in the circumstance of uncertainty. The presence of various conceivable outcomes that has obscure event is named as risk (Yoe, 2000). Yoe (2000) additionally avows that not all risk are chances but rather a few risks are questionable. Risks and uncertainties anyway share comparable attributes in managements, creation and trade. Arranging, checking, usage, alteration, conduct and clarify decisions are the central factors that are affected by risks and uncertainties as per Okema (2001). The

idea of the risk and its application are the premise to characterize chance with a typical component of subjectivity. The particular of accurately anticipating the correct period amid an undertaking in the construction business where sureness exists or guaranteed is extremely extraordinary (Flanagan and Norman, 1993). A few analysts construct their definitions with respect to the results and likelihood of a venture result been figured it out. Risk may exist when a choice is communicated as far as scope of conceivable results and when known probabilities of the results are appended, while as uncertainty is when there is one conceivable result of a game-plan. There is obscure result of the likelihood of every result and in a few events, there are no reference to the possibility of terrible results on risk. In this way, great outcomes ought to be applicable in the meaning of risk (Education and Learning Wales, 2001).

Some eminent scholars like Flanagan and Norman (1993), plainly recognized the meanings of risk and uncertainty. For risk to happen, the principle subordinate is likelihood which could be communicated quantitatively. Uncertainty, in any case, may be characterized as a circumstance in which there are no notable information or past history identified with the circumstance being considered by the leader. Risk is a component subjected to experimental estimation, while uncertainty is of a nonquantifiable write as expressed in the discoveries of an exploration directed by ADB (2002). In this manner, a circumstance where there are sign of its probability of the acknowledged estimation of a fallen variable inside expressed points of confinement is risk related and can be depicted by the changes around the normal of a likelihood math. In the event that the changes of a variable are with the end goal that they can't be portrayed by a likelihood math, the circumstance is depicted as uncertainty.

Greene (2001) saw risk as the likelihood an unfavourable occasion that happens amid a stipulated day and time, or results from a specific test. Greene (2001) likewise opined that there is the probability that factual hypothesis complies with all the formal laws influencing probabilities. Greene (2001) anyway attested that, the fundamental weakness about these factual speculations is that they depend generally on mystery or the estimation of what is to happen.

In outline, a deliberate method for managing risks can be considered as risk. The presumption that there are uncertainties with forecasts of risk attests that there are just uncertainties basically in light of the fact that there is just ever an expectation of likely occasions. For risk to exist there ought to be uncertainty, consequently their relationship yet risks are altogether subjective and revolved around past involvement, authority preparing in a region of field of mastery, and social qualities to which the risk relates (Greene, 2001).

As per study done in 2007, the discoveries demonstrated that the government of Ghana is the greatest customer in the business (Agyakwa-Baah, 2007; Tuuli et al., 2007). Visit postponements and cost overwhelms on a considerable measure of undertakings are a portion of the difficulties of the construction business in spite of its commitment to financial advancement and construction (Frimpong et al., 2003) There are the requirement for genuine measures and the correct risk management procedures to be set up to keep these cost invades and delays as opined by Ahadzie et al.(2008), who watched that general project cost and quality ought to be seen as the most vital criteria of achievement in the project execution in Ghana.

Quick growth in most construction enterprises far and wide achieves infrastructural advancement. The construction in the construction business prompts increments in GDP of a country and it is extremely basic to organize infrastructural advancement and

make the essential arrangements in most governments' spending plans to fund such activities (Odeyinka et al., 2007). Most now and again new difficulties are confronted considering the risks engaged with the plan and generation in construction projects. By nature, risk management in construction industry considers a ton of degree for some ecological and socio-political issues dating from precontracts, contract up to present contract arrange driving on culmination time issue, cost overwhelms and low-quality work (Okuwoga, 1998). In as much as project managers endeavour to restrain cost overrun, it is unavoidable and will influence project particularly when it includes vast measure of cash (Odeyinka et al., 2007). With a specific end goal to stay away from or diminish the misfortunes, management of the risk associated with the construction venture is required. The parts and materials required for amassing, outlining and delivering by various providers from different controls and innovative incongruities to build up an assemble domain is the construction procedure.

PMI (2008) depicts any impermanent undertaking with the expectation to make remarkable management or item as a venture. The contrast amongst project and an organization's typical activity is that project in the long run reaches an end. Tasks are transitory in presence and in this manner have a settled life saver and as per PMI (2008) each project must satisfy its unequivocal target with a one-time exertion inside a particular time. Activities may fluctuate inside levels of an association, while a venture might be around one bureau of an association, others may cut over all divisions inside the association. General projects may include a few gatherings of work force in a group or a solitary individual.

2.3.1 Risk and Uncertainty

Uncertainty and risk are firmly related as risks related with the usage of construction projects. Normally risk is seen totally as uncertainty albeit all announcements characterizing risk contains some component of uncertainty. Uncertainty is express regarding an event's likelihood of occurrence. On the off chance that the likelihood of event of an occasion is 100%, at that point it is named to be certain. Then again, a likelihood event recorded as 0%, implies the occasion is uncertain. There exists an enormous gap of uncertainty between the farthest point of 0% and 100% (Jaafari, 2001).

Uncertainty makes it hard to have a correct standpoint of future potential outcomes. To oversee uncertainty adequately, the changeability and equivocalness nature of uncertainty should be separated. A circumstance of use where a quantifiable factor takes a unit of set of conceivable qualities depicts its fluctuation nature. Vagueness circumstance is considered when there is no total learning in connection to the circumstance being surveyed. (Hillson and Murray-Webster, 2007a).

A few circumstances albeit indeterminate are not viewed as risk. On the off chance that the uncertainty does not influence the set targets, it wouldn't be considered as risk. There can't be risk without it being characterized in connection to specific destinations (Jaafari, 2001). Hilson and Murray Webster (2007a) hinted that there is a qualification amongst risk and uncertainty; risk is characterized in connection to particular goals and thinks about the results while uncertainty does not consider.

Figure 2.1 exhibits the connection amongst risk and uncertainty for projects.

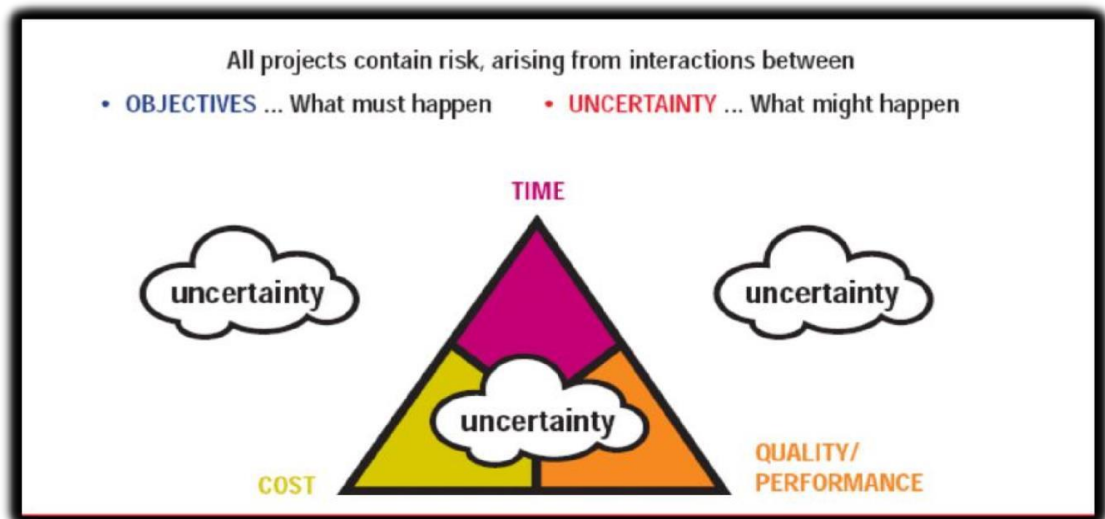


Figure 2.1 Relationship between Risk and Uncertainty

Source: Hillson, (2005)

As a finishing up comment, it is to be noticed that diverse meanings of risk and uncertainty have been produced using distinctive perspective by different analysts. Anyway, there is accord such that risk and uncertainty have one of a kind separate implication. By and large risk is connected to the forecast of a result utilizing likelihood. Then again, uncertainty is a circumstance of future result in light of subjective likelihood.

2.3.2 Sources of risks

Risks in project management can originate from various sources. Training and Learning Wales, (2001) demonstrated the accompanying as wellsprings of risks: Environmental risks, Political risks, Social risks, Financial risk, Legal risks, Technological risks, Commercial risk, Communications risks, Geographical risks, Management risks, Geotechnical risks, Construction risks, Operational risks, and Demand/item risks.

The wellsprings of risk are one of a kind to singular undertakings and too related by and large to all activities. The related risk in the two space should be investigated during the time spent undertaking risk identification. Figure 2.2 shows guide of learning delineating the wellsprings of risk influencing the goals of a project

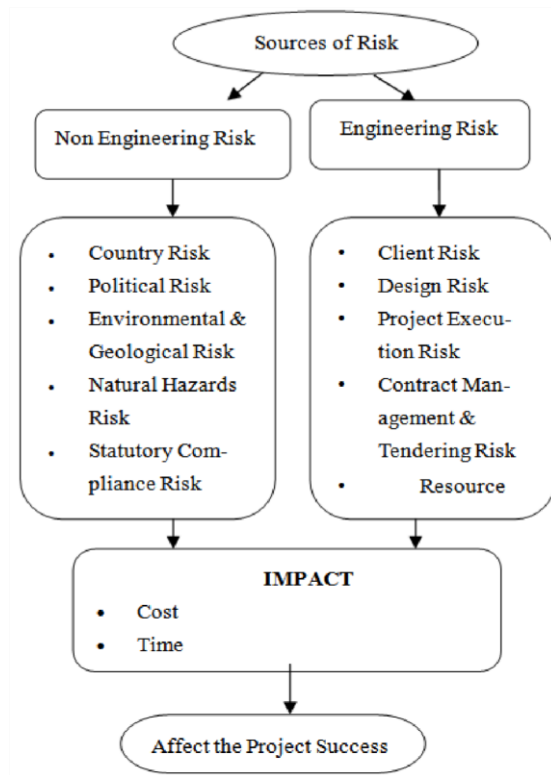


Figure 2.2: A guide of learning delineating the wellsprings of risk influencing the destinations of a venture

Source: Renuka et al. (2014)

Figure 2.2 assembled the risk factors under Engineering risk which can be anticipated and Non-engineering risk factors which can't be anticipated. It is suitable that the conjecture of the designing components be made at the underlying phases of the undertaking since they are unsurprising. While the non-engineering elements which influence the planned cost, assessed time and wanted nature of the project, and predominantly include uncertainties ought to be broken down and evaluated to accomplish project objectives.

2.4.3 Identification of Risk Factors in Construction Projects

Table 2.1 summarises identified risk factors as suggested by researchers from various kinds of construction projects.

Table 2.1 Shows risk factors identification in construction projects.

Researcher(s)/Work	Identified critical risks
<i>Mustafa et al., (1991)</i>	Inflation, Country Economic, Condition and rules and regulation, unavailability of funds, Financial failure.
<i>Dey, (2002)</i>	Scope and design changes, Technology, Weather and climatic Conditions, Statutory clearance and approvals.
<i>Ghosh et al., (2004)</i>	Scope and design changes, Inflation, Country Economic Condition and rules and regulation, unavailability of funds, Financial failure, Construction Delays
<i>Laryea, (2007)</i>	Scope and design changes, Technology Implementation, Site conditions and Unknown Geological Condition, Inflation, Country Economic Condition and rules and regulation, unavailability of funds, Financial failure, Lack of availability of resources
<i>Enhassi and Mosa, (2008)</i>	Scope and design changes, Technology Implementation, Site conditions and Unknown Geological Condition, Inflation, Country Economic Condition and rules and regulation, unavailability of funds, Financial failure, Weather and climatic Conditions, Poor Safety procedures, Construction Delays.
<i>Sun & meng, (2009)</i>	Site conditions and Unknown Geological Condition, Inflation, Country Economic Condition and rules and regulation, unavailability of funds, Financial failure, Inadequate managerial skills, improper coordination between teams, Lack of availability of resources
<i>Wang et al., (2010)</i>	Inflation, Country Economic Condition, Statutory clearance and approvals, construction delays.
<i>Eybpoosh, (2011)</i>	Scope and design changes, Technology Implementation, Site conditions and Unknown Geological Condition, Inflation, Country Economic Condition and rules and regulation, Lack of availability of resources.
<i>Rezakhani, (2012)</i>	Scope and design changes, Technology, unavailability of funds, Financial, Weather and climatic Conditions, Poor Safety procedures.
<i>Goh et al., (2013)</i>	Scope and design changes, Technology Implementation, Site conditions and Unknown Geological Condition, Inadequate managerial skills, improper coordination between teams Lack of availability of resources, Construction Delays.

Source: Renuka et al., (2014)

Table 2.1 demonstrates the distinguished risks in construction projects affirmed by well-known risk management scientists and authors. To have the capacity to deal with the distinguished risks fittingly, the risks have been organize arranged by desperation as found in figure 2.3 below.

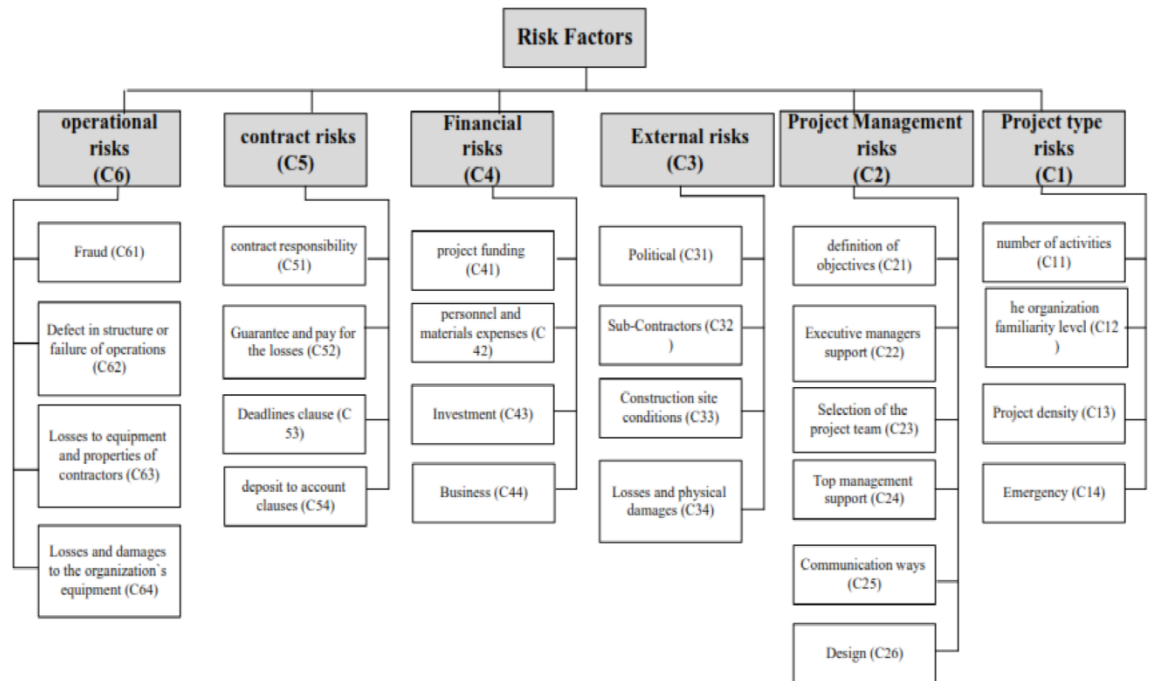


Figure 2.3: The various levelled structure of distinguished risk factors

Source: Tah and Carr (2000)

To have the capacity to deal with distinguished risks well, it is produced into an arrangement of WBS (Work Breakdown Structure). WBS alludes to the recognizable proof of assignments together with the required assets so as to convey the outline to execute the task (Smith, 2008). It is helpful to look for answers to the three basic inquiries in chance ID including; what could turn out badly? How likely is it? (Likelihood), and how it will influence the venture? (Effect). Venture director and the group could utilize the experience and exercises learnt from the past, utilize a reenactment model to display conceivable risks notwithstanding conceptualizing

keeping in mind the end goal to perceive the potential risk factors (Lockyer and Gordon, 1996).

2.3.4 Classification of risks

From the point of view of the PMI (2008), risk grouping is characterized as a structure that gives a comprehensive procedure of deliberate risk distinguishing proof to a steady specifying and which coordinate its commitment to the quality and adequacy to the risk ID process.

Contingent upon the idea of risk, Researchers through the distinguishing proof process have found and grouped into various sorts. Such grouping incorporates Contractual/legitimate,

Construction, Political, Management, Physical, Environmental, plan, Financial, Common risks, Safety and Delay risk

The main six classes identified with risk factors were external, materials, labour and equipment, design, financial, and management. An audit of the writing with respect to this categorization offers the accompanying clarifications and how they influence projects as showed in Table 2.2.

Table 2.2 A Table showing Risk classification

Category	Description
<i>Management</i>	In project management there are two major aspects: the art and the science of the project. The art deals with the people involved in the project, while the science deals with defining and coordinating the work to be done; for example, it involves the knowledge, understanding, and skilful application of a project management process (Heerkens, 2001)
<i>Design</i>	One of the most important requirements to minimise time delay and cost overrun is the allocation of sufficient time and money at the design phase (Koushki et al., 2005). Design is one of the most critical categories because its related factors were identified as key risks in construction projects (Fereig and Kartam, 2006).
<i>Financial</i>	This category takes into account factors with respect to possible financial difficulties on the project, which may be due to cash flow problems, delayed payments, and external economic issues. (Alaghbari et al., 2007). Delayed payment for executed projects is the key related risk factor that affect the financial category as concluded by various studies (Sweis et al., 2008) and (Aibinu and Odeyinka, 2006).
<i>Materials</i>	The effect of risk factors can have a direct bearing on tasks and the cost implication on the project can be serious (Manavazhi and Adhikari, 2002). Type of materials, their availability and the selection time are critical risk factors when it comes to material issues.
<i>Labour- and equipment</i>	Shortage of workforce and the existence of unskilled labour are risk factors in relation to Labour issues. (Sweis et al., 2008)
<i>External</i>	External risks are usually ranked low and do not have a contributory role in the delay of the project (Sugiharto and Keith, 2003). Most of the studies show that external risks, including weather and site conditions, have the lowest impact on the completion of a project (Alaghbari et al., 2007).

Source: Altoryman (2014)

It is fundamental to take a gander at the conceivable inside and outside risk elements to the different partners. The risk source and its impact are basic while recognizing risks (Raftery, 1999).

2.4 OVERVIEW OF RISKS MANAGEMENT

Overseeing risk has existed since the start of civilisation when individuals expected to store their harvest for some time later, and when strongholds and wall were worked to secure towns and belonging. Another illustration is the point at which a tradesman

deals with his risk while moving products starting with one place then onto the next by having the purchaser pay the vender a security store to be returned once the purchaser gets the stock in great condition, so if the tradesman faces any calamities amid his trip, he gets remuneration. From Babylonian circumstances until the Age of Enlightenment, risk was not overseen completely, but rather depended on “gut feeling”. In any case, an all the more organized strategy was seen after analysts and scholars created measured strategies for surveying risk (Douglas, 2009).

In construction venture management, management of risk is a necessary of the decision-making channel (Tang et al., 2007). Risk management (RM) enhances the future prospects of a venture as it distinguishes vulnerabilities and probabilities (Borge, 2001). It is characterized as a fundamental procedure by which all undertaking related risks are distinguished and assessed by measuring them, with a specific end goal to take a cool-headed choice in dealing with the risk (Zou et al., 2007).

As indicated by Walker (2000), Construction venture management is characterized as:

"The planning, co-appointment and control of a task from origination to finishing (counting authorizing) in the interest of a customer requiring the ID of the customers' targets as far as utility, work, quality, time and cost, and the foundation of connections between assets, coordinating, checking and controlling the supporters of the undertaking and their yields, and assessing and choosing options in quest for the customer's fulfilment with the venture results." The Institute of Risk Management (IRM) states that risk management (RM) is a quickly creating discipline with no unmistakable perspectives or agreement on what is associated with chance. The IRM recognizes chance as having two measurements: positive and negative. Positive risks

could affect the achievement of an undertaking, and negative risks are related with the conceivable disappointments of a venture (IRM, 2002).

2.4.1 Risk Management Process

Diverse scientists have recommended different risk management process. Crafted by Boehm (1991) proposition comprised of two stages which are Risk appraisal (made up of risk distinguishing proof, chance examination and risk prioritization) and Risk control (comprising of risk management arranging, chance determination and risk observing arranging, following and restorative activity. Chapman and Ward (1997) laid out a non-specific risk management process comprising of nine stages:

1. Defining main segments of the project;
2. Paying regard to key way to deal with risk management;
3. Identification of potential wellsprings of risks;
4. Outline imperative data about risk presumption and connections;
5. Allocate obligation of risks and reactions;
6. Evaluate the level of uncertainty;
7. Estimate the relative weight of the different risks;
8. Strategize reaction;
9. Ensure checking and controlling of the execution stage.

In the risk management process, four stages have rather been exhibited by PMI (1996) which are:

1. Identification,
2. Quantification, 3. Construction of reactions,
4. Control.

The procedure of risk management involves Identification, Assessment, Allocation and dealing with all task risks (APM, 2000). Figure 2.4 represent risk management process.

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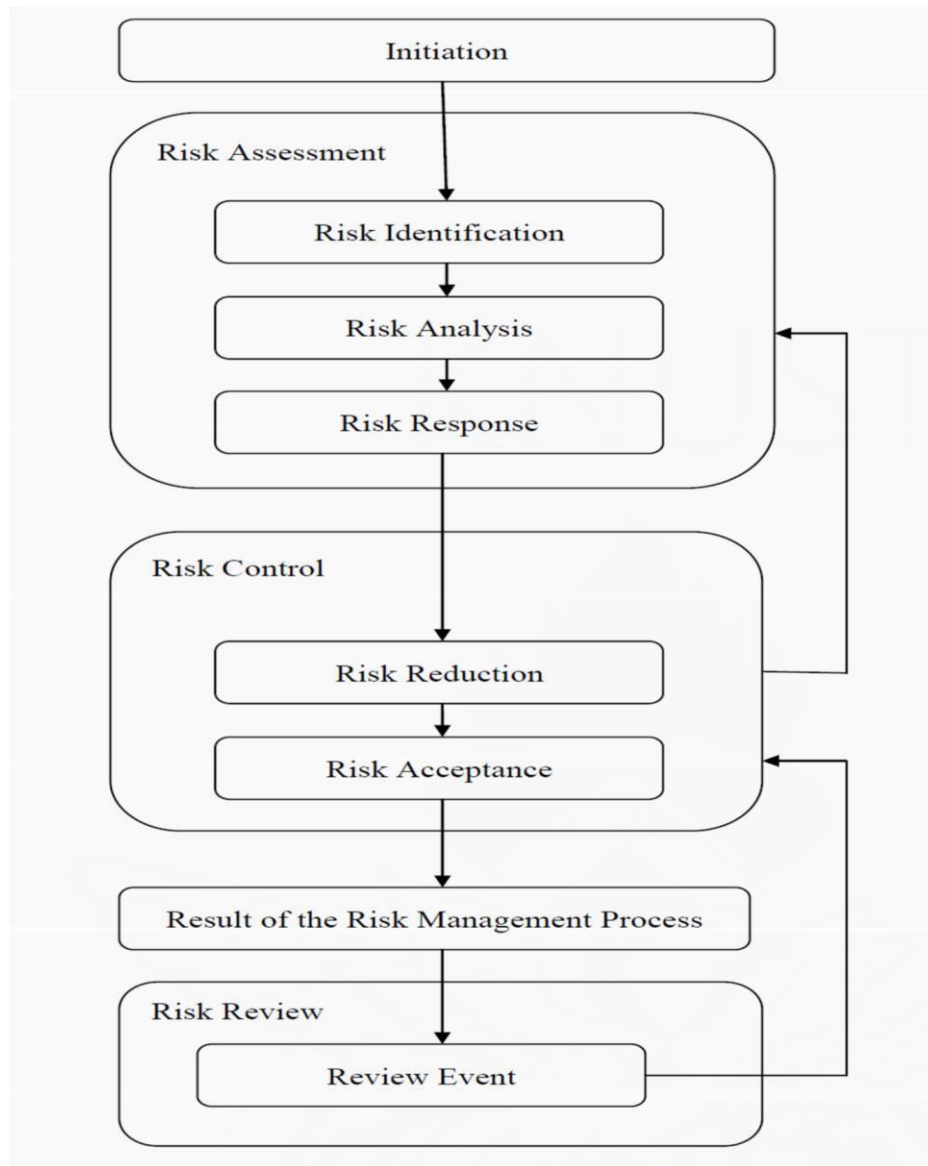


Figure 2.4 Process of risk management

Source: (Simon and Gunn, 2009), (Gray and Larson, 2003) and (Murch, 2001)

2.4.2 Construction risk management Approach-Conceptual Model

Taking social reactions, association structure and procedures and innovation, the model portrays a dependable basic leadership process. The construction risk management applied model delineates structure for quantitatively distinguishing, breaking down, and reacting to chance in construction projects. The model is more cantered around introductory arranged risk ID and its management instead of after, when genuine misfortunes and cases have been showed (Enshassi and Mayer, 2001).

Figure 2.5 delineates a calculated model of construction risk management.

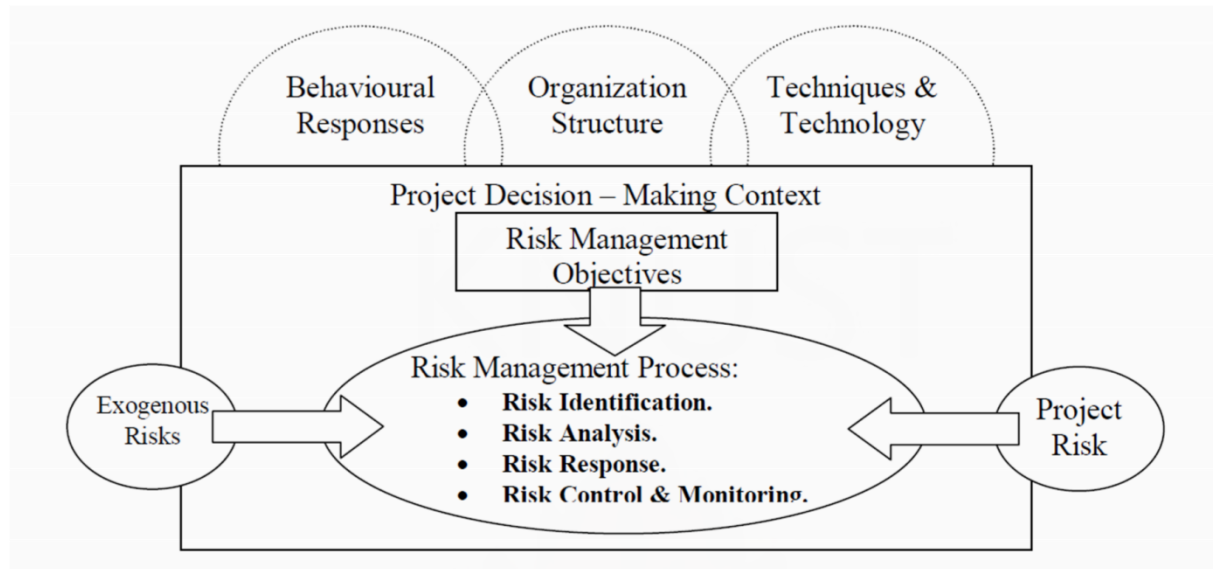


Figure 2.5: Conceptual Model of Construction Risk Management

Source: Enshassi and Mayer, (2001)

2.4.2.1 Risk identification/distinguishing

Events that influence the accomplishment of objectives and adversely cause issue, as indicated by Moavenzadeh and Rossow (1999) are risks. Recognizable proof of potential risks takes after the initial step of risk arranging, finding and out ling those components that influence the goals of an association. Notwithstanding distinguishing the wellsprings of risks and it is the point at which the wellspring of risk is recognized that the outcomes of that source are known. Examining the results of sources or the issue it causes is imperative under this very risk management process.

Distinguishing of risk uncovers two sorts of risks (controllable and uncontrollable). Controllable are wilfully attempted and its result is a piece of the immediate control of an undertaking while those risks which don't impact a task is named as uncontrollable risks as said by Chege and Rwelamila(2000). The distinguishing of the constituents of risks figures out which risks are probably going to influence the project and recording

the attributes of each. Risk identification ought to be performed all the time all through the project, it's not a one-time event as indicated by (PMI, 1996). A theory led in 1995 by Isaac characterized the principle constituents of risk recognizable proof as a strategy used to fill in as a guide on what those risks should look like when recorded to create risks (Isaac, 1995). In each project there are internally and externally risks and it is the target of risk identification to address these two components. The components or things that can be impacted by the project group, be it fetched estimation and staff assignments, are inward risks. In any case, there are a few things past the impact and control of the venture group, run of the mill illustration is the activities of government. In each undertaking setting, risk distinguishing proof isn't just worried about positive results or openings yet in addition the negative results or risks (PMI, 1996). This is a basic stage as a more extensive and clearer see is taken by the undertaking group to determine the risks that are probably going to block the venture in meeting its cost focus with no requirement. The importance and criticality of this task risk management is insisted in an examination by Enshassi and Mayer (2001) which adds to writing that there ought to be appropriate acknowledgment to the presence of at least one potential risk which may bring about calamity or renouncing an occasion or open door for pick up coming about because of legitimate restorative activity; inability to do as such will lead deferrals or cost overwhelms.

Identifying risk can be contrasted with mapping the world which is focused on the area of the guide creator. Wherever one remains to check the world from a map, might be altogether uncover the entire world to you and a few spots natural to you may not be evident to other undertaking groups and the other way around. Each task when seen from the best has complex layers of arranging, different connections of vertical and level and in addition consecutive issues and it is the capacity of the management group

to impact the result of a venture by what they see, however result of activities are constrained. There ought to be more noteworthy fixation on what could happen as opposed to endeavouring to centre around what ought to happen (Flanagan and Norman, 1993). Going further, Flanagan and Norman (1993) again watched the primary gear of risk ID is concentrating on the impacts of the risks and its sources. There can be an inventory of broad risk concocted; in any case, they could be fragmented and deficient prompting choice flopping basically on the grounds that most chiefs don't consider the full range of the conceivably occasions or things that may destructively influence an undertaking. One method for providing food for this is by legitimate ID and classification of risks to limit the risks epitomized in projects (Enshassi and Mayer, 2001).

2.4.2.2 Risk Analysis

Risk management process is a pivotal field of project management process in the construction business. It is the procedure of risk management where the impacts and reasons for occasions which may cause devastation are recognized and managed. A characterized and precise estimation of risk occasions is the point behind such investigation and to some degree settles on the basic leadership of the procedure to be particular and distinct (Estate Management Manual, 2002). The centrality of breaking down risk isn't outlandish as it dissects the different results of any choice and catches every single practical alternative. Customers all the more regularly are keen on the possible cost of a building venture, yet notwithstanding, extends for the most part and reliably encounter cost invade, too frequently the more essential inquiries of 'imagine a scenario in which' are not asked by customers (Flanagan and Norman, 1993).

Evaluating the distinguished risks is the fundamental rule of risk analysis. Risk analysis are carried out by surveying values on the impact risk have on time and cost. The financial procedures or parameters of the particular impacts could be investigated and three summed up sorts of risk treatment can be applied: that is, exchange, avoiding or diminishing and tolerating or holding risk (Education and Learning Wales, 2002). Flanagan and Norman (1993), opined that the probable circumstances if a project is ended or does not take after the underlying arrangement, the utilization of risk analysis becomes possibly the most important factor. There will be clearer vision of the risks when dynamic personalities are connected to the best accessible information in a deliberate and organized route as opposed to the accomplishment it would have picked up by instinct alone. There is acknowledgment of uncertainty that encompasses the best gauge in risk analysis approach by producing a likelihood dispersion in view of a mastery judgment. This along these lines enhances the impacts of vulnerabilities and offers a superior comprehension of activities. Risk analysis isn't an independent movement; rather they are segments of all choices consistently made to react to extend elements as expressed by (Jaafari, 2001).

Assessment of risks and communicating of risks are additionally basic to risk and it surveys the potential outcomes on the undertaking (PMI, 1996). In spite of the fact that, it is muddled in nature however it isn't constrained various groupings or variables including: Threats and openings can associate in a startling route, for instance, booking deferrals may compel receiving new methodologies which lessens the term of the general undertaking. As per an investigation led by Bender and Ayyub (2001), the utilization of scientific procedures secure undertaking supervisors control cost however some over depend on these methods making bogus impression of dependability and accuracy. These procedures are utilized all through the entire life

expectancy of the project and above all the experience of construction specialists all through the construction project.

Risk analysis likewise shows what could occur if the project does not go along the arranged course (Flanagan and Norman, 1993). Figure 2.6 diagrams the arrangement of risk analysis in a construction project.



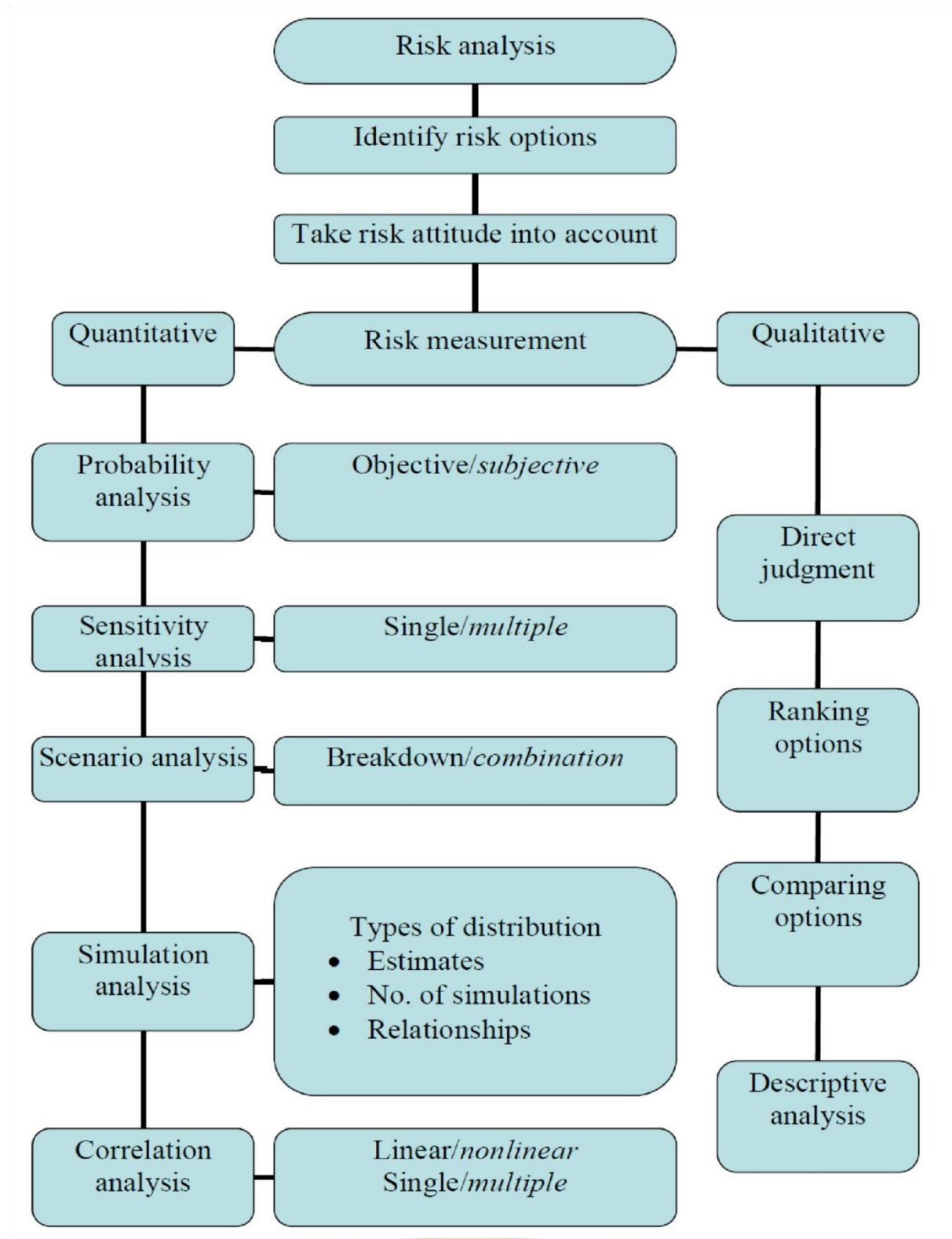


Figure 2.6: Sequence of Risk Analysis

Source: Flanagan & Norman, (1993)

Table (2.3) summarizes the various procedures used for risk analysis.

Table 2.3: Various risk analysis techniques

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

Source: Chapman and Ward, (1997)

2.5.2.3 Risk response/reaction

The Project Management Institute (1996) featured three different ways of risk reacting in projects: circumventing is killing a particular risk by evacuating the reason. Most on occasion particular risk can be wiped out as not all risks can be dispensed with by venture management groups; relief is the presentation of new innovation or purchasing protection, for instance, to diminish the normal financial incentive by lessening its likelihood of events; tolerating as the name suggests is tolerating whatever the outcomes of the risks may be. Managing a lower benefit of some movement is uninvolved while building up an alternate course of action executable when risks happen is dynamic PMI (1996). There had been recommendations in the matter of how to react to remaining risks by lessening vulnerabilities by acquiring extra pertinent data prompting a re-assessment of risk impacts. Another school of thought is the end of the risk factor through entire or incomplete re plan. There were proposals of exchanging the risk to other subtemporary workers and protecting the events of the risk factors. Abu Rizk (2003) added to the statement over that a further premature birth of these undertaking when the risks are excruciating and no great instruments could be taken to relieve the harms. Four identifiable and watchful suitable techniques for treating construction related risks are maintaining a strategic distance from, diminishment, exchange and risk maintenance as buttressed by the discoveries of comparative

investigations (Akintoyne and MacLeod, 1997; Ahmed et al., 2001; Enshassi and Mayer 2001; Education and Learning Whales, 2001).

2.4.2.3.1 Mitigating risk

This is a general term used to connote the lessening of likelihood its unfavourable on the project. There might prompt a totally disposal of risk occasions as saw in chance evasion. As indicated by Piney (2002), it is just judicious to not weight on the effect of the risk since it winds up unsatisfactory when the promising impact achieves a level. The selection of one of these methodologies will work in diminishing the potential risk effect on a project (Piney, 2002).

2.5.2.3.2 Avoiding risk

Risk avoidance now and again is called risk elimination is certainly not a summed-up chance reaction rehearse in construction industry as the shirking of putting an offer or the hesitance in venture financing, for instance, end the life of the undertaking notwithstanding amid the prior long stretches of the task. In an offer to absolutely take out risks in construction enterprises, the above referred to cases are impracticable and prompt deferrals and cost overrun. A fairly helpful approach/condition could be received keeping in mind the end goal to dodge risk. A contractor may tender for a contract with a higher offer, or place conditions on the specific offer, or marking a pre-contract or arranging a great pre-contract condition, for not tendering on contracts that harbour higher risks as seen by Flanagan and Norman (1993) in their led study.

2.4.2.3.3 Transferring risk

As the name means; this risk reaction practice utilizes the exchange of risk starting with one management group then onto the next or from one anticipate to the next. The presentation of insurance premiums in construction projects are helpful, be that as it may, it doesn't release all the recognized risks of the task however covers a segment of risks (Tummala and Burchett, 1999). In addition, Tummala and Burchett (1999) additionally demonstrated that the exchange of risk basically should be possible in two different ways: exchanging the risk from the capable element for by procuring sub-contractual worker on the hazardous projects; and maintenance of the property or action however exchanging the money related risk through surety and insurance packages.

2.4.2.3.4 Sharing risk

There are circumstances in which the primary players consent to share the risk included, utilizing legally binding instrument. In such examples, parties grasp and handle risk they are OK with or they believe is within their capacities. Risk sharing duties change legally (Nicholas, 2004), and are as per the following:

1. Fixed-value: Risk duty is principally on the contractor.
2. Fixed-cost with impetus fee: Risk duty is part with the contractual worker having the most noteworthy of 60% and the customer taking the rest.
3. Cost plus motivating force: Risk obligation is imparted to the contractual worker having the less duty of up to 40% and the customer having the greatest offer of up to 60%.
4. Cost plus fixed fee: Risk duty is put altogether on the customer/client.

2.4.2.4 Retaining risk

This risk reaction practice includes an inner management instrument diverted at lessening controlling risk (Zhi, 1995). Akintoyne and MacLeod (1997) recommended that, it is helpful while maintaining a strategic distance from the risk been taken care of by a specific organization is incomprehensible, there may be a little or immaterial monetary misfortune and the likelihood of its events are unimportant, making it uneconomical to exchange. Akintoyne and MacLeod (1997) clarified that the predictable or unforeseeable risks are financed and controlled by the contractor or organization and there are two strategies formulated to hold risk in construction projects. An aloof maintenance strategy takes place when the contractor carrying out the work borne every one of the risks which may happen through obliviousness, carelessness, or nonattendance of choice. Passive retention technique is nonguaranteed.

Akintoyne and MacLeod (1997) additionally demonstrated that a self-protection is a consider management system formulated to deal with risks after making an intensive investigation of the reasonable misfortunes to be experienced and discovering elective techniques. Agyakwa-Baah (2007), recognized that risks are generally taken care of by construction organizations by adding a possibility of 10% to the cost of the venture cost to address any risk. In addition, the significance of the business is found in its commitment to GDP and the rate designated to construction works in the national spending plan of Ghana (Agyakwa-Baah et al., 2010).

Akoi-Gyebe (2009), likewise noticed the commitment of the construction business running from the immediate importation of building materials and parts to supplemental household generation and to the utilization of plan and usage aptitude gave by outside advisors and temporary workers. Akoi-Gyebe (2009) recognized

different regions of commitment which were inside street transportation, as it was the generally accessible type of transport in Ghana: it conveys more than 97% of all traveller and cargo movement. Aside connecting rural generation regions with neighbourhood, provincial and national markets, street transportation interfaces every single significant city, towns and towns. There has been plenteous directing of assets into the street part in ongoing time by Governments with the objective of keeping up or enhancing the condition of the streets. Risk possibilities are a consequence of past encounters hid inside the offering procedure, as per Mills (2001), and additionally expounds that possibilities ensure the contractor's interests if a risk happens.

In the construction business, the basic utilization of possibility entireties to manage risk is probably not going to support more powerful management of projects, nor to prompt more noteworthy proficiency. Or maybe there ought to be a more complete comprehension of the idea of risks they experience, their odds of event and effect on a stakeholder's association.

2.4.2.5 Risk Monitoring

Keeping an eye on identifiable risks and new risks and additionally observing of leftover risks are normal as the venture advances. This phase of the management procedure guarantees that usage of risk calendar and assessment how to lessen it and extraordinary reports arranged frequently to learn the likelihood of new risks and approaches to deal with them. This is an existence time cycle and in addition the venture is existent and chiefs in enterprises, as per Kremljak (2010), ought to have a total information on future occasions by giving emergency courses of action in view

of the framework being referred to objective Kremljak (2010). In the creating construction areas, this wonder is normal and test instruments ought to be endeavoured to bring worthy arrangements.

Numerous exploration works have been done on risk management rehearses in construction industry; a typical likeness among every one of the investigations is the critical result of risks affecting the conveyance of a construction project. Chen et al., (2004) recognized 15 chance factors on the premise cost of a venture. Chen et al., (2004) discovered acceleration of material cost and mistaken spending plan as the exceptionally positioned chance occasions. Shen (1997) examine additionally uncovered eight noteworthy risk occasions representing delay in construction projects utilizing construction experts as respondents. Shen (1997) likewise recommended that, the most vital as of risk is the capacity to treat it and continually screen how measures are been affected.

Cap et al., (2004) additionally directed an investigation in an examination with the point of distinguishing factors influencing security measurement of construction execution, the examination likewise uncovered management and undertaking supervisor's failure to make the consciousness of safety on building locales, absence of limit building workshops and administrators' unwillingness to infuse assets in wellbeing related issues. Different investigations have been done on chance management on periods of an undertaking to learn the overarching risk factors and their impacts on the venture destinations.

Uher and Toakley (1999) additionally contemplated on the social and social issues influencing the execution of risk management rehearses on a task life cycle, it was found that, there is generally okay at the reasonable period of the venture. What's more, as indicated by Abdou (1996), grouped risks in construction under budgetary, time,

outline stage, legally binding, hierarchical and the construction itself. The implication venture in attempted risk management practice is chance orders which include organizing differing risks factors influencing a construction venture. Perry and Hayes (1985) exhibited a basic approach in overseeing risks viably and separated them as far as risks retainable by the three fundamental gatherings to the venture, accordingly the customer, contractual worker and specialist. They consolidated a general approach sponsored by a framework demonstrating the levels of the work.

A few analysts characterized risks under four principle classes; industry, customer, venture and the undertaking condition (Chapman (2001). While Shen (2001) likewise assembled it under market, political, institutional arrangements, management, lawful and monetary.

2.5 RISK FACTORS IN GHANA

Outer and inside components could be owing to chance in the construction business. These variables drive the venture and ought to be viewed as a key getting ready for the task. Ayirebi-Dansoh (2005) placed that, Ghanaian Construction Companies are experiencing arrangement of difficulties as it is stood up to with rivalry from both outside and neighbourhood firms, political obstruction and hard monetary condition.

Ahmed et al., (2007) built up in their examination that, there is a relationship on the obtainment approach and financial circumstance of the undertaking. On comparable examinations, Gunderman and Applegate (2005) prescribed that, organizations ought to build up their ability by striking a harmony between the open doors that stand up to them and the conceivable negative outcomes of risk and the capacity to attempt such exercise puts the firm in a higher platform to touch base at a worthy conclusion.

2.5.1 External components of Risk in Ghana

2.5.1.1 Financial Risk Factors

Monetary disappointment and deferral in instalments in construction projects represents a noteworthy risk. Berko (2007) expressed that, around 70% of framework projects done in Ghana are not subsidized by the Government of Ghana but rather from outside associations and nations. Contractual workers are continually whining of deferral in instalment due to the loosening up bureaucratic framework in legislative divisions and organizations. In addition, when these outside associations and organizations delay in the arrival of the required assets, the advance of the undertakings are backed off (Berko, 2007).

2.5.1.2 Economic Risk Factors

Poor money related markets, expansion and value climbing are among of the factors related with financial risk drivers which has an immediate outcome on projects“ overwhelming (Agyakwa-Baah, 2007; Denini, 2009). Money insecurity may bring about cost overwhelms chiefly on account of expansion. Edwards and Bowen (1998), recognized financial risks in

Ghana as trade rates, material supply, work supply, monetary strategies and expansion. Frimpong et al. (2003) included that, the ascent in expansion ought to likewise be considered in risk contemplates.

2.5.1.3 Government

In creating nations like Ghana, Road projects are politically spurred and seen by numerous as increases to fulfil open request. Numerous streets are left helpless before legislators and as indicated by Agyakwa-Baah (2009), it is a definitive objective of government to lead and quick track framework venture the general public and besides, the execution of the legislature is evaluated in the creating nations by formative activities. This makes pointless weight on government to begin something which will be ended in light of the fact that it isn't obliged in the government's spending plan.

It was contended by De la Cruz et al. (2006) that, triumphant political scores prompt spontaneous framework improvement which does not have the important subsidizing and required coordination of such projects.

2.5.1.4 Environmental Risk Factors

These risks related with the regular habitat needs to do with the climate and this factor is not really involvement in Ghana, for example, brutal climate condition like tropical storm or tornados however the two occasional changes are witness in Ghana, for example, the wet and dry season seasons. De la Cruz et al. (2006) opined that, whenever chance components are to be considered, occasions, for example, the states of the ground and likely contaminants and site conditions ought to be notes and in addition time limitations forced on the task by the customer.

2.5.1.5 Technical Risk Factors

In an investigation directed by Ofori (1994), there was the specify of innovative improvement in Ghana requiring speculation, sound monetary condition, a physical

foundation, top management support and help. In any case, it is hard to credit these components to the construction division in creating nations including Ghana. Also, specialized inadequacy of architects has come about to incorrect outline points of interest or the freshness of chipping away at complex projects and risk inclined tasks. Also,

Oladapo (2007) recognized that, varieties are extremely significant in construction activities and its impact is inescapable on venture destinations, for example, time and cost. To give a basic comprehension of varieties, Baxendale and Schofield (1986) said the expansion or subtractions made to the extent of the undertaking add up to variety.

2.6 INTERNAL RISK FACTORS IN GHANA

Lacking and broken Plants and gear have been proposed to be a compelling issue in construction firms, albeit nearby temporary workers for the most part utilize works for their works (Berko, 2007). In addition, materials deficiency, imperfect materials inaccessibility of the required abilities and the wretched execution of work and in addition the absence of specialized mastery to work plant and hardware have additionally been distinguished as risk most neighbourhood contractual workers are encountering inside (Berko, 2007; Agyakwa-Baah, 2009)

2.6.1 Project team relations and correspondence

Collaboration, correspondence and positive human progression are entwined because of their endeavours in risk management on an undertaking and their effect on the venture objectives. Also, the insufficient stream of data among venture partners is a prosecution on the strength of the undertaking. Prior Lester (2007), watched that inside

the undertaking condition, various types of connections are set up, for example, sincere or forceful from the partners which ought to be overseen in an expert way to offsite its appalling impact on the venture. Correspondence and collaboration are extremely basic and ought to be embraced by the facilitator of the task in light of the fact that the record that even represent the undertaking is a type of correspondence and such has a direction on the venture. Santoso et al. (2003) assessed 130 risk factors and found that, correspondence is the very positioned factor and has a normal effect and likelihood of happening.

2.7 IMPACT OF RISK MANAGEMENT ON PROJECTS

Project risk can be of benefit or challenge to a project. Too much contingency is uncompetitive is uncompetitive, less contingency increases the chance of failure. Risk management or allowing for floats within budgets aids in setting risk levels, with the preferred level of risk, and gives confidence level of project (Flanagan et al., 2006)

Many a time, risk is set at task level, and it is a normal practice to allow for some contingency to every project. The allowance may even be a definite quantity 10% for example. Normally it is advantageous to set the contingency at project level. Also using the ranges of the task estimates to appreciate what contingency should be set for the project in general; this shows the reality that while some task may be delayed, some may be completed on time and others may be completed earlier than expected (Cavignac, 2009).

Besides, setting the right level of contingency, risk management also affects the project team by offering a platform to express concern and also for backing or supporting assumptions. Doing away with restrictions of working with base estimates allows team

members to give honest and open opinions concerning impending results (Eskesen, 2004). Risk management workshop is an essential platform for project team members to come together and share ideas, but is often ignored. It can result to deliberating and clarification of the scheme of the project activities and overlooked works are often noticed. The workshop creates awareness of the project status to the whole project team. It is crucial for the project groups to consult with each other even though there are separate cost and schedules for each group. A risk management workshop can unite these disciplines (Dey, 2011).

Risk management also ensures risk alleviation and response techniques. Cost verses benefit analysis can be used to see the relationship between risk mitigation techniques and appreciate how to effectively spend the money. Upon including the response implementing cost in the comparison, the net effect of the response on the cost of project. Whether there is an increase in cost and whether the increase can signify the time its saves is what is used to judge the response. Managing risk mitigation techniques enables us to completely appreciate their effects (Smith, 2006).

Another benefit of risk management is that, it ensures that contracts are fully negotiated, tenders to be submitted at the best price and contingencies appreciated. In a nut shell, risk management means the project is better known, can be well planned and more profitable (Chapman, 2003).

Risk management increases profitability. Construction contracts can be chosen and priced at the correct level of risk, also with the project managed with full understanding of the risk. Negotiation can be done on specific risks to clarify who bears these risks and then they can be added to the contracts (Adams, 2008).

Understanding and budgeting cost commitments- taken into account risk. Management of risk can produce curves for cost commitment at ideal levels of confidence (Raz, 2002).

Also, estimates of revenue can be represented as ranges, so that revenue pipelines can be understood as well as profit projection (Smith, 2006).

Besides the above benefits, projects can also benefit from risk management by making better decisions based on accurate information. With the best knowledge of the future, projects can benefit from realistic projection and an appreciation of sensitivity (Oracle white paper, 2009).

2.8 CHAPTER SUMMARY

This section took a gander at the explored writing on how risk and uncertainty, how the undertaking management forms are influenced by chance and the risk management, practices and strategies utilized in the construction business.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 INTRODUCTION

The steps used in the gathering of data for the purpose of this study are discussed in this chapter. The research design, the strategy, population and the sample size used are detailed out in this chapter. The tools which were made used of and the methodology are detailed out. In other to achieve the aim and objectives of this study, two methods were used. First of all, all relevant literature relating to this topic or study were collected through journals, articles, books and the web. Secondly, structured questionnaires were sent to targeted population for their response to be collected and analysed.

3.2 RESEARCH STRATEGY

According to Bouma and Atkinson (1995) research strategy involves an appropriate methodology used to address the relevant research questions and hypothesis of a research work. Quantitative and qualitative research strategies are the two main types for research strategy (Kothari, 2004). He further postulated that the choice of quantitative or qualitative approach for a study is based on the research aim and objectives including the available related information.

Berg (2001) also in a study argued that qualitative research addresses the means of understanding theories related to the society by focusing on the relationship between the area of study and the particular researcher. He went on further argued to argue that qualitative research is subject to the views of the society through observations, explanations and making assumptions out of a concept.

Creswell (1994) also said quantitative research is a measurable investigation of worldwide issues by conducting tests on theories and hypothesis to ascertain the validity and viability of the theories. Bouma and Atkinson (1995) also postulated that it is advantageous to use quantitative research if the study seeks to achieve reliability, impartiality and real world like features. Quantitative research is represented with numerals and analysed with statistical tools (Burns and Grove, 2001).

In this study, a survey strategy was used. It is largely quantitative research.

3.3 RESEARCH DESIGN

A research design deals with the procedures for a scientific investigation. The procedure for designing a research involves a scheme to serve as a guidance for gathering and analysing data (Polit and Hungler, 1985).

The main instrument for gathering information for the purpose of statistics with regard to the related topic is the questionnaire. Questionnaires can become a crucial research instrument through which opinions can be made concerning a particular group of people or a population at large when it is effectively designed and administered (Berg, 2001).

In the questionnaire design for this study, the objectives for this study were initially identified. The purpose of which is to aid in framing the questions that will be relevant to this study. The questions were brief and concise to enable the respondents answer them without any difficulties.

3.4 RESEARCH POPULATION

In terms of statistics, population can be defined as units with a probability to be involved in a survey sample for a study. These units can be a group of people, members of a set or employees (Groves et al., 2009). For the purpose of this research work, the target population is an appreciable number of D1K1 building contractors that are registered with the Ministry of water resources, works and housing and located within Accra, Tamale and Kumasi. These categories were chosen because of their immense organizational culture with high financial and technical capacity for execution of large demanding projects. The data collected from the ministry indicates Sixty (60) of such contractors.

3.5 SAMPLE SIZE

Sampling was defined by Wood and Haber (1998) as the procedure used to select representative units of a target population for a study for the purposes of a research work. It is done to obtain scientific knowledge from the selected samples. The process of sampling aids in addressing issues in research works of scientific nature (Wood and Haber, 1998).

Burns and Grove (1987) postulated that normally, at least a sample size of 30 units or subjects is acceptable but again they argued that 30 units are inadequate to be used as a sample size in most research works (Burns and Grove, 1987).

With regard to this study, the sample size was determined using statistical calculations. The Creative Research System (2005) formula was used in this study to arrive at the sample size. This is shown below:

$$SS = \frac{Z^2 \times P \times (1 - P)}{C^2}$$

Where SS = sample size

Z= Z value (e.g. 1.96% for 95% confidence interval)

P= Percentage picking a choice, expressed as a decimal, (0.50 used for sample size needed).

C= Confidence interval (0.05)

$$SS = \frac{1.96^2 \times 0.5 \times (1-0.5)}{0.05^2} = 384$$

Correction for finite population

$$SS_{New} = \frac{SS}{1 + \frac{SS-1}{pop}}$$

Where *pop* is the population = 60

$$SS_{New} = \frac{384}{1 + \frac{384-1}{60}}$$

= 52

Therefore 52 questionnaires were sent out to the field.

3.6 SAMPLING METHOD

Sampling proves to give practical ways of making sure that data collecting and processing features of a research are undertaken while ensuring that the sample is a perfect picture of the population (Fellows and Liu, 1997).

For the purpose of this study, the sampling technique employed for the study was purposive sampling technique. A pre-determined criterion was set that has to do with level of experience management professional in firms and involvement in risk management was employed to select respondents for the study. A compilation of

contractors was made by identifying live projects done by D1K1 firms with samples chosen from the stratum of target population of the live projects.

3.7 RESEARCH LIMITATION

This investigation was centred around just building development ventures without considering common works and other master works in view of the restricted time and assets. Likewise, it is restricted to just D1K1 building contractual workers therefore one must be cautious in generalizing the findings of the study to other contractual workers other than D1K1 or the entire country.

3.8 DESIGN OF THE QUESTIONNAIRE

In order to get the views of contractors regarding risk factors questionnaires were designed for the survey. Fifty- two (52) questionnaires were administered to the various firms with an appropriate cover letter.

Below are the four sections the questionnaire used to satisfy the aim of study.

1. Respondents' demographic profile.
2. Prevalence risk on sites.
3. Effects of risk on construction.
4. Strategies for the management of risk on construction sites.

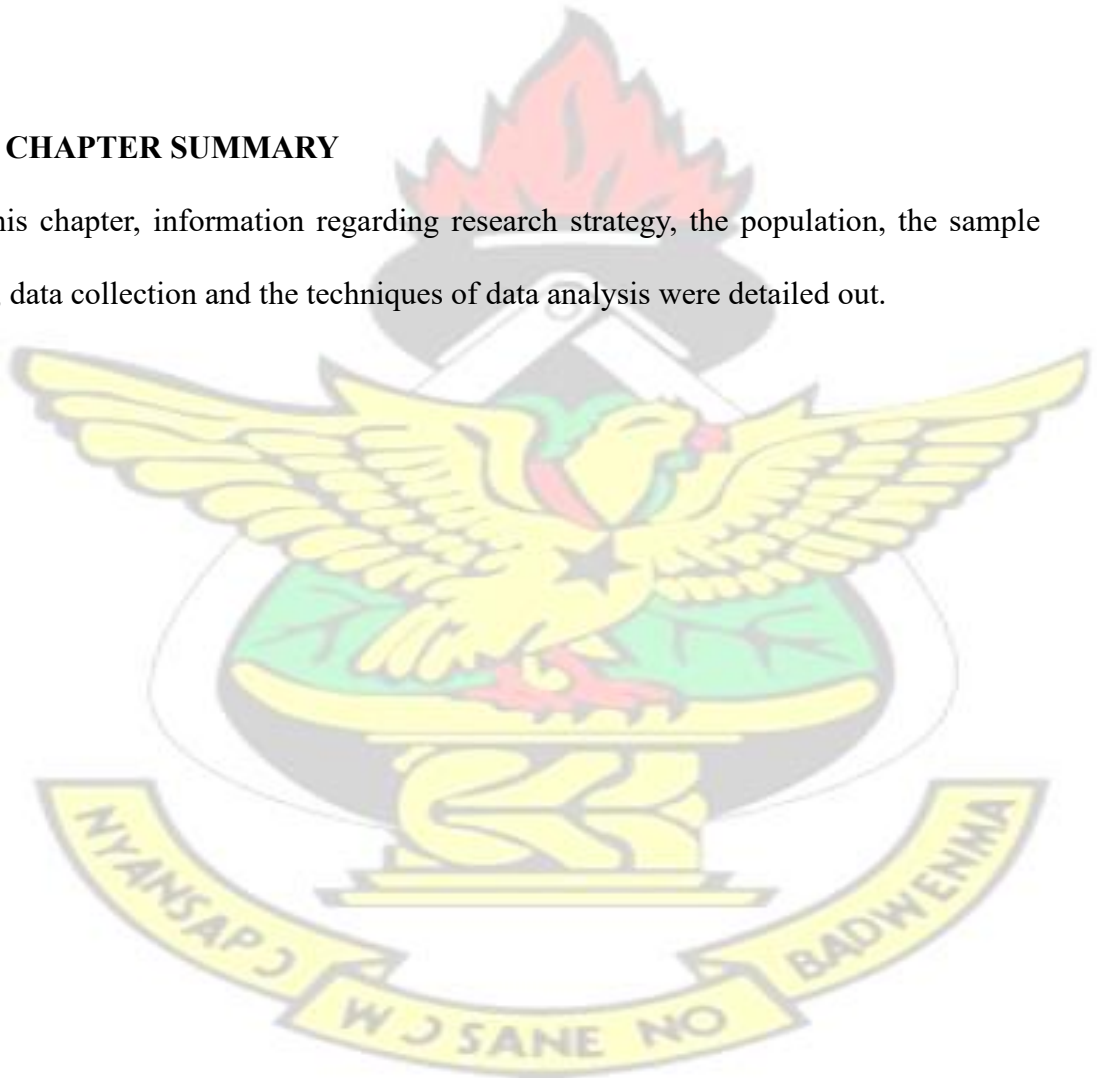
3.9 COLLECTION OF DATA

Data collection is simply a way of gathering proof. Data is used to reinforce arguments in a scientific educational research. It serves as the basis for all research works (Singh,

2006). The data is what guides the author towards achieving his aim. For the purpose of this research, the data was collected using close ended questionnaires. The questionnaires were delivered to the respondents in person and retrieved in the same manner. Microsoft Excel and SPSS were used in this study to analyse the collected data. Descriptive statistic was used to analyse the results in percentages and figures. The importance of the risk factors and management practices were determined using the Relative Importance Index (RII) and ranked accordingly.

3.10 CHAPTER SUMMARY

In this chapter, information regarding research strategy, the population, the sample size, data collection and the techniques of data analysis were detailed out.



CHAPTER FOUR

DATA ANALYSIS AND DISCUSSION OF RESULTS

4.1 INTRODUCTION

This chapter of the thesis is dedicated to the discussion and analysis of the results that were obtained from the field survey. The data were collected using closed-ended questionnaires. The questionnaire which was distributed had two sections, the first part dealt with the respondents' profile while the second part strategically considered all the research objectives of the study. The software used for the analysis were the Statistical Packages for Social Sciences windows version 23 and Microsoft Excel, 2013. The tools of analysis adopted in this study are Relative Importance Index and Mean Score Rankings.

4.2 SURVEY RESPONSES

After sending 52 questionnaires out, 41 of them were retrieved representing a response rate of 68.33%. This response rate was considered as adequate for further analysis when it was likened to the response rate of Owusu-Manu and Badu (2009) who recorded a response rate of 53.7% and Ahadzie (2007) who also recorded a response rate of 45%. Moreover, Baruch (1999) purported that a response rate of approximately 35% is satisfactorily for most academic studies. Also, Fields (2005) reported that a minimum response rate of thirty (30) is good for further analysis. Hence, the response rate of 68.33% is enough for it to be considered for further analysis.

4.3 RESPONDENT'S PROFILE

The main purpose of this chapter is to authenticate the responses of the survey. The respondents profile goes a long way to help the researcher understand the background

of his/her respondents. Such information is very vital to enable the researcher to understand whether the respondents have adequate knowledge or expertise in the area being researched or studied on. Though the population is set, the respondent's profile helps the researcher to see if there are some unqualified respondents not suitable for the study or likely making the response to be collected bias towards a particular group of people.

4.3.1 Current Organization

The respondents were asked to indicate their organisation. This will help us know the perspective from which each respondent responds to the survey. The responses are summarized in Table 4.1.

From table 4.1 below, it can be seen that majority of the respondents were from contracting firms representing 39% of the total questionnaire received while 29.3% were from Quantity surveying firms, the second highly ranked profession. 22% of the respondents were from Engineering firms while four respondents representing 9.8% were from Architectural firms. Since this study is to assess the risk management practices of Ghanaian Contractors, it turns out that majority of the respondents who were contractors or construction professionals, and are those who have adequate knowledge about the construction process.

Table 4.1: Organisation of Respondents

	Valid Returns	Percentage of Valid Returns
Architectural Firms	4	9.8%
Quantity Surveying Firms	12	29.3%
Contracting Firms	16	39%
Engineering Firms	9	22%
Total	41	100%

Source: Field survey, 2018

4.3.2 Position or Duty in this School

The respondents were asked to indicate their position. This will help us know the perspective from which each respondent responds to the survey. The responses are summarized in Table 4.2.

From table 4.2 below, it can be seen that majority of the respondents were in management representing 39% of the total questionnaire received while 29.3% were Senior managers, the second highly ranked profession. 22% of the respondents were site engineers while four respondents representing 9.8% were Directors.

Table 4.2: Respondents Position

	Valid Returns	Percentage of Valid Returns
Director	4	9.8%
Senior Management	12	29.3%
Management	16	39%
Site/Office Engineer	9	22%
Total	41	100%

Source: Field survey, 2018

4.3.3 Number of executed projects in the last 5 years

Experience is very paramount and necessary to be determined. The respondents' previous experience from previous projects will inform us of the validity of the data. The importance of this demographic variable affects the quality of data collected. For instance, obtaining results from a group of people who have lots of experience in an activity cannot be compared who are novice in that endeavour. Therefore, the number of projects recently executed is a crucial question to ask.

Table 4.3: Number of executed projects in the last 5 years

Number of executed projects	Valid Returns	Percentage of Valid Returns
10 Projects or less	5	12.2%
11-20 Projects	24	58.5%
20-30 Projects	12	29.3%
Total	41	100%

Source: Field survey, 2018

From table 4.3, it can be deduced that 12.2% of the respondents, representing 5 number of the respondents had less than 10 or less Projects. These groups are those who joined the construction industry not very long ago do not have much practical insight in the field. Also, a substantial number of the respondent (58.5%) had 11 – 20 Projects (24 in number). 12 in number of the respondents had 20 – 30 Projects.

4.3.4 Respondents Perception of risk in Ghana

Since this study is assessing the risk management practices of Ghanaian Contractors, it was imperative that the respondents of the study should at least give their view on the state of risk in the construction industry of Ghana. Therefore, a follow up question was asked to determine their views. The analysis of this question is summarized in table 4.4 blow.

Table 4.4: Respondents Perception of risk in Ghana

Perception of Risk	Valid Returns	Percentage of Valid Returns
very low	0	0%
low	0	0%
medium	4	9.8%
high	29	70.7%
very high	8	19.5%
Total	41	100%

Source: Field survey (2018)

From table 4.4, it can be deduced that the risk is perceived to be high. All the respondents agree to some degree, hence the degree of perception became clear, as 5 number of the respondents asserted that risk is on the average 70.7% of the respondents reported that it is high. 19.5% of the respondents also said that the risk is very high.

4.3.5 Can risk be eliminated?

The respondents were asked whether they think with some risk management techniques implemented in the construction industry of Ghana, the risk in the industry can be eliminated or at least reduced. They were required to answer yes or no and the results are summarized in table 4.5 below.

Table 4.5: Risk eliminated

Can risk be eliminated	Valid Returns	Percentage of Valid Returns
Yes	41	100%
No	0	0%
Total	41	100%

Source: Field survey (2018)

The results from table 4.5 above shows that all of the respondents think with some risk management techniques implemented in the construction industry of Ghana, the risk in the industry can be eliminated or at least reduced.

4.4 TO IDENTIFY THE PREVALENCE RISKS ON SITES

In order to achieve this objective, various risk factors identified from literature to examine the current challenges of construction in Ghana were used in the questionnaire. The respondents were asked to rank these variables on a scale of 5= Very prevalent 4= prevalent 3=moderately prevalent 2= Less prevalent 1= Not prevalent (See Appendix A). The weightings of each identified factor are used to

indicate the most prevalence factors. Table 4.6 gives the details of the identified risk factors that are prevalence to construction projects in Ghana based on the categorized risk as well as the individual risk.

Table 4.6: Identified risk factors

	Rank Category	Ranks factors in category	3	4	5
1	Physical	Poor safety procedures resulting into Accident Occurrence	7	30	4
		Supplies of defective materials	9	20	12
		Varied labour and equipment	9	20	12
2	Environmental	Acts of God	3	30	8
		Difficulty to access the site	11	20	10
		Adverse weather conditions	3	30	8
3	Design	Defective design (incorrect)	1	10	30
		Not coordinated design	7	30	4
		Inaccurate quantities	7	30	4
		Lack of consistency between bill of quantities, drawings and	3	30	8
		Rush design	3	30	4
		Awarding the design to unqualified designers	7	30	4
4	Logistics	Unavailable labour, materials and equipment	25	16	
		Undefined scope of working	12	28	1
		High competition in bids	4	29	8
		Inaccurate project program	30	11	
		Poor communications between the home and field offices	7	24	10
5	Financial	Inflation		11	30
		Delayed payments on contract		12	29
		Financial failure of the contractor	3	30	8
		Unmanaged cash flow	2	12	27
		Exchange rate fluctuation	10	29	2
		Monopolizing of materials due to closure and other unexpected	12	29	
6	Legal	Difficulty to get permits	18	15	8
		Ambiguity of work legislations	19	13	9

Identified risks cont'd

	<i>Risk Category</i>	<i>Factors</i>	Weight		
6	Legal	Legal disputes during the construction phase among the stakeholders	3	30	4
		Delayed disputes resolutions	7	30	4
		No specialized arbitrators to help settle fast	25	16	
7	Construction	Rush bidding	11	20	10
		Gaps between the Implementation and the specifications due to misunderstanding of drawings	3	30	8
		Undocumented change orders	1	10	30
		Lower quality of work.	7	30	4
		Changes in design	7	30	4
		Difference in actual and contract executed quantities	3	30	8
8	Political	Change of government	3	30	4
		Change of government policy	7	30	4
		New governmental acts or legislations	25	16	
9	Management	Ambiguous planning due to project complexity	12	28	1
		Resource management	4	29	8
		Changes in management ways	30	11	
		Information unavailability (include uncertainty)	7	24	10
		Poor communication between parties involved	9	20	12

Source: Field survey (2018)

4.4.1 Findings

Considering table 4.6 above it can be deduced that after sending 60 questionnaires out and retrieving 41 of them, all of the respondents agreed that the identified risk factors are prevalent in the construction industry of Ghana despite that they are project or organisational dependent. This is evident in the fact that all responses are between the scale of 3 – 5.

Considering the weightings of each risk factor under the various categories, the Financial risk category has the highest aggregate weightings. This indicates that financial risk has more effect on projects.

The Legal risk category on the other hand has a less aggregate affirmative response which reflect the fact that it is the least identified risk category that typically affect projects in Ghana.

Discussion on the Category of risks

Contingent upon the idea of risk, Researchers through the distinguishing proof process have found and grouped into various sorts. Such grouping incorporates Contractual/legitimate, Construction, Political, Management, Physical, Environmental, plan, Financial, Common risks, Safety and Delay risk (Mustafa, 1991; Akincl et al., 1998; Dey, 2002; Ghosh et al., 2004; Wigunaand Scott, 2005; Enshasi and Mosa, 2008; Wang et al., 2010; Razakhani, 2012; Goh et al., 2013 referred to in Renuka et al., 2014).

The main six classes identified with hazard factors were outer, materials, work and gear, plan, money related, and management. An audit of the writing with respect to this categorisation offers the accompanying clarifications and how they influence extends.

4.5 THE EFFECTS OF RISKS ON CONSTRUCTION

This section reports on the effect of risk on construction projects in Ghana. Mean Score Ranking (MSR) and Relative Importance Index (RII) would be adopted for this study. Adopting the Likert Scale, the respondents were engaged to answer the questionnaires based on their experience and involvement in construction projects. Here again respondents were engaged to indicate on a scale of 1 – 5 the extent of agreement to the identified variables.

4.5.1 Findings

The significance level was set at 95% before analysing the data. Also, based on the five-point Likert scale rating, a success criterion deemed significant if it had a mean of 3.5 or more. Where two or more criteria have the same mean, the one with the lowest standard deviation assigned the highest significance ranking (Ahadzie, 2007). According to Ahadzie (2007), the standard error is the standard deviation of sample means as well as a measure of how likely a sample represents the population. Hence, a large standard error (relative to the sample mean) suggests that there is a lot of variability between means of different samples. A small standard error suggests that most sample means are similar to the population mean; therefore, the sample is likely to be an accurate reflection of the population (Ahadzie, 2007; Field, 2005). The standard error associated with all the means is relatively close to zero suggesting that the sample chosen is an accurate reflection of the population.

From table 4.7, it can be deduced that the respondents ranked the various effects of risk on construction in Ghana and after analysis, enables making better decisions based

on accurate information was ranked first with an RII of 0.883, mean of 4.25 and standard deviation of 0.863. Risks enables contracts to be fairly negotiated, bids to be submitted at the right price, and sensitivity to be appreciated was the second ranked variable with an RII of 0.834, mean of 4.17 and standard deviation of 0.907. Clarification of the scope of project tasks, and missing work is often identified was ranked third with an RII of 0.829, mean of 4.15 and standard deviation of 0.825. The fourth ranked variable from table 4.7 is Estimates of revenue can be represented as ranges, so that revenue pipelines can be understood as well as profit projection, which came fourth with an RII of 0.805, mean of 4.10 and standard deviation of 1.328. With 0.790 RII, 0.846 standard deviation and 4.10 mean, Risks leads to the Variation of construction program came 5th on the effects of risk on construction. Risks can lead to cost overrun was the 6th ranked variable on the effects of risk on construction projects in Ghana. It came 6th with an RII of 0.776, mean of 3.98 and standard deviation of 1.082.

From the Table 4.7, risk ensures setting the right level of contingency, Understanding and budgeting cost commitments- taken into account risk, Risks also enable risk response and mitigation strategies to be expressed and It creates a forum for expressing concerns and for challenging or defending assumptions were ranked 7th, 8th, 9th and 10th respectively.

Table 4.7: The Effects of Risks on Construction

	N	Sum	Mean	Std. Error	Std. Dev.	RII	Rank
It enables making better decisions based on accurate information	41	181	4.25	.125	.863	0.883	1st

Risks enables contracts to be fairly negotiated, bids to be submitted at the right price, and sensitivity to be appreciated.	41	171	4.17	.131	.907	0.834	2nd
Clarification of the scope of project tasks, and missing work is often identified.	41	170	4.15	.119	.825	0.829	3rd
Estimates of revenue can be represented as ranges, so that revenue pipelines can be understood as well as profit projection	41	165	4.10	.625	1.328	0.805	4th
Risks leads to the Variation of construction program	41	162	4.08	.122	.846	0.79	5th
Risks can lead to cost overrun	41	159	3.98	.156	1.082	0.776	6th
It ensures setting the right level of contingency	41	154	3.88	.121	.841	0.751	7th
Understanding and budgeting cost commitments- taken into account risk	41	150	3.85	.126	.875	0.732	8th
Risks also enable risk response and mitigation strategies to be expressed.	41	146	3.79	.126	.874	0.712	9th
It creates a forum for expressing concerns and for challenging or defending assumptions.	41	134	3.27	.148	1.026	0.654	10th

Source: Field survey (2018)

4.5.2 Discussions

4.5.2.1 It enables making better decisions based on accurate information Cost verses benefit analysis can be used to see the relationship between risk mitigation techniques and appreciate how to effectively spend the money. Upon including the response implementing cost in the comparison, the net effect of the response on the

cost of project. Whether there is an increase in cost and whether the increase can signify the time it saves is what is used to judge the response.

Managing risk mitigation techniques enables us to completely appreciate their effects (Smith, 2006).

4.5.2.2 Risks enables contracts to be fairly negotiated, bids to be submitted at the right price, and sensitivity to be appreciated

Risk ensures that contracts are fully negotiated, tenders to be submitted at the best price and contingencies appreciated. In a nut shell, risk management means the project is better known, can be well planned and more profitable (Chapman, 2003). Construction contracts can be chosen and priced at the correct level of risk, also with the project managed with full understanding of the risk. Negotiation can be done on specific risks to clarify who bears these risks and then they can be added to the contracts (Adams, 2008)

4.5.2.3 Clarification of the scope of project tasks, and missing work is often identified.

Risk also affects the project team by offering a platform to express concern and also for backing or supporting assumptions. Doing away with restrictions of working with base estimates allows team members to give honest and open opinions concerning impending results (Eskesen, 2004). Risk management workshop is an essential platform for project team members to come together and share ideas, but is often ignored. It can result to deliberating and clarification of the scheme of the project activities and overlooked works are often noticed. The workshop creates awareness of the project status to the whole project team. It is crucial for the project groups to consult

with each other even though there are separate cost and schedules for each group. A risk management workshop can unite these disciplines (Dey, 2011).

4.5.3 Generally, on the rest of the variables

Many a time, risk is set at task level, and it is a normal practice to allow for some contingency to every project. The allowance may even be a definite quantity 10% for example. Normally it is advantageous to set the contingency at project level. Also using the ranges of the task estimates to appreciate what contingency should be set for the project in general; this shows the reality that while some task may be delayed, some may be completed on time and others may be completed earlier than expected (Cavignac, 2009). Too much contingency is uncompetitive, less contingency increases the chance of failure. Risk management or allowing for floats within budgets aids in setting risk levels, with the preferred level of risk, and gives confidence level of project (Flanagan et al., 2006)

4.6 STRATEGIES FOR THE MANAGEMENT OF RISK ON CONSTRUCTION SITES

In order to achieve this objective, various variables identified from literature to be some of the strategies for the management of risk on construction sites were used in the questionnaire. The respondents were asked to rank these variables on a scale of 1= Strongly disagree 2= Disagree 3= Moderately 4 = Agree 5= Strongly Agree. The mean, standard deviation, and RII for each variable is shown below in Table 4.8.

From table 4.8, it can be deduced that the respondents ranked the various strategies for eliminating risk on construction in Ghana and after analysis, referring to previous and ongoing similar projects for accurate was ranked first with an RII of 0.883, mean of

4.25 and standard deviation of 0.863. Producing a proper schedule by getting updated project information was the second ranked variable with an RII of 0.834, mean of 4.17 and standard deviation of 0.907. Depending on subjective judgment to produce a proper program was ranked third with an RII of 0.829, mean of 4.15 and standard deviation of 0.825. The fourth ranked variable from table 4.7 is Planning alternative methods as stand-by, which came fourth with an RII of 0.805, mean of 4.10 and standard deviation of 1.328. With 0.790 RII, 0.846 standard deviation and 4.10 mean, consciously adjust for bias risk premium to time estimation came 5th on the strategies of risk elimination on construction projects. Transfer or share risk to/with other parties was the 6th ranked variable on the strategies of risk elimination on construction projects in Ghana. It came 6th with an RII of 0.776, mean of 3.98 and standard deviation of 1.082.

Table 4.8 Strategies for the management of risk on construction sites

	iptive N	S Sum	Mean	Std. Error	Std. Dev.	RII	Rank
Refer to previous and ongoing similar projects for accurate.	41	181	4.25	.125	.863	0.883	1st
Produce a proper schedule by getting updated project information.	41	171	4.17	.131	.907	0.834	2nd
Depend on subjective judgment to produce a proper program.	41	170	4.15	.119	.825	0.829	3rd
Plan alternative methods as stand-by.	41	165	4.10	.625	0.828	0.805	4th

Consciously adjust for bias risk premium to time estimation.	41	162	4.08	.122	.846	0.79	5th
Transfer or share risk to/with other parties.	41	159	3.98	.156	1.082	0.776	6th
Utilize quantitative risk analyses techniques for accurate time.	41	154	3.88	.121	.841	0.751	7th

Source: Field survey (2018)

4.6.2 Discussions

4.6.2.1 Refer to previous and ongoing similar projects for accuracy.

Evaluating the distinguished risks is the fundamental rule of hazard examination. Hazard investigation are finished by surveying esteems on the impact chance have on time and cost. The financial procedures or parameters of their particular impacts could be investigated and three summed up sorts of hazard treatment can be connected: that is, exchange, staying away from or diminishing and tolerating or holding hazard (Education and Learning Wales, 2002). Flanagan and Norman (1993), opined that the probable circumstances if a task is ended or does not take after the underlying arrangement, the utilization of hazard investigation becomes possibly the most important factor. There will be clearer vision of the risks when dynamic personalities are connected to the best accessible information in a deliberate and organized route as opposed to the accomplishment it would have picked up by instinct alone.

4.6.2.2 Produce a proper schedule by getting updated project information.

Assessment of risks and communicating of risks are additionally basic to hazard and it surveys the potential outcomes on the undertaking (PMI, 1996). In spite of the fact that, it is muddled in nature however it isn't constrained various groupings or variables

including: Threats and openings can associate in a startling route, for instance, booking deferrals may compel receiving new methodologies which lessens the term of the general undertaking. As per an investigation led by Bender and Ayyub (2001), the utilization of scientific procedures secure undertaking supervisors control cost however some finished depend on these methods making bogus impression of dependability and accuracy. These procedures are utilized all through the entire life expectancy of the venture and above all the experience of construction specialists all through the construction venture.

4.6.2.3 Depend on subjective judgment to produce a proper program.

A theory led in 1995 by Isaac characterized the principle constituents of hazard recognizable proof as a strategy used to fill in as a guide on what those risks should look like when recorded to create risks (Isaac, 1995). In each venture there are inside and remotely by and large risks and it is the target of hazard distinguishing proof to address these two components. The components or things that can be impacted by the venture group, be it fetched estimation and staff assignments, are inward risks. In any case, there are a few things past the impact and control of the venture group, run of the mill illustration is the activities of government. In each undertaking setting, hazard distinguishing proof isn't just worried about positive results or openings yet in addition the negative results or risks (PMI, 1996).

4.6.3 Generally, on the rest of the variables

In construction venture management, management of hazard is a necessary of the decision-making channel (Tang et al., 2007). Hazard management (RM) enhances the future prospects of a venture as it distinguishes vulnerabilities and probabilities

(Borge, 2001). It is characterized as a fundamental procedure by which all undertaking related risks are distinguished and assessed by measuring them, with a specific end goal to take a cool-headed choice in dealing with the risk (Zou et al., 2007).

As indicated by Walker (2000), Construction venture management is characterized as:

"The arranging, co-appointment and control of a task from origination to finishing (counting authorizing) in the interest of a customer requiring the ID of the customers' targets as far as utility, work, quality, time and cost, and the foundation of connections between assets, coordinating, checking and controlling the supporters of the undertaking and their yields, and assessing and choosing options in quest for the customer's fulfilment with the venture results." The Institute of Risk Management (IRM) states that hazard management (RM) is a quickly creating discipline with no unmistakable perspectives or agreement on what is associated with chance. The IRM recognizes chance as having two measurements: positive and negative. Positive risks could affect the achievement of an undertaking, and negative risks are related with the conceivable disappointments of a venture (IRM, 2002).

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 INTRODUCTION

This study was conducted to explore the construction project risk factors and their effects on construction projects in Ghana. It was strategically composed of five main chapters which beautifully explicate the study.

5.2 SUMMARY OF FINDINGS

5.2.1 Identify risk factors that typically affect construction projects in Ghana For this objective to be attained to help us in fulfilling the aim of the study, several pertinent and detailed literatures were obtained and reviewed to understand what is being discussed in literature concerning the risk factors affecting construction projects in Ghana. In obtaining the purpose of this objective, respondents were asked to determine the prevalence of the identified risk factors affecting construction projects in Ghana from literature. With 5= Very prevalent 4= prevalent 3= Moderately prevalent 2= Less prevalent 1= Not prevalent, the questionnaires were answered by the respondents. After analysis, all the listed risk factors have been identified to significantly affect construction projects in Ghana.

5.2.2 Assess the effect of the identified risks on projects

For the second objective to be achieved, important literature relating to the effect of risk on construction projects in Ghana were obtained, studied and reviewed, and the most salient ones were identified and taken. The prominent variables under the effect of risk on construction projects were categorically grouped into a close-ended questionnaire which the respondents were entreated to answer. With 1= Strongly

disagree 2= Disagree 3= Moderately 4 = Agree 5= Strongly Agree the respondents answered the questionnaires. After analysing the data, it was deduced that the effects of risk on construction projects were mostly positives such as it enables making better decisions based on accurate information, enables contracts to be fairly negotiated, bids to be submitted at the right price, and sensitivity to be appreciated and Clarification of the scope of project tasks.

5.2.3 Examine the risk management techniques that are being practiced

For this objective to be achieved, the necessary apt literature was reviewed. Variables obtained from the literature review were strategically compounded into understandable and answerable questionnaires, where respondents were asked to indicate by their level of agreement to the identified variable how they believe are important strategies to manage risk on construction projects. With 1= Strongly disagree 2= Disagree 3= Moderately 4 = Agree 5= Strongly Agree the respondents answered the questionnaires. After analysis, the identified strategies which were considered as very important for managing risk on construction projects were referring to previous and ongoing similar projects for accurate, producing a proper schedule by getting updated project information, depending on subjective judgment to produce a proper program and Planning alternative methods as stand-by.

5.3 CONCLUSION

The study thus concludes as follows:

Almost all the risk factors reviewed affect construction projects in Ghana. The finance category has the highest severity impact on construction projects while the physical category has the least severity impact on construction projects. The factors to consider

in risk management include: referring to previous and ongoing projects of similar nature for accuracy; producing a proper schedule by getting updated project information; depending on subjective judgment to produce a proper program; and planning alternative methods as stand-by.

5.4 RECOMMENDATION

1. Training of staff towards the risk and its management should be a priority in order to advance the business of the firm.
2. Contractors should look at integration of various expert risk management systems with other schedules and systems already being operated.

5.5 LIMITATIONS OF THE STUDY

This study is limited to the contractors, but future research on the topic should take into consideration the client and the project consultant perspective. Future research should also look into the allocation of risks on a construction project.

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APPENDIX

QUESTIONNAIRE

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

COLLEGE OF ART AND BUILT ENVIRONMENT

**DEPARTMENT OF CONSTRUCTION TECHNOLOGY AND
MANAGEMENT**

Dear Sir/Madam,

**QUESTIONNAIRE SURVEY: EXPLORING PROJECT RISK
MANAGEMENT PRACTICES OF GHANAIAN BUILDING
CONTRACTORS.**

I am currently undertaking a study aim at assessing risk management practices of Contractors in Ghana. In addressing the stated aim, I am conducting a questionnaire survey to solicit information from contractors in Ghana. This study will help in assessing identified risks and the management practices being employed in addressing

them. This will help in suggesting best risk management practices in the Construction Industry.

This study is solely for academic purposes and your responses will be treated as STRICTLY CONFIDENTIAL. Participating Contractors will be provided with the findings of the study upon request.

I would like to thank you for accepting to assist and cooperate towards this study.

Yours Sincerely,

WILSON OKYERE BOATENG

MSc Project Management

Mr. J.C. Danku

KNUST

PMB

First Part: Respondent's Profile

1. Type of organization currently working at?

☐ Contracting Firms

☐ Architectural Firms

☐ Quantity Surveying Firms

☐ Engineering Firms

☐ Others.....

2. What is your position at the firm?

☐ Director

☐ Deputy Director ☐

Project Manager

☐ Site/Office Engineer

☐ Other (please specify):

3. Number of executed projects in the last 5

☐ 10 Projects or less

☐ 11-20 Projects years

☐ 20-30 Projects

☐ 31- 40 Projects

☐ More than 40 projects

4. In your rich experience, how do you view the risk in the construction industry of Ghana?

☐ Very Low

☐ Low

☐ Medium

☐ High

☐ Very High

5. Do you think with some management techniques implemented in the Construction Industry of Ghana, the Risk in the industry can be eliminated or at least reduced?

☐ Yes

☐ No

PART TWO

A.TO IDENTIFY THE PREVALENCE RISKS ON SITES

From your own experience, how would you rate the extent of the following risks on projects?

Please answer by ticking (✓) the corresponding boxes.

5= Very Significant 4= Significant 3= Moderately Significant 2= Less Significant 1= Insignificant

	<i>Risk Category</i>	<i>Factors</i>	Significance				
			1	2	3	4	5
1	Physical	Poor safety procedures resulting into Accident Occurrence					
		Supplies of defective materials					
		Varied labour and equipment					
2	Environmental	Acts of God					
		Difficulty to access the site					
		Adverse weather conditions					
3	Design	Defective design (incorrect)					
		Not coordinated design					
		Inaccurate quantities					
		Lack of consistency between bill of quantities, drawings and					
		Rush design					

		Awarding the design to unqualified designers							
4	Logistics	Unavailable labour, materials and equipment							
		Undefined scope of working							
		High competition in bids							
		Inaccurate project program							
		Poor communications between the home and field offices							
5	Financial	Inflation							
		Delayed payments on contract							
		Financial failure of the contractor							
		Unmanaged cash flow							
		Exchange rate fluctuation							
		Monopolizing of materials due to closure and other unexpected							
6	Legal	Difficulty to get permits							
		Ambiguity of work legislations							

	<i>Risk Category</i>	<i>Factors</i>	<i>Severity</i>				
7	Legal	Legal disputes during the construction phase among the stakeholders					
		Delayed disputes resolutions					
		No specialized arbitrators to help settle fast					
8	Construction	Rush bidding					
		Gaps between the Implementation and the specifications due to misunderstanding of drawings and designs					
		Undocumented change orders					
		Lower quality of work.					
		Changes in design					
		Difference in actual and contract executed quantities					

9	Political	Change of government					
		Change of government policy					
		New governmental acts or legislations					
10	Management	Ambiguous planning due to project complexity					
		Resource management					
		Changes in management ways					
		Information unavailability (include uncertainty)					
		Poor communication between parties involved					

B. TO DETERMINE THE EFFECTS OF RISKS ON CONSTRUCTION

From your experience as a construction expert, rank the identified impacts of risks.

Please answer by ticking (✓) the corresponding boxes.

1= Strongly disagree

2= Disagree

3= Moderately

4 = Agree

5= Strongly Agree

	IMPACTS	1	2	3	4	5
1	It ensures setting the right level of contingency					
2	It creates a forum for expressing concerns and for challenging or defending assumptions.					
3	Risks also enable risk response and mitigation strategies to be expressed.					
4	Risks enables contracts to be fairly negotiated, bids to be submitted at the right price, and sensitivity to be appreciated.					
5	Understanding and budgeting cost commitments- taken into account risk					
6	Estimates of revenue can be represented as ranges, so that revenue pipelines can be understood as well as profit projection					
7	It enables making better decisions based on accurate information					
8	Clarification of the scope of project tasks, and missing work is often identified.					
9	Risks leads to the Variation of construction program					
10	Risks can lead to cost overrun					
	Other (state and rank)					

C. TO DETERMINE THE STRATEGIES FOR THE MANAGEMENT OF RISK ON CONSTRUCTION SITES

From your experience as a construction expert, rank the identified risk management techniques. *Please answer by ticking (✓) the corresponding boxes.*

1= Strongly disagree 2= Disagree 3= Moderately 4 = Agree 5= Strongly

Agree

	Preventive Method	1	2	3	4	5
1	Utilize quantitative risk analyses techniques for accurate time.					
2	Depend on subjective judgment to produce a proper program.					
3	Produce a proper schedule by getting updated project information.					
4	Plan alternative methods as stand-by.					
5	Consciously adjust for bias risk premium to time estimation.					
6	Transfer or share risk to/with other parties.					
7	Refer to previous and ongoing similar projects for accurate.					
	Remedial Method					
8	Increase manpower and/or equipment.					
9	Increase the working hours.					
10	Change the sequence of work by overlapping activities.					
11	Coordinate closely with subcontractors.					
12	Close supervision to subordinates for minimizing abortive work.					
13	Change the construction method					
	Risk Analysis Technique					
14	Expert Systems (including software packages, decision support systems computer-based analysis techniques such as at Risk.					
15	Probably analysis (analyse historical data).					
16	Sensitivity analysis.					
17	Simulation analysis using simulator computer packages.					

18	Direct judgment using experience and personal skills.					
19	Comparing analysis (compare similar projects through similar conditions)					

THANK YOU!

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