

MITIGATING CRITICAL RISK FACTORS ON PROJECT DELIVERY

BY

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DECLARATION

I hereby declare that this project report on mitigating critical risk factors on project deliver; is the results of my own work, towards the attainment of MSc Project Management. And references to other people’s work have duly been cited.

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ABSTRACT

Several scholars have stated the fact that risk has a major impact on projects and its delivery, which proves that risk management is very vital in the execution of every project. This study engrossed on the mitigating critical risk factors on project delivery. The various objective for the study were: To identify type of risks or risk factors that influence project delivery, and to examine risk mitigating strategies adopted by construction companies. This study used questionnaires for data collection, through which the quantitative method was used. The purposive sampling and convenience sampling techniques were employed. The study sampled 60 respondents from 5 construction firms in the Greater Accra Region of Ghana. Twelve (12) respondents from each firm, these companies include: Berock ventures, Consar, Multi Tridax complex, Tonyam company Ltd and Core Construction Ltd Further, in which the target is also made up of top level managers and officers within the target population. In all, data gotten back from all respondents were 43. The descriptive statistics and the mean score ranking was used in analysing data. Two objectives assisted in attaining the main goal of the research. The first objective offered the risk factors that influence project delivery, these risk factors were presented under these headings, which are; external and site condition risks, economic and financial risks, technical and contractual risks and managerial risks. and from the data results, these factors ranked under these headings includes; unforeseen site ground condition influence project delivery, difficulty in obtaining permits and ordinances influence project delivery, constant rise in prices of materials influence project delivery, poor cost control influence project delivery, delay in providing detail drawing influence project delivery and finally, labour, material and equipment problems affect project delivery. The main goal of the second objective was also achieved, this was successful by presenting the risk mitigating strategies adopted by construction companies, these strategies includes: there is information to forecast and identify future risks, projects are constantly screened to avoid unwanted risks, to ensure insurance policies to ensure risk transfer when risk occurs, to ensure integrated catastrophic model for risk prevention or elimination and the final strategy ranked as effective was; thorough risk assessment or evaluation is done always. The focus of this research is to mitigate critical risk factors on project delivery, and from the following above the aim of the research was accomplished.

Keywords: Project delivery, Risk factors, Risk.

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DEDICATION

This work is dedicated to the Most High God, my late Parents Mr and Mrs. Yeboah, my children Nelley, Hans, Perry and Percy Atta Amanie, my family and friends for their endless support.

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND

According to the Project Management Institute (PMI) risk are always associated with projects. These risks are uncertain events or conditions with outcomes that can either positively or negatively affect at least one project objective, which could be; time, cost, scope, or quality (PMI, 2008). Looking at the various aspect risk can affect; time, cost, scope, or quality, it implies that risk and affect almost every aspect of a project. In general, there are different types of risk. This includes; technological risks, Market risk, Organisational risks, financial risks, Turbulence risks (ECEG, 2005). In general, these risks have varying effects on projects. Flanagan et al., (2006) posited that, these risks post major threats to projects, and ultimately the delivery of project, as they have the potential of negatively affecting projects. As a result of this it is prudent that these risks are either managed or mitigated (Flanagan et al., 2006).

According to the National Audit Office (2000) risk mitigation involves “having in place a corporate and systematic process for evaluating and addressing the impact of risks in a cost effective way and having staff with the appropriate skills to identify and assess the potential for risks to arise. Risk mitigation is one of the nine knowledge areas propagated by the Project Management Institute (PMI, 2008) this highlights the importance of risk mitigation. Risk mitigation is a comprehensive and systematic way of identifying risk, analysing risk and responding to risk with the aim of achieving project objectives (ICE, 2005). This process extends even to the period of use. For example, in the construction industry, risk is usually regarded as the presence of potential or actual threats or opportunities that has the ability to influence the objectives of a project during construction, commissioning, or even at the time of use (ICE, 2005).

This indicates that risk can exist in every section of a project, making even the completion stage one to consider when analysing or potential risk factors. This readily points out to the importance of considering risk in projects. This can be said to require an extensive analytical review of all aspects of projects which is ideally coupled with an extensive analysis of various outcomes.

The current study seeks to identify the different types of risk factors that influence project delivery in the construction industry. The various strategies available for mitigating the risks will also be considered, as mitigating the risks has the potential of promoting project delivery efficiency.

1.2 PROBLEM STATEMENT

It has been identified that risk is an important part of any project (PMI, 2008). The importance of risk in project is as a result of its effect on projects. Mainly, these effects are negative, implying that risk can result in devastating outcomes for projects. As a result of this, it is ideal to manage risks that are associated with projects. Managing risk effectively has been recognised to result in better outcome of projects (PMI, 2008). Ideally every industry that carries out project should employ proper risk management strategies or systems to manage risks, but studies have shown that this are ignored in most cases (ICE, 2005).

Ignoring risk at any level of project management is one that can be problematic. From project initiation to project delivery and sustainability, risk exist and the management of the risks to ensure value for money cannot be taken for granted. The importance of the management of risks is even more profound in the construction industry, one that is known for various risks, that can however be managed or mitigated (Cakmak and Ecem, 2019).

Ghana has been identified to be characterised with a lot of construction projects (Adaliwor, 2017). Some of these projects never get completed or stuffer at the delivery phase of the project life

(Adaliwor, 2017). According to Adaliwor (2017) one major reason for this is lack of proper risk management strategy, and also the failure to identify the various risk that exist in our demographic with regards to the construction industry. Identification of these risks also requires the appropriate mitigation strategies, one that Tetteh (2014) identified as always changing or improving. According to Tetteh (2014) there is need to constantly evaluate new mitigation strategies in project management.

From all what have been stated above, Mohammed (2016), stated in his study that, even though there are some risk management techniques in the system, it is still mentioned that workers in the construction industry are tackled with the issue of risk management and assessments which are effective. Risk management systems in construction are presented to help recognize risk in projects, analyze them systematically and use suitable tool in managing these risk. Therefore, in order to undo reduce risk in construction and its complexity, there is a necessity for strategies to risk management, and this therefore, leaves a gap that needs to be addressed, that there is a need to examine effective risk management strategies. Which is why this study sought to identify effective strategies for mitigating risk factors in the construction industry.

1.3 AIM

The aim of this study is to propose strategies for mitigating risk factors on project delivery.

1.4 OBJECTIVES

Based on the aim of the study the following objectives seek to be achieved;

1. To identify type of risks or risk factors that influence project delivery
2. To examine risk mitigating strategies adopted by construction companies

1.5 RESEARCH QUESTIONS

1. What are the types of risks or risk factors that influence project delivery?
2. What risk mitigating strategies are adopted by construction companies?

1.6 SCOPE OF THE STUDY

The study was conducted in the greater Accra region. The study selected Accra because it is the capital city of Ghana, and there are currently a lot of projects are on-going in that area (Ghana Statistical Service, 2013). The main focus for the study is to mitigate critical risk factors on project delivery, the study also threw more light on the type of risks or risk factors that influence project delivery.

1.7 RESEARCH METHODOLOGY

The quantitative method was selected for this study, which was based on questionnaires for the data collection and this approach was chosen because of its statistical and mathematical features that it carries. The population of the study consists of construction firms in Accra. However, the target population was made up of construction firms in the Greater Accra Region of Ghana. The study chooses Greater Accra Region because, most of the well-known construction firms in Ghana operate from this region. Therefore, it's appropriate that respondents are taken from this region. Further, the targeted respondents were also made up of managers and other key construction officers within this targeted population. Data was collected from these respondents and questionnaires were prepared based on the factors from the research literature and this was mainly on the aim and objectives of the research. The source of the literature was from books and other related articles to the study. Closed ended and open ended questions were used. Data was analyzed using

descriptive statistics and the Mean Score Ranking where by factors were ranked according the level of importance and the level at which respondents agree with those factors presented from the literature.

1.8 SIGNIFICANT OF THE STUDY

The management of risk in projects has been established to be instrumental to various stakeholders in projects. This is because the management of risk influences the outcome of projects. Effective management of risk has been established to be beneficial to the stakeholders. This implies that the sponsors, the users, the sellers, organizational groups, business partners, functional managers, and suppliers of projects would all benefit from proper risk management, in which this study addressed. Hence been informed about the various risks that exist in the industry, this enlightened management on the various risk and also help them in employing strategies to mitigate the various risks. This implies that, the findings of the study were useful to the various stakeholders of projects since it gives information about various risk factors in the construction space in Ghana.

The findings of the study were instrumental to the construction industry, as there was availability of first-hand information on the various risk factors that exist in the construction industry and also, the strategies available to mitigate them. This importance can also extend to other industries as they can be adopted, especially mitigation strategies.

The findings of the study were also instrumental in academia as it adds to the existing literature on mitigation of risk in project management, and also to the limited literature to those in the construction industry.

1.9 ORGANISATION OF THE STUDY

The study covers five chapters, with each chapter focusing on specific factors of interest. Chapter one covers the background to the study, the statement of the problem, the objectives of the study, research questions, and significance of the study. Chapter two covers the review of literature. Chapter three of the study covers the methodology. The chapter four covers the analysis and discussion of the study, and chapter five covers the conclusion and recommendation of the study.

CHAPTER TWO

LITERATURE REVIEW

This chapter covers the review of literature related to the study. Concepts related to the relevant selected indicators of the study were reviewed and discussed extensively. The sources of these literature were from books, journal, peer reviewed researches and articles.

2.1 PROJECT MANAGEMENT AND DELIVERY

Morris (1993) conducted a research and based on his results he defined project management as a process of joining together several special project management practices that has to be done as the project progresses from life cycle formation to distribution in order to attain the goals of the project for a successful project delivery. A successful project delivery is the process whereby all project

goals are attained to reach the level of the customer's satisfaction. Within a project there is the need to appreciate the contribution of PM practices because it accounts to a successful delivery of the project, (Munns & Bjerirmi, 1996). Jason (2003) explains a project as when a distinctive effort is taken to produce a package within a time frame, charge and quality constraints to reach client expectations. Also what makes a project stand out is because of the fact that it is void of replication of events and processes. Every project cannot do without a certain amount of risk which must endured because it entails some level of uncertainty, which shows that risk must be considered in projects (Jason, 2003). Taking a look at another definition of project by Munns and Bjeirmi (1996) both of the department of civil engineering, university of Dundee, Scotland, defined a project as "the attainment of exact actions and tasks at the expense of valued resources.

The project must be concluded within a set of fixed start and end dates as well as having the right requirements as expected from client for delivery. The British Standard Institute explains a project as "An innovativeness (activity or set of correlated activities) that has a set time for start and finish (Gould, 1999). Consequently, 'an inimitable set of organized activities, with specific objectives within defined schedule carried out by an individual or organization to meet budget and performance parameters.' with certain starting and completion points, (Albert, 2009).

A project is defined by the Project Management Institute (2004) as "a temporary endeavour undertaken to create a unique product, service, or result". This implies that a project is supposed to have a purpose, with a time frame that spells the beginning and end of the project, and needed resources to be accomplish the goals of the project for a successful delivery. To make sure all these are possible, there is need to properly coordinate all the elements of a project, or manage the project. According to the Project Management Institute (2004) "Project management is the application of knowledge, skills, tools, and techniques to project activities to meet project

requirements leading to a successful project delivery. It is accomplished through the application and integration of the project management processes of initiating, planning, executing, monitoring and controlling, and closing.” According to PMI (2004) projects are usually structured in different parts, which represent different stages; these stages are then connected and managed to result in the completion of the project. This represents the lifecycle of the project. According to Newton (2015) there is no universal life cycle phase for projects. This is because there are different types of project. Usually the phases of projects are unique to the particular project, however, the main aim is to help focus on time, cost and quality.

For example, Maylor (2010) proposed the 4D phases of project lifecycle. According to Maylor (2010) a project lifecycle is typically characterized with 4 major phase;

1. Define
2. Design
3. Do it
4. Deliver it

As seen in figure 1, the various phases are characterized with specific tasks. Failure to implement each task can result in the failure of the project. It involves planning which covers the setting of goals and objectives. It also evaluating the background of the project and creating a timeline for the project.

The next phase is Design it, it is characterised with planning, mainly planning activities that are geared towards serving as a blueprint for achieving the project’s goal. It also includes the identifying challenges and the consideration of measures to tackle such challenges.

The next phase is Do it. This phase is characterised with carrying out planned activities geared towards achieving the goals of the project. It is also associated with capturing and recording of data, the provision of feedback and the reflection on the progress of the project. T

he last phase which is the Deliver it phases, which is characterised with measuring the project outcome against the established goals

On the other hand, the PMI (2008) identified 5 phases in the project lifecycle. This includes;

- Project conception and initiation
- project definition and planning
- project launch/execution
- project performance
- control project close/closure

Phase one is characterised with the conception of the project which is expected to have a project plan, aimed at guiding the project. This phase is characterised with the definition of the project goal, and some form of feasibility research. This is also where stakeholders are identified.

The next phase, is the definition and planning phase. This is associated by the scope, budget of the project and a timetable, which is instrumental in keeping the project on course. Responsibilities and roles are also established at this stage. This phase is also required to stipulate communication plans, both internally and externally. It stipulates risk management plans.

The next phase is the execution of the project. This stage includes the establishment of the team for the project. At this stage, the project teams are also informed of their duties. Resources are also assigned in this phase. Procurement management and project execution is also cover in this phase.

The next stage measures the progress of the project. This stage is related with evaluating results as

against the stated targets and milestones of the project. At this stage, KPIs are used to measure the progress of the project. This stage includes the evaluation of budgets and costs. Quality evaluation is also considered here with regards to various stakeholders' expectations. The various treats and risks to the completion of the project are also evaluated here. The last stage which is the closure of the project. The stage covers the formal termination of contracts, the writing of report by the project manager and the documentation of any challenges.

2.2 OVERVIEW OF RISK FACTORS

According to Rezakhani (2012) as the likelihood for difficulties with respect to a project being attained, and the attainment of the goal of a project in which it's a future event which is undefined with the rate of reality greater than 0% but below 100% that has impact on one of the project goals (which is, the cost, scope, or quality). The future event is normally unforeseen according to (Chia, 2006).

A doubt which normally exists in an event is classified as risk. Nevertheless, in 1921 Knight stated that the modification between uncertainty and risk thus: "the other, which is uncertainty needs to be reserved in a logic wholly distinct from the acquainted idea of Risk, whereby has never been detached correctly. The fact which is important is that "risk" means in some cases a quantity prone of measurement, while at other times it is something distinctly not of this character; and there are

far-reaching and crucial differences in the use of the words depending on which of the two is really present and operating. It will appear that a measurable uncertainty, or "risk", as a term, is so far different from an un-measurable one that it is not in effect an uncertainty at all."

The reality which is significant is that "risk" signifies now and again an amount of inclined estimation, while at other times it is something which is not of this character; and there are expansive and pivotal contrasts in the use of the words relying upon which of the two is truly present and working. Also "risk", as a term, which is unique in relation to an un-quantifiable one that is not a result of an uncertainty by any means. There is an involvement of risk of various kinds and types in all projects or business ventures. In the construction industry, the industry is subject to more risks than other industries (Flanagan and Norman, 1993). In projects of construction, risks together with indecisions are of several types. The following are political, economic, financial, environmental, and technical, are all a type of risk. Construction industry has not really taken much time in getting to know the main benefit of risk management (Flanagan and Norman 1993). It was mentioned by Akintoye & MacLeod, (1997) that risk in construction is generally declared as measures that usually affects time, quality and the cost of project. Cullen, (2012) mentioned that the application of risk management processes in construction can give initial visibility to possible "problem areas" and chances, where energy and money can be expended early in the design and construction phases to decrease susceptibility, insurance costs, business or mission disruption, and claims. Research conducted by Al-Bahar & Crandall (1990) mentioned that risk is essentially present in all construction projects. In frequent times, construction projects fail to attain their time, quality, and budget objectives. A risk model permitted construction risk management system (CRMS) is presented in aiding contractors recognize project risks and methodically to examine and manage them.

2.3 RISK IN PROJECTS

Project risk is an uncertain event or condition which can either positively or negatively affect the outcome of the project, which could be; time, cost, scope, or quality (PMI, 2008). ISO 31000 (2009) has a similar definition of risk, which is defined as the effect of uncertainty on objectives, with impacts that can either be positive or negative. According to Kogan and Tapiero (2007) risk arises “from the direct and indirect adverse consequences of outcomes and events that were not accounted for or that were ill prepared for, and concerns their effects on individuals, firms or society at large. It can result from many reasons both internally induced and occurring externally with their effects felt internally”.

The European Commission Expert Group (ECEG) (2005) indicates that there are different types of risk with regards to projects. Some of these risks are more profound than others as a result of their significant effect on projects (ECEG, 2005). Some of such risks include; technological risks involve risks that results in non-completion of projects or an under-performance of the procured service or product (ECEG, 2005). This type of risk also includes suppliers default on agreements, selecting an inappropriate technology for a project, and selecting a technology at an inappropriate time (ECEG, 2005).

ECEG (2005) also identified Market risk as a result that engenders as a result of; situations where the private demand does not meet expectation, public markets remain divided or in situations where there is lack of organisations’ delivering innovations. Organisational risks which is part of the major risks identified by ECEG (2005) are associated with failed or under delivered procurement. Societal risks on the other hand as recognised by ECEG (2005) are risks that are associated with the absent of acceptance and adoption by users of a new or changed service

delivered within a society. Financial risks are associated with risks that are related to uncertainties in meeting target costs, or the inability to generate the needed for projects (ECEG, 2005). Turbulence risks which are the last type of risks established by the ECEG (2005) are risks that are associated with large-scale projects. This type of risks is as a result of a number of unforeseen occurrences that eventually contributes to various stakeholders in the project cycle to re-assess their priorities and change their expectations, which in turn could lead to further dysfunctions. In generally, all the highlighted risks have varying effects on projects.

2.4 RISK AND UNCERTAINTY

There is a close connection between risk uncertainty which is noticed as pressures connected based on construction project application.

Usually risk is observed totally as doubt though all accounts explaining risk contains some element of uncertainty. Uncertainty appears as far as a happening which has the probability of occurring. For a situation whereby an event occurring has 100%, then, at that point it is named to be sure. Then again, a plausibility event recorded as 0%, implies that is a questionable event (Jaafari, 2001). Its normally difficult to have a cautious standpoint of future potential outcomes when one focuses on uncertainty. To achieve uncertainty effectively, there must be a separation of the changeability and equivocalness nature of uncertainty. A circumstance of utilization where an assessable factor takes a unit of set of potential qualities portrays its nature of inconsistency. A circumstance where

one is uncertain is estimated as when there is no entire learning in respect to the circumstance being reconsidered. (Hilson and Murray-Webster, 2007). A few circumstances however vague are not seen as risk. Risk cannot be in existence without it being characterized in connection to specific targets (Jaafari, 2001). Hilson and Murray Webster (2007) hinted that there is a contrast among uncertainty and risk. one is disclosed in connection to explicit targets and takes into concern the results (risk,), in which on the other hand uncertainty doesn't pay special mind to that.

2.4.1 Sources of risks

There are sources of risk when it comes to project management. Education and Learning Wales, (2001) specified risks sources in the following: Political risks, Financial risk, Environmental risks, Social risks, Legal risks, Commercial risk, Technological risks, risks in terms geographical, communication, management, construction, operational and geotechnical risks. There is a level of uniqueness in risk sources to individual projects. Therefore, in most cases there must be a risk identification during project execution.

2.5 PROJECT RISK MANAGEMENT ON PROJECT DELIVERY

This are of knowledge includes all processes which involves: risk planning, identification, analysis and control of a project. The main emphasis of this area is to upsurge the likelihood and impact of positive events, and reduces the possibility and influence of adverse events on the project (PMBOK, 2008). The following procedures are included in this area; Risk management planning, Risk identification, Quantitative risk analysis, Qualitative risk analysis, Risk response planning and Risk monitoring and controlling.

2.5.1 Risk management

The National Audit Office (2000) specified that risk management comprises “having in place a corporate and systematic procedure for assessing and addressing the influence of risks in a cost operative way and having staff with the suitable skills to identify and assess the potential for risks to arise. The significance of risk management cannot be underestimated as risk management is one of the nine knowledge areas instituted by the Project Management Institute (PMI, 2008). Management of risk is a comprehensive and an organized way of identifying risk, analysing risk and replying to risk with the goal of achieving project goals (ICE, 2005). Risk management goes beyond the period where the project is being carried out, to the period of use. This infers that risk can exist in every section of a project, making even the completion stage one to consider when examining any potential risk elements. This willingly points the significance of considering risk in projects.

Chapman and Ward (2004) risk management plays an important role in the success or failure of any project. This implies that the level of risk management associated with any project determines the outcome of the project. In general, a number of activities are characterised with the management process of risk associated with projects. However, there are activities that profound. The ECEG (2005) recognises 3 main tasks for risk management. The first is; defining and assessing risks and rewards for all project stakeholders of the project at every level of procurement process. This task involves identifying the different nature of risks, which is subjected to change during the various procurement process. The causes and sources of the risks, and the possibility of risks occurring. This type of task also includes identifying the potential consequences of risk occurring. The second task has to do with implementing measure geared towards avoiding or mitigating the possibilities of identified risks from occurring. This task also includes allocating responsibilities

geared towards reducing the occurrence of identified risks. The third task as identified by ECEG (2005) is defining measures to reduce the potential consequences and assign who bears the cost of mitigation and the reduced benefits. In general, all the tasks are aimed at reducing the impact of risks on projects. In general, reducing the impact of risks by weaken their impact on projects is an important part of risk management. This is one of the reasons why risk management strategies play an important role in the success of a project. If strategies that are geared toward reducing the impact of risks are implemented effectively, they play important roles in the success of projects (Chapman & Ward, 2007). According to Chapman and Ward (2007) the important of a properly structured and implemented risk reduction strategy can serve as a replacement for uncertain and volatile events with a more predictable or controlled response. According to ECEG (2005) no specific risk-management methods exist as they depend on the type of project, risk or organizational culture. Other factors like; awareness measures, contract design, supplier involvement, training schemes, can also influence risk management strategies (ECEG, 2010). However, there are some bodies that have set down principles and guidelines that organizations can use to manage risk. The International Organization (ISO) is one of such bodies and has a standard known as the ISO 31000. ISO 31000 (2009) Risk Management-Principles and guidelines, provides a structured framework with principles and guidelines for geared towards managing risk. This framework can be adopted by any organization regardless of its size, mode of operation or sector. This is an instrumental in mitigating the impact of risk by identifying opportunities, threats and effectively allocating and using resources for risk treatment ("ISO 3100:2009," 2009).

The PMI (2008) stipulates 5 major stages that are associated in risk management. They include;

- Risk management should be planned

- Risk identification
- Qualitative analysis should be performed
- Achieve quantitative analysis
- Strategize risk response
- Control and monitor risk.

As seen in figure 1, the different risk management stages follow a particular order. It shows that provisions for risk are made before the risks occur. As a result of this, potential risks are identified and this in turn leads to an analysis of the risk. The result from the analysis then assists in planning appropriate responses to the risks. All these are essential in properly managing the risks associated with projects.

Figure 1 : risk management



Source: PMI (2008)

2.6 AGENTS OF RISK MANAGEMENT

For a project to be successful a number of factors are to be considered. These include factors that hold significant influence on risk and uncertainty. Uncertainty according to Galbraith (1977) is “the difference between the amount of information required to perform the task and the amount of information already possessed by the organization. Risk on the other hand according to (PMI, 2008) is “an uncertain event or condition that, if it occurs, has a positive or negative effect on a project's objectives”.

Risk and uncertainty management are important in project management and success (Bartlett, 2004). The PMI (2008) bolsters this point that project management should always include risk management. However, there are agents that need to make sure this happen. Key among them is the Project Manager, whose main aim is to mitigate project risk (Bartlett, 2004; PMI, 2008). In most cases project managers are the head of risk management teams, in that case the team as a whole become responsible for assessing risk. Regardless of these there are other stakeholders

that are instrumental in risk management. PMI (2008) defined a stakeholder as a “person or organization (e.g., customer, sponsor, performing organization, or the public) that is actively involved in the project, or whose interests may be positively or negatively affected by execution or completion of the project. A stakeholder may also exert influence over the project and its deliverables. Stakeholders are usually required to periodically evaluate risks in projects mainly because of their personal interest in the project, and the stakeholders can either be internal or external to the project (Turner & Mueller, 2004). These stakeholders could include; clients, sponsors, key specialists in the project team's organisation or organisations, external participants, local authorities and contractors (Turner & Mueller, 2004).

In as much as these stakeholders are usually tasked with recognising risks associated with projects, they sometimes possess as risks to the project themselves. Ward and Chapman (2008) posited that; “stakeholders are a major source of uncertainty in projects. They further stated that; “the most important uncertainty management issues are usually related to objectives and relationships between the key stakeholders, particularly the internal stakeholders and especially within the ‘project owner’” (Ward & Chapman 2008). These key stakeholders are usually the project owner and the management team. The project owner is the one that finances the project and is has a primary interest in receiving the benefits of the project (Turner & Mueller, 2004). According to Olsson et al (2008) “the project owner is the one taking the risk related to the cost and future value of the project.

Project management team on the other hand is more concerned with delivering the project within the allocated time and budget (Turner & Mueller, 2004). Usually the greatest risk lies in aligning these two set of priorities from the project owner and the project management team (Turner &

Mueller, 2004). This highlights the important of having their priorities align (Pinto & Slevin, 1988).

2.7 EXTERNAL RISK FACTORS ON PROJECT DELIVERY

2.7.1 Financial Risk Factors

The key risk that befalls projects in construction is the limited funds and payments that are suspended for a long time. Rendering to Berko (2007), more than 50% of the building plans that are put up in Ghana are mostly funded by international bodies and companies whilst the little or no money is wired into these buildings by the Ghana government. Due to this so called long protocols and delegation of power in government divisions lead to long intervals of paying for infrastructural plans resulting in the irritable nature of contractors. However, there are also instances where the sponsorship acquired for carrying out these projects are delayed by the international countries and this action seriously affects the project advancement (Berko, 2007).

2.7.2 Economic Risk Factors

Quite a number of elements are linked to the risk factors in the area of trade and industry and among them are uncompetitive markets, and abnormal increase in price which tends to negatively affect the ongoing project (Agyakwa-Baah, 2007; Denini, 2009). The uncontrollable patterns of exchange rate can cause huge debts and loss on both parties since inflation is unavoidable. Edwards and Bowen (1998), pinpoints currency rates, supply of resources, hiring human capital, monetary arrangements and increase in prices falls under dangers of economic administration. Frimpong et al. (2003) further stated that syllabus in schools should cover the subject of dealing with rise and falls of currency.

2.7.3 Government

Ghana is an example of a developing country where the practice to quench the thirst of citizens and gain support from them are embedded in the construction of highways using political intents. The officials and legislators are left to poorly handle these highways and as written by Agyakwa-Baah (2009), it is the sole responsibility of the administration of the country to supervise and direct the setup of structures and record their progress and worthy to note that the criteria for evaluating productivity in nations that are developing is by monitoring evolving projects. Notwithstanding the fact that this criteria of measurement exerts stress on administration to act on impulse which later jeopardizes their national plan and financial laid out plan. It has led to a debate by De la Cruz et al. (2006) that, it is unnecessary to on the part of political leaders and party flagbearers to start building unintended projects that lack subsidy and the requisite management for these projects.

2.7.4 Environmental Risk Factors

Under the category of threats posed by the nature in societies in this part of the country are often not experienced. Ghana is free from unfavorable climate change such as storms, downpour, cyclones. There are only two recurrent weather climates in Ghana and that's the rainy and sunny changes. De la Cruz et al. (2006) spoke on the fact that certain consideration is to be taken note of when it comes to time management and especially analyzing the state of the earth and anything that will be harmful to the land and also any period of constraints enforced by the client on the work.

2.7.5 Technical Risk Factors

In the advancement of the industrial sector in Ghana, some ways to achieve this feat is by providing money, a stable market, a tangible building, the backing and aid from government as sited from the study steered by Ofori (1994). Nevertheless, these ways to improve construction sectors in the country has been tough to come by and resulted in a lot of problematic issues. Additionally, most of the imprecise and in correct calculations and measurements of infrastructure designs arises from the negligence and limited knowledge of designers who have not been exposed to working on composite and insecure projects. Furthermore, there are variations always taking place in the construction world due to how fast the world is moving in terms of technology and its impact on the purposes of project works is unescapable specifically in matters of charges and duration Oladapo (2007). In order to formulate a simpler viewpoint of what variations entails, Baxendale and Schofield (1986) explained that it involves the totaling and deductions completed on the dimensions of the project.

2.7.6 Internal Risk Factors in Ghana

Though local project heads employ additional effort for their contracts, technological inputs have been engaged since they have claimed to be more impactful on firms involved in construction. (Berko, 2007). Besides, other factors contribute to the difficulties native contractors face in their daily field jobs and some are known as scarcity of assets, malfunctioning equipment, inaccessibility of prerequisite abilities and low productivity output from hired labor and the privation of capability to activate and function machineries (Berko, 2007; Agyakwa-Baah, 2009)

2.7.7 Project team relationships and communication

Effective, communication and human dynamics that are positive human are interlaced because of their endeavors in project risk management, and their effect on the objective of the project.

Additionally, the lack of information flow among project partners is an arraignment the project success. In Lester (2007) study, noticed that in the environment of project execution, various types of connections are built up, for example, relationships among stakeholders, which ought to be overseen in an expert way to avoid any effects on project. Effective communication and working in togetherness are very needful and ought to be embraced by every manager of project, this is because, documents that the project agreement is based on, can be understood through communication. Many risk factors are being assessed in the study of Santoso et al. (2003), where by it was noticed that communication was ranked high in this study.

2.8 THE PROCESS OF RISK MANAGEMENT

Several scholars have dealt into the management procedures of risk. In the studies conducted by Boehm (1991) there two major phases of risk management, which are; assessment of risk (which includes identification, prioritization and also analysis of risk) and the second phase is, Risk control (which entails management planning of risk, monitoring planning, resolution, and lastly tracking and corrective action of risk). Management process of risk was also presented by Chapman and Ward (1997), which includes all of the following:

1. Major sections of the project must be defined;
2. Tactical method to risk management must receive adequate attention;
3. Sources of risks which are potential must be identified;
4. Risk assumption and relations must have necessary information defined;
5. Risks and it responses must be allocated its responsibilities;
6. Level of uncertainty be ensured to be evaluated;

7. Comparative weight of the various risks must be evaluated;

8. Ensuring that responses are planned;

9. All execution phases must go through effective monitoring and control.

The management procedures of risk are also presented in four parts by the PMI (1996) and this includes:

1. Identifying,

2. Measure level,

3. Responses must be developed,

4. Controlling.

2.9 RISK MANAGEMENT APPROACH TO IMPROVE PROJECT DELIVERY

2.9.1 Mitigating risk

This is a phrasing used to imply the decrease of likelihood on a project execution. This may bring about a total end of events of risk as seen in the avoidance of risk. Piney (2002) mentioned, it is just reasonable not pressurize oneself on risk impact because it becomes intolerable when this impact arrives at a level. The selection of one of these methodologies will work in diminishing the potential impact of the risk on project (Piney, 2002).

2.9.2 Avoiding risk

The way toward keeping away from risk on occasion is called elimination of risk, in which is not certified as a response to risk in the sector of construction. In an offer to absolutely take out risk in construction, the above referred models are impracticable and lead to deferrals and cost being exceeded. In some way, a valuable methodology could be received better than avoidance of risk. Contractors normally, may delicate or go for an agreement with a higher offer, or spot conditions on the specific offer, or marking a pre-contract, in other words, a good pre-contract condition, over contracts that has a very high risk, (Flanagan and Norman, 1993).

2.9.3 Transferring risk

Just like the name goes; this type of risk practice utilizes the exchange of risk starting with one team of management to another team. The presentation of premiums in regard to insurance in construction are helpful, in any case, it doesn't release all project risk known or seen, but rather covers some part of them (Tummala and Burchett, 1999). In addition, Tummala and Burchett (1999) further demonstrated that the risk transfer basically should be possible in two different ways: moving the risk from an entity whereby procuring sub-contractual worker on the project which is unsafe; and maintenance of the property by moving the budgetary risk through guarantees and other packages in regard to insurance.

2.9.4 Sharing risk

There can be examples whereby people associated with work choose to share risk by applying instruments that are legally binding. In such cases, parties go out and manage risk that they are

sure of being able to manage. Sharing of risk duties change legally (Nicholas, 2004), and they follow in this sequence:

1. Responsibility of risk mainly being on the contractor, (Fixed-price)
2. In this case there is a split of risk whereby the contractor takes 60% and the client focuses on the remaining, (Incentive fee including Fixed-price)
3. In this case there is also a split of risk whereby the contractor rather takes 40% and the client focuses on the large percentage of 60% (Cost plus incentive fee)
4. In this case, the client takes all risk responsibilities, (Cost plus fixed fee)

2.9.5 Retaining risk

Risk response entails a management mechanism which is internal, in which is aimed at decreasing risk that controls, (Zhi, 1995). Akintoyne and MacLeod (1997) recommended that, it is favorable when risk avoidance been management by a specific company is difficult, the existence of a little loss in finance and it being insignificant may occur, which may make it uneconomic to handover. It was clarified by Akintoyne and MacLeod (1997) that the predictable or unforeseeable risk are financed and constrained by the contract or organization involved, through which there are two strategies conceived to hold risk in projects. An inactive maintenance strategy happens when the contractor playing out the work tolerated every one of the risk which may happen through carelessness, or nonappearance of choice. Retention method which is passive is non-insured. Akintoyne and MacLeod (1997) further demonstrated that a self-insurance is a conscious administration system invented to deal with risk after making an exhaustive investigation of the imaginable misfortunes to be experienced, through which alternative strategies are being identified. Agyakwa-Baah (2007), recognized that risk are for the most part taken care of by

development organizations by contingencies of 10% being added to the expense of the cost of project in managing any risk. Additionally, the significance of the sector is found in its commitment to Gross domestic product and the rate dispensed to development works in the national budget of the country Ghana (Agyakwa-Baah et al.,2010). Akoi-Gyebi (2009), likewise noticed the commitment of the construction is extending from the immediate importation of structure materials and the utilization of the plan and execution ability given by outside experts and temporary workers to manage. Akoi-Gyebi (2009) recognized contributions at different aspects, which includes; street transportation, as it was the broadly accessible type of vehicle in Ghana. Aside connecting areas of agriculture, national and regional markets, which also includes most cities, towns and towns. There has been bounteous directing of funds into the roads sector by Governments in this recent times, with the objective of keeping up or improving the condition of roads.

2.9.6 Risk Monitoring

In examining of risk that is well-known together with residual risk and also new risk, in which is known as the progress of project. The management procedure stage ensures that risk schedule application and assessment on how to decrease risk, whereby special reports are organized often to establish the likelihood of new risks and how they must be managed, (Kremljak, 2010). Kremljak, (2010) continued that, in the creating construction divisions, this marvel is normal and test apparatuses ought to be attempted to bring satisfactory remedies. Many research works have done quite a number of research on the management of risk in the sector of construction; which is well known among every one of the investigations of risk impacting the management of project. Chen et al., (2004) recognized 15 risk elements on the premise cost project cost. Chen et al., (2004)

discovered heightening of material cost and erroneous spending plan as the exceptionally positioned events of risk. Shen (1997) study likewise uncovered eight huge events of risk representing delay in construction and utilizing professionals in construction. Shen (1997) likewise proposed that, the most significant risk aspect, is the capacity to treat it and always screen how measures are being affected. Cap et al., (2004) likewise directed an investigation in an examination with the point of recognizing factors influencing wellbeing measurement of construction, through which the investigation additionally uncovered construction projects failure to make the awareness of security on most important issues in regard to safety. Perry and Hayes (1985) introduced a basic methodology in adequately managing risk and separating them in regard to risk retainable by the three key parties to project, which is the customer, specialist and the contractor.

CHAPTER THREE

METHODOLOGY

3.1 INTRODUCTION

The study sought to mitigate critical risk factors on project delivery of Construction firms in Ghana. This section of the research work covers techniques and research method employed for the research. The methodology provides the plan, procedures and processes followed coupled with techniques adopted to achieve the purpose of the study. The chapter covered the study design, population, sampling technique and sample size, data collection procedures, ethical consideration and data analysis information. The chapter provides justification to the choice of research design and techniques employed by the researcher in the study investigation. The chapter explains in detail the processes and procedures undertaken in ensuring that the stated goal for the research is achieved.

3.2 RESEARCH DESIGN

The study generally is descriptive in nature. In the sense that, the study seeks to describe the phenomenon (risk factors and risk mitigating strategies) under investigation. The descriptive nature of the study helps to provide answers to issue such as “What” and “How” within the context of investigation (Goran, 2010). In view of this, Gorna (2010), intimated that research execution requires significant methods significant to the general research process. Creswell (2013), maintains that in every social science investigation, three crucial and vital methods underscores such investigation namely quantitative, qualitative and mixed methods.

Considering the indication by Creswell (2013), coupled with the postulated purpose of the study, the researcher employed the quantitative method. The study utilized such method of investigation

based on significant number of reasons. These reasons emphasize the appropriateness of such a method for the study. Firstly, the quantitative method was embraced because this uses arithmetic data for operative comprehension, interpretation and data presentation (Goran, 2010). Secondly, the method was embraced and utilized because; it aids in providing lucidity to multifaceted information and procedure that is complex to comprehend using qualitative method (Snape & Spencer, 2009). Thirdly the quantitative was embraced because it helped in examining the association and linkages among variables such as risk mitigating strategies and project delivery (Creswell, 2009; Snape & Spencer, 2009). Further, this aids to observe one variables effects, such as risk mitigating strategies on another variable such as project delivery (Creswell, 2009). Further, Creswell (2013), explained that quantitative method assists in testing theories empirically and accurately. Researchers analyze elements using statistical tools that are standard, such as regression, correlation, descriptive statistics, relative importance index, factor analysis etc (Goran, 2010). Hence, examining mitigating critical risk factors on project delivery of Construction firms is apt that such approach is adopted.

In accordance with the quantitative method, Mahotra (2007), posited that the tactical plan or blue print for fulfilling any research or study is known as the research design. The research design details the procedures that the individual conducting the research must follow in a method of acquiring data needful to provide solution to the research problem. Considering the definitions, the study employed the survey design. The survey design has two main types namely cross sectional and longitudinal survey designs (Goran, 2010). Specifically, the study laboured on the cross sectional survey design type. Critical reasons underpin the embracing and utilization of such design. Firstly, the design allowed the researcher to utilize instrument that would help obtain information based on what is happening with regards to a given phenomenon such as risk

mitigating strategies and project delivery. Further, this type of design provided the researcher the liberty to acquire data from respondents sampled within a particular time.

3.3 POPULATION OF THE STUDY

Research population is the complete sum of subjects considered for the study (Polit and Hungler, 2007). The targeted population constitutes the totality of the major population or selected population from the larger population that the study hinges on or the researcher has interest in (Creswell, 2009; 2013). This suggests the population of any research is a vital component of the research plan. It was indicated by Lodico et al., (2006), that every research's quality is dependent on the suitability of its targeted population. This concisely depicts that accessing information from wrongful, unqualified and inappropriate respondents has the propensity of disparaging the study's findings. The choice of population is very critical to the overall achievement of the research purpose. Therefore, before appropriate and relevant data is taken, it is significant to come very clear with the population to be used for the study.

In view of this, the research population entailed construction firms in Accra. However, the targeted population was made up of construction firms in the Greater Accra Region of Ghana. The study chose Greater Accra Region because most of the construction firms in Ghana operate from this region. Their head offices are within the capital city and its region. Therefore, it is appropriate that respondents were taken from this region. The construction sector of Ghana is one of the sectors contributing significantly towards the socio-economic development of the country. Its contribution to infrastructure development and cannot be downplayed. The various construction firms the study focused on included; Berock ventures, Consar, Multi Tridax complex, Tonyam company Ltd and Core Construction Ltd. Further, the targeted was made up of top level managers and officers within

the target population. The target population was appropriate because, they were respondents who had in-depth knowledge with regards to mitigating of risk and project delivery within construction firms.

3.3.1 Unit of Analysis

The unit of analysis of the study includes top level managers of construction firms thus;

- (a) General Managers, Deputy managers or directors
- (b) Operational Managers, Risk Control Managers, Financial Managers, Audit Managers, and Project Managers

3.4 SAMPLING TECHNIQUE

Purposive sampling and convenience sampling techniques are employed. The sampling techniques are non-probability in nature. The reason for the choice of purposive sampling technique was that, it allowed the researcher to sample respondents who have the experience and potential to inform the grand research questions to be addressed with regards to construction risk factors. Using the purposive there is a need to have one or more groups predefined upon which the researcher has his focus on. Oliver (2006) explained that purposive sampling is a type of non-probability sampling where by choices concerning the population who have knowledge in the research area are selected for the study. Secondly, the convenience sampling method allowed the researcher to choose, available and prepared respondents for the research.

The various sampling techniques were adopted because, by the use of the purposive sampling technique, the researcher sampled out some particular subset of construction firms, which were: Berock ventures, Consar, Multi Tridax complex, Tonyam company Ltd and Core Construction

Ltd. Secondly, by the use of the convenience sampling technique, the researcher administered questionnaires to respondents that were available and prepared in answering the questionnaire given. With these two sampling technique the researcher reached the rightful respondents to answer questionnaires given.

3.5 SAMPLE SIZE DETERMINATION

Sample size covers the number of respondents selected to represent a given population. Creswell (2009), maintains that the sample should be a representative of the larger population. Therefore, choosing the right sample entails a number of strategies. Therefore, in view of the two sampling techniques (purposive and convenience) used; the study sampled 60 respondents from 5 construction firms in the Greater Accra Region of Ghana. Twelve (12) respondents were sampled from each construction company ($12 * 5 = 60$). Creswell (2013), contend that a quantitative study should have basically 50 respondents whilst that of qualitative should be at least 9 and at most 30. This underpins the reason for the choice of the sample size since it was difficult to obtain the sampling frame of target population of all construction firms in the Greater Accra Region of Ghana.

3.6 SOURCES OF DATA

Goran (2010), indicated that two serious foundations of data collection reinforce any research strategy namely primary and secondary. Therefore, in congruence with the purpose and slated objectives of the study both primary and secondary sources of data were employed. The primary data collection involved the use of questionnaire. The study also obtained information through the

secondary sources. The secondary data collection sources include research articles, published and unpublished works, reports from construction companies, library collections, books and websites.

3.6.1 Research Instrument

The primary device used by the study is questionnaire. The questionnaire was designed based on the objectives and research coupled with literature. The scholarly work employed in design of risk types and factors was Wiguna and Scott (2010), and Wiguna, and Scott (2005). In addition, the questionnaire was designed in consistent with the scheduled research objectives. The questionnaire covered three areas namely demographic information of respondents, risk types or factors, risk mitigating strategies and project delivery. It must be understood that, the researcher modified some items obtained from existing measures to suit the study context. The questionnaire was designed using the Likert scale with ranks ranging from 1 through to 5 thus from strongly disagree through to strongly agree. Respondents were asked to tick per their knowledge in the subject area.

3.7 DATA COLLECTION PROCEDURE

The questionnaire administration was done through an entry process. The researcher obtained a letter of introduction from Kwame Nkrumah University of Science and Technology, to enable the study to be carried out. The letter was presented to the head of human resource managers of the selected construction firms in the Greater Accra Region of Ghana. After approval obtained, the researcher carried out the data collection exercise using an informed consent as well as the questionnaire. After the research instrument, the researcher explained the objective of the research. The informed consent was presented to sampled respondents to either partake or withdraw at any period of the data collection. The data collection exercise occurred at the premises of all the

sampled companies. Selected respondents who participated in the study utilized 20 to 30 minute to fill the questionnaire. Gathering of the data took about three weeks based on respondents work activities in making time to answer questionnaire.

3.8 DATA ANALYSIS

Analysis of data is very key in every study, data was gathered, coded and analyzed as mentioned in the design of the research. Data was analyzed to ensure reliability, suitability, and precision. Descriptive statistics and the Mean Score Ranking were used to convey the results of data gathered and as such made the analysis straight forward.

3.9 SUMMARY OF THE CHAPTER

This chapter was geared towards identifying the procedures to be adopted for this study. A quantitative research approach was employed and data collected was source from top level managers and officers in the construction field in the *Accra metropolis*. The chapter explained and looked into the research design, population of the study, unit of analysis, sampling technique, sample size determination, sources of data, research instrument, data collection procedure, ethical issues and the data analysis. The collected data were coded and analyzed using descriptive statistics and the Mean Score Ranking. With this the methodology for the study was well presented.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1 INTRODUCTION

The chapter explains and presents the results for the analysis. The questionnaire survey and its responses were analyzed with the statistical methods defined in the approach of the study. Data outcomes are seen below in the tables with in-depth discussions.

4.2 RESPONSE RATE

Questionnaires for the study were given out to sixty (60) construction workers in 5 construction companies sampled out of construction firms in the Accra metropolis. A total of 43 questionnaires were returned, representing 72% of the sample size.

Table 4.1 Response Rate

Category	Sample Size	Response Size	Response Percentage
Construction firms	60	43	72%

Source: Field Data, (2019)

4.2.1 Name of Construction Firm

The study focused on the management and other skilled officers in five construction company as the population. This companies includes: Berock, Multi Tridax complex, Consar, Tonyam company Ltd, and lastly Core Construction Ltd. Results from the data presents, out of 43 respondents; 6 respondents from Berock, 8 from David Walter, 8 from Consar, 12 from Inocon group, and 9 respondents from Limerica. All respondents were known as skilled officers from each construction firm.

Table 4.2 Name of Construction Firm

Years of Experience	Frequency	Percentage
Berock	6	14.0
Multi Tridax complex	8	18.6
Consar	8	18.6
Tonyam Company Ltd.	12	27.9
Core construction Ltd	9	20.9
Total	43	100

Source: Field Survey, (2019)

4.2.2 Gender

Data characteristics from the study also presents the gender of respondents, below in the table shows a number and percentage of respondent's gender. 72.1 percent out 100 (43) percent respondents were males 27.9 percent were females. The data below gives the gender of all respondents.

Table 4.3 Gender

Years of Experience	Frequency	Percentage
Male	31	72.1
Female	12	27.9
Total	43	100

Source: Field Survey, (2019)

4.2.3 Age

Demographic information from respondents also gave a data of their ages. According to the field survey, 20.9% of the respondents have an age range of 20 to 29 years representing ages of youth in Ghana, 48.8% were between ages 30 to 39, 14% in the ages 40 to 49, 11.6% in ages between 50 to 59 and lastly 4.7% representing 2 respondents were between the ages 60 years and above. All respondents were matured enough in the industry.

Table 4.4 Age

Years of Experience	Frequency	Percentage
20 – 29 years	9	20.9
30 – 39 years	21	48.8
40 – 49 years	6	14.0
50 – 59 years	5	11.6
60 years and above	2	4.7
Total	43	100

Source: Field Survey, (2019)

4.2.4 Education

This section was added to the research because, education puts respondents in a better spot to analyze systems and data to draw conclusions that are accurate out of data, in regard to the subject. Mitigating critical risk factors on project delivery can be conducted better by people with good education. All of the respondents had their education above the secondary level, 9.3% representing 4 of the respondents had their education up to the diploma level, 27.9% of the respondents had Bachelor's degree, and lastly majority of the respondents which is 62.8% of the respondents had degrees in masters. The following is summarized in *Table 4.5*

Table 4.5 Education

Years of Experience	Frequency	Percentage
Diploma or equivalent	4	9.3
Bachelor's Degree or equivalent	12	27.9
Master's Degree or equivalent	27	62.8
Total	43	100

Source: Field Survey, (2019)

4.2.5 Position

Responses on the various positions of respondents were received, the various manager included; Quantity surveyors, Engineers, Project managers, Architect and site supervisor. Quantity Surveyors deal with measurement and control cost of works (which include waste minimization) therefore it was important to get some data from these ones too. The engineers also plan, mark out leveling before any building work takes place on site, Project managers plan, execute, supervise and close projects. Architects design the entire building, even if its complex, site supervisors organizes construction work and sees to it that all safety hazards and measures are under control. Hence the *Table 4.6.* gives a clear view of the positions

Table 4.6 Position

Profession	Frequency	Percentage
Quantity Surveyor	7	16.3
Engineer	16	37.2
Project manager	8	18.6
Architect	5	11.6
Site supervisor	7	16.3
Total	43	100

Source: Field Survey, (2019)

4.2.6 Years of Work

The years of respondents working with their companies was presented in the table 4.7 below. The number of years spent executing projects in one's firm develops their knowledge in key aspects of construction management in the firm, which includes mitigation measures. Therefore, 34.9% have been in their construction companies for 1 to 5 years now, 32.6% have been in their companies for 6 to 10 years, 14% have been in there for 11 to 15 years, 11.6% have been there for 16 to 20 years, and in all 7% representing 3 respondents have been in their construction companies for 21 years and above, which was good for the study to gather accurate information from respondents in their various firms. *Table 4.7* gives full details of the number of years' respondents have worked in their companies.

Table 4.7 Years of Work

Years of Experience	Frequency	Percentage
1 – 5 years	15	34.9
6 – 10 years	14	32.6
11 - 15	6	14.0
16 - 20	5	11.6
21 years above	3	7.0
Total	43	100

Source: Field Survey, (2019)

4.3 RISK TYPE/FACTORS INFLUENCING PROJECT DELIVERY

The study delved into risk factors influencing project delivery. The study took this path to aid in attaining a successful research. The study concentrated on this area as a first objective and from the review of the literature, the study was able to gather risk factors influencing project delivery. The following factors were stated in a questionnaire and presented to respondents. Analysis of data was completed using the Mean score ranking. The table below presents results of data analyzed.

Table 4.8 Risk type/factors influencing project delivery

Risk Types/Factors	Mean	Standard deviation	Ranking
External and Site Condition Risks			
A1: In my firm, unforeseen site ground condition influence project delivery	4.26	0.581	2nd
A2: In my firm, the weather conditions always influence project delivery	3.71	1.031	3rd
A3: In my firm, difficulty in obtaining permits and ordinances influence project delivery	4.84	0.531	1st
Economic and Financial Risks			
A4: In my firm, constant rise in prices of materials influence project delivery	4.77	0.649	1st
A5: In my firm, high interest rate influence project delivery	3.26	0.621	3rd
A6: In my firm, poor cost control influence project delivery	4.09	0.366	2nd
Technical and Contractual Risks			
A7: In my firm, inadequate compensated variation order influence project delivery	3.51	0.960	2nd
A8: In my firm, defective designs influence project delivery	2.14	0.774	3rd
A9: In my firm, delay in providing detail drawing influence project delivery	4.65	0.842	1st
Managerial Risks			
A10: In my firm, defective construction work affect project delivery	1.19	0.294	3rd
A11: In my firm, inadequate project program affect project delivery	3.23	0.649	2nd
A12: In my firm, labour, material and equipment problems affect project delivery	4.09	0.546	1st

Source: Field Survey, (2019)

This part of the study threw more light on risk factors influencing project delivery. A literature review was conducted and with the help of management staff in the construction industry together with the Mean Score ranking, the results are presented above in table 4.8. The factors were presented in subtopics in which each subtopic has a number of elements. From the first risk type which is *External and Site Condition Risks*; had two elements which respondents ticked as very key in their firms, and these were ‘unforeseen site ground condition influence project delivery’

and ‘difficulty in obtaining permits and ordinances influence project delivery’. The second risk type was *Economic and Financial Risks*, which also had two factors ticked as very key under economic and financial risk and this was; ‘constant rise in prices of materials influence project delivery’ and poor cost control influence project delivery. The next type was *Technical and Contractual Risks*, which had only one element chosen as key by the respondents in their firms, this was ‘delay in providing detail drawing influence project delivery.’ Next, is the *Managerial Risks*, respondents stated one strong risk factor under this type which is ‘labour, material and equipment problems affect project delivery’.

Under the *External and site condition risk*, which was mentioned by De la Cruz et al. (2006) that, whenever factors of risk are being mentioned, the occurrences like ground conditions and conditions of site must be taken into consideration, together with the restrictions of time bounded on the project from the owner. Most at times management take conditions of site and ground conditions for granted, these factors end up showing certain characteristics that affects the project in the course of execution. Example: water log area needs to be checked before construction beginnings. Taking the risk of not checking the condition of a land can influence project delivery.

Under *economic and financial risk*, by Berko (2007) said that, a huge percentage of about 70, of projects constructed in Ghana are funded by foreign countries but not the government of this country. Hence, when these agencies who are foreigners funds the project, it ends up in slowing down the project. Financial markets systems that are poor, inflation amongst variables connected with economic risk issues which influences the advancement of projects (Agyakwa-Baah, 2007; Denini, 2009). Anytime management decides to pay less attention on the constant rise in prices of materials and poor cost control, the project delivery gets affected. Management must ensure to add

up some contingencies to cater for prices that may rise so as to avoid delays in the execution of project and the purchasing of materials.

Technical and Contractual Risks, Ofori (1994) also mention the element ranked high by respondent, in which he stated that, technical ineffectiveness of persons who design have led to poor designs, which influences project delivery. Delay in providing detail drawing influence project delivery, this factor was ranked high by respondents. This is because some managements of construction firms take the risk of executing projects without detailed drawings, and this is a huge risk factor to project execution. Management must ensure to have all drawings needed to execute project and ensure to inspect that all drawings are in order to support a successful project delivery.

Lastly, under the *Managerial Risks*, according to (Berko, 2007; Agyakwa-Baah, 2009) material and equipment problems has a high possibility to affect project delivery. Most construction firms, don't put in much efforts when it comes to labor, material and equipment's. Most management normally take the risk of choosing unskilled workers and hiring of low quality equipment's, in which this affects projects delivery. Management must ensure to put skilled labour, and high quality materials and equipment to ensure successful project delivery. All the findings selected by respondents were key factors also mentioned in the literature review. And with the help of the Mean score ranking this was achieved.

4.4 RISK MITIGATING STRATEGIES

The study delved into risk factors influencing project delivery. The study took this path to aid in attaining a successful research. The study concentrated on this area as a first objective and from the review of the literature, the study was able to gather risk factors influencing project delivery. The following factors were stated in a questionnaire and presented to respondents. Analysis of data was completed using the Mean score ranking. The table below presents results of data analyzed.

Table 4.9 Risk mitigating strategies

Risk Mitigating Strategies	Mean	Standard deviation	Ranking
Risk Acceptance			
B1: In my firm, there is information to forecast and identify future risks	4.51	0.668	1 ST
B2: In my firm, there is low failure rate when risk acceptance level is effectively estimated	3.09	1.288	3 RD
B3: In my firm, there is constant risk estimation and prediction	1.86	0,675	4 TH
B4: In my firm, risk acceptance decisions are part of the risk estimation model	3.86	0.467	2 ND
Risk Avoidance			
B5: In my firm, there is constant design of risk causes	0.95	0.653	4 TH
B6: In my firm, project that poses greater risk are cancelled or avoided	2.44	0.908	3 RD
B7: In my firm, established policies and procedures helps to foresee and avoid high risk situations during project execution	3.21	0.514	2 ND
B8: In my firm, project are constantly screened to avoid unwanted risks	4.65	0.650	1 ST
Risk Transfer			
B9: In my firm, there are risk strategy to transfer risk to appropriate parties such as suppliers	2.84	0.374	2 ND
B10: In my firm, there exist insurance policies to ensure risk transfer when risk occurs	4.81	0.450	1 ST
B11: In my firm, there is careful analysis of risk based on probabilities	1.72	0.630	3 RD
B12: In my firm, contract terms are thoroughly scrutinized since they provide a means for risk shift or transfer	1.26	1.136	4 TH
Risk Elimination			
B13: In my firm, there exist integrated catastrophic model for risk prevention or elimination	4.65	0.482	1 ST
B14: In my firm, there exist risk related communication strategy	2.07	0.884	3 RD
B15: In my firm, there exist systems for identifying weak links with the potential of creating risks	3.70	0.465	2 ND
B16: In my firm, there is system for auditing key material suppliers	1.35	0.613	4 TH
Risk Reduction			
B17: In my firm, risk prioritize tools are used to severity of risk occurrence	2.67	1.459	3 RD
B18: In my firm, risk controls are implemented to reduce risk	3.07	0.593	2 ND
B19: In my firm, thorough risk assessment or evaluation is done always	4.26	0.441	1 ST
B20: In my firm, risk diversity strategies are adopted to control risks	2.67	1.459	3 RD

Source: Field Survey, (2019)

This part of the study presents strategies for mitigating risk factors, a number of articles in regard to the research area was sought for, in which assisted in arriving at strategies for mitigating risk factors. The strategies were presented in subtopics in which each subtopic has a number of elements as seen in the table 4.9 above. The various strategies include; risk acceptance, risk avoidance, risk transfer, risk elimination and risk reduction.

Under the first strategy which is *Risk Acceptance*, two of the elements under this strategy was selected as key strategies, and these are “there is information to forecast and identify future risks” and there is constant risk estimation and prediction. According to a study by Akintoyne and MacLeod (1997) and also in the study of Agyakwa-Baah (2007) this two factors were similarly mentioned in their study. When management forecast and identify future risks”, this will help make plans towards how these risk can be managed and also identify certain methods or approaches in preventing or reducing these future risk ahead after forecasting. A constant risk estimation and prediction also helps in managing risk factors by supporting or reducing the risk encountered.

Secondly, one element was ranked very key, which was “project is constantly screened to avoid unwanted risks” under the strategy *Risk Avoidance*. Even though Flanagan and Norman (1993) didn’t mention the actual statement, they stated that effective approaches can be approved in the ways of avoiding risk, therefore there must be other approaches like regular screening to avoid unwanted risk as mentioned by the respondents.

The next strategy, the *Risk Transfer* also went through the same process where by one of the statements under this strategy was ranked very important and the factor was “there exist insurance policies to ensure risk transfer when risk occurs”. From the table 4.9 above, “there exist integrated

catastrophic model for risk prevention or elimination” and “there exist systems for identifying weak links with the potential of creating risks” were selected as key by respondents under the strategy *Risk Elimination*. Management must ensure to put in place policies to manage risk and ensure effective risk transfer, where by this can also aid in the prevention and elimination of risk as these policies and models are put in place.

In the table above, *Risk Reduction*, was also considered by respondents, where by one element was chosen as a strong element under this strategy and this is “thorough risk assessment or evaluation is done always”. According to Piney, (2002), it is not mostly advisable to always focus on eliminating risk but rather, the approval of one methods will deliver in decreasing the impact of risk on a project. With the help of these strategies, the mitigating critical risk factors can be attained. A consistent risk assessment and evaluations aids in knowing risk ahead and what to do to prevent or reduce these risk. Hence, it is important for management to consider consistent risk assessment and evaluation and this should be done by a skilled personnel in the various construction firms.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1 INTRODUCTION

The research aim was to propose strategies for mitigating risk factors on project delivery. In this chapter, the objectives to the research is to assist in achieving the aim of the research at all the sections of the study. This includes the chapter one which introduced the study, chapter two, that focused on the review of the literature, chapter three, was mainly on the method of the research, chapter three light on the entire analysis of data, and this chapter will have its focus on the conclusion and recommendations for the study. Factors that were highly selected in achieving the study was mentioned in this chapter. In all, this chapter presents the conclusions of the study.

5.2 SUMMARY TO THE RESEARCH OBJECTIVES

- To identify type of risks or risk factors that influence project delivery
- To examine risk mitigating strategies adopted by construction companies

5.2.1 Objective “A”: To identify type of risks or risk factors that influence project delivery

The research was able to attain this objective, by identifying the risk factors that influences project delivery. After the background to the study, the various areas were presented in the literature review, Project management and delivery, overview of risk factors, risk in projects, risk and uncertainty, sources of risks, project Risk Management on project delivery, risk management, agents of risk management, external factors of risk on project delivery in Ghana, and risk management approach to improve project delivery. These areas gathered above, helped in

gathering some information relating to the first objective. From the literature review, risk factors that influence project delivery were presented to persons to answer. The risk factors were ranked under these topics external and site condition risks, economic and financial risks, technical and contractual risks and managerial risks. All these headings had statement that were under them for respondents to rank if they agree or disagree. The various factors ranked high under these headings includes: unforeseen site ground condition influence project delivery, difficulty in obtaining permits and ordinances influence project delivery, constant rise in prices of materials influence project delivery, poor cost control influence project delivery, delay in providing detail drawing influence project delivery and finally, labour, material and equipment problems affect project delivery. These statement under the various subtopics were ranked high as risk factors. The study came to conclusion under this objective, where by the factors under this objective were identified. Therefore, the objective above was well achieved.

5.2.2 Objective “B”: To examine risk mitigating strategies adopted by construction companies.

It was aimed by the study that; it can't find risk factors without researching on mitigating strategies to manage these factors. Therefore, literature in this area was were presented. And with the help of respondents who were management officers in five top selected construction firms, that was selected by the researcher. These firms included Berock ventures, Consar, Multi Tridax complex, Tonyam company Ltd and Core Construction Ltd. With this, the main goal under this objective was achieved. The Mean score raking was used to analyze the results of the respondent's data. The risk mitigating strategies were also ranked under the various headings, there are: Risk acceptance, risk avoidance, risk transfer, risk elimination and lastly risk reduction. The various

strategies were mentioned as the highly ranked and the key strategies for risk mitigating strategies, the mentioned strategies are: there is information to forecast and identify future risks, project are constantly screened to avoid unwanted risks, to ensure insurance policies to ensure risk transfer when risk occurs, to ensure integrated catastrophic model for risk prevention or elimination and the final strategy ranked as effective was; thorough risk assessment or evaluation is done always. The rest of the strategies were also ranked but these strategies were selected as key strategies for mitigating risk factors.

5.3 CONCLUSION

In conclusion, the main aim of the study, which was to propose strategies for mitigating risk factors on project delivery, was mainly targeted and achieved. All objectives under this subjected was successfully attained. The study used the quantitative method, through which the purposive sampling and convenience sampling techniques supported in selecting the respondents from the various construction companies selected. The results of the data given gathered from respondents was ranked throughout using the Mean score ranking. Out of twelve risk factors that were selected under four headings, six of the factors were ranked as the main risk factors. In the second objective, out of twenty mitigating strategies that were selected under five topics, five of them were ranked as key mitigating strategies for minimizing the various risk factors. This assisted the study to achieve its key goal.

5.4 RECOMMENDATIONS

The following recommendations were mentioned to be considered;

- The construction sector is directed to consider the significance of risk factors which will help them enable appropriate management of these risk in construction.
- In directive to advance cost estimation in construction there is the necessity to do analysis of risk which can help bring out all risk factors, that must be dealt with.
- An operative way of attacking risk is to ensure that one adequately prepared for it. Therefore, the study recommends that all construction companies must a plan to manage risk.
- It is recommended that companies should have competent estimating staffs through the life of the project from preparation of budget, to design, and tendering and all the various stages of undertaking a construction work.
- It must be ensured that, there are contingencies that are adequate to handle the instability of market prices and also for estimations that are done.

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QUESTIONNAIRE

This research seeks to examine mitigating critical risk factors on project delivery of construction firms in Ghana. Any information provided would be confidential. I will be grateful if you could fill the questions below for me. Thank you.

Section A: Demographic Data

1. Name of Construction Firm -----
2. Gender: Male () Female ()
3. Age : () 20 – 29 years () 30 – 39 years () 40 – 49 years () 50 – 59 years ()
60 years above ()
4. Highest level of formal education: Secondary School or equivalent () Diploma or
equivalent () Bachelor’s Degree or equivalent () Master’s Degree or equivalent ()
Doctorate Degree or equivalent () Others specify
5. Position in construction firm -----
6. How many years have you worked with your construction firm : 1-5 years () 6-10 years
() 11-15 years () 16 – 20 years () 21 years above ()

SECTION B: RISK TYPE/FACTORS INFLEUCING PROJECT DELIVERY

7. Please indicate your acceptance for the questions in the table in relation to the scale
below;
1= Strongly Disagree (SD); 2 = Disagree (D); 3= Neutral (N); 4 = Agree (A) and 5=
Strongly Agree (SA)

Risk Types/Factors	SD	D	N	A	SA
External and Site Condition Risks					
A1: In my firm, unforeseen site ground condition influence project delivery					
A2: In my firm, the weather conditions always influence project delivery					
A3: In my firm, difficulty in obtaining permits and ordinances influence project delivery					
Economic and Financial Risks					
A4: In my firm, constant rise in prices of materials influence project delivery					
A5: In my firm, high interest rate influence project delivery					
A6: In my firm, poor cost control influence project delivery					
Technical and Contractual Risks					
A7: In my firm, inadequate compensated variation order influence project delivery					
A8: In my firm, defective designs influence project delivery					
A9: In my firm, delay in providing detail drawing influence project delivery					
Managerial Risks					
A10: In my firm, defective construction work affect project delivery					
A11: In my firm, inadequate project program affect project delivery					
A12: In my firm, labour, material and equipment problems affect project delivery					

8. Please can you outline some of the risks types or factors that influence projects delivery in your construction firm -----

SECTION C: RISK MITIGATING STRATEGIES

9. Please indicate your acceptance for the questions in the table in relation to the scale below;

1= Strongly Disagree (SD); 2 = Disagree (D); 3= Neutral (N); 4 = Agree (A) and 5= Strongly Agree (SA)

Risk Mitigating Strategies	SD	D	N	A	SA
Risk Acceptance					
B1: In my firm, there is information to forecast and identify future risks					
B2: In my firm, there is low failure rate when risk acceptance level is effectively estimated					
B3: In my firm, there is constant risk estimation and prediction					
B4: In my firm, risk acceptance decisions are part of the risk estimation model					
Risk Avoidance					
B5: In my firm, there is constant design of risk causes					
B6: In my firm, project that poses greater risk are cancelled or avoided					
B7: In my firm, established policies and procedures helps to foresee and avoid high risk situations during project execution					
B8: In my firm, project are constantly screened to avoid unwanted risks					
Risk Transfer					
B9: In my firm, there are risk strategy to transfer risk to appropriate parties such as suppliers					
B10: In my firm, there exist insurance policies to ensure risk transfer when risk occurs					
B11: In my firm, there is careful analysis of risk based on probabilities					
B12: In my firm, contract terms are thoroughly scrutinized since they provide a means for risk shift or transfer					
Risk Elimination					
B13: In my firm, there exist integrated catastrophic model for risk prevention or elimination					
B14: In my firm, there exist risk related communication strategy					
B15: In my firm, there exist systems for identifying weak links with the potential of creating risks					
B16: In my firm, there is system for auditing key material suppliers					
Risk Reduction					
B17: In my firm, risk prioritize tools are used to severity of risk occurrence					
B18: In my firm, risk controls are implemented to reduce risk					
B19: In my firm, thorough risk assessment or evaluation is done always					
B20: In my firm, risk diversity strategies are adopted to control risks					

THANK YOU