UNIVERSITY OF EDUCATION, WINNEBA

COLLEGE OF TECHNOLOGY EDUCATION, KUMASI

RISK MANAGEMENT ON MASS HOUSING ESTATE

A CASE STUDY IN THE UPPER WEST REGION.

LUKE SEGDONG

NOVEMBER, 2017

UNIVERSITY OF EDUCATION, WINNEBA

COLLEGE OF TECHNOLOGY EDUCATION, KUMASI

RISK MANAGEMENT ON MASS HOUSING ESTATE

A CASE STUDY IN THE UPPER WEST REGION.

LUKE SEGDONG

7151190012

A project report in the department of CONSTRUCTION AND WOOD TECHNOLOGY EDUCATION, Faculty of TECHNICAL EDUCATION, submitted to the school of Graduate Studies, University of Education, Winneba, in partial fulfilment of the requirement for the award of a Master of Technology (Construction Technology) Degree

NOVEMBER, 2017

DECLARATION

STUDENT DECLARATION

I LUKE SEGDONG declare that this project report, with the exception of quotation and reference contained in published works which have all been identified and duly acknowledged, is entirely my own original work and it has not been submitted either in part or whole, for another degree else where

SIGNATURE …….

DATE…………..

SUPERVISOR'S DECLARATION

I hereby declare that the preparation and presentation of this project report was supervised in accordance with the guidelines for supervision of dissertation as laid down by the University of Education, Winneba.

SIGNATURE……

DATE ……..

NAME OF SUPERVISOR: Dr. Nongiba Alkanam Kheni

ACKNOWLEDGEMENTS

The writing of this project report was made possible through the contribution of many people. I would therefore like to acknowledge these individuals for their invaluable support and encouragement. I am greatly indebted to Dr. Nongiba Alkanam Kheni who has guided me through the writing of this dissertation. I wish to express my profound gratitude to him for his guidance, constructive criticism and constant encouragement for the completion of this work. I indeed appreciate his concern and interest in this work and many sacrifices he has made in the midst of his tight schedule to call me constantly to edge me up. My thanks also goes to all contractors in the study area who assisted me in this studyFinally to my family and relations especially to my dear wife and children for the sacrificesthey made allowing me to be away from home for studies. May God richly bless them.

DEDICATION

I dedicate this academic piece first to the almighty God who gave me strength and courage; then to my wife Madam Anacletta V. Segdong, my children and Mr.Zaachi for their unflinching support and encouragement.

TABLE OF CONTENTS

CONTENT **PAGE**

DECLARATION ii

ACKNOWLEDGEMENTS iii

DEDICATION iv

TABLE OF CONTENTS v

LIST OF TABLES iix

LIST OF FIGURES ix

ABSTRACT xi

CHAPTER ONE : INTRODUCTION

1.1 Background of the Study 1

1.2 Statement of the Problem 3

1.3 Aim and Objectives of the Research 4

1.4 Research Questions 4

1.5 Significance of the Study 5

1.6 Limitation of the Study 6

1.7 Delimitation of the Study 6

1.8 Organization of the Study 7

CHAPTER TWO : LITERATURE REVIEW

2.1 Introduction 8

2.2 Definition of terms and basic issues 8

2.3 Features of mass housing estate projects 10

2.3.1 Concept of Risk Management in mass housing estate 15

2.3.2 Types of risk 19

2.3.3 Benefits of Risk Management.....20

2.3.4 Limits of Risk Management.....22

2.3.5 Risks in Construction Projects 23

2.4 Project Life Cycle 24

2.4.1 Pre-project Phase 29

2.4.2 Planning and Design Phase.....29

2.4.3 Contractor Selection Phase 30

2.4.4 Project Mobilization Phase 31

2.4.5 Project Operation Phase.....31

2.4.6 Project Handing over and Termination Phase 33

2.5 Risk Management Process 34

2.5.1 Risk identification process.....36

2.5.2 Risk Categorization and Risk Urgency Assessment.....40

2.5.3 Risk Response Process.....40

2.5.4 Risk Control.....41

2.3.1 Risk Avoidance/Prevention 42

2.5.5 Risk Reduction/ Mitigation.....43

2.6 Transfer.....44

2.6.1 Retention.....44

2.6.2 Monitoring 45

2.6.3 Exercising control 46

CHAPTER THREE : STUDY AREA AND METHODOLOGY

3.1 Introduction.....48

3.2 Profile of the Study Area 48

3.3 Research Design.....50

3.3 Study Population.....52

3.4 Sampling Techniques.....52

3.4.1. Sample Units and Size 53

3.5 Data Collection 54

3.5.1 Questionnaires Design 55

3.5.1.1Demographic Information.....55

3.5.1.1.1 Project profile.....56

3.5.1.1.2 Respondent's opinion on the risk management on mass housing estates.....57

3.5.2 Validity and Reliability of Research Instruments.....57

3.5.2.1 Reliability of the research 58

3.6 Data Analysis and Presentation 58

CHAPTER FOUR : ANALYSIS AND DISCUSSION OF RESULTS

4.1 Introduction.....59

4.2 Socio-Demographic Characteristics of Respondents.....59

4.3 Risk management practices in mass housing projects 61

4.4 Potential risk factors and their impacts.....64

4.4.1 Nature of involvement in the construction industry 66

4.4.2 Prevailing risk factors in mass housing construction.....67

4.5 Ways of managing risk in estate development 69

CHAPTER FIVE : SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction.....72

5.2 Summary of key Findings 72

5.2.1 Risk management practices in mass housing projects 72

5.2.2 Potential risk factors and their impacts 73

5.2.3 Ways of managing risk in estate development 74

5.3 Conclusion 75

5.4 Recommendations 75

5.5 Suggestions for Further Research 76

REFERENCES 78

APPENDIX 84

LIST OF TABLES

TABLE **PAGE**

Table 2.1 Phases, Stages, and Steps in the PLC 27

Table 2.2 PLC for a construction project.....28

Table 2.3 Risk Identification Techniques 38

Table 2.4 Risk Categories divided into Groups 39

Table 4.1 Demographic Characteristics of Respondents 60

Table 4.2 longevity in construction industry 62

Table 4.3 some risk management practices in the Upper West Region.....63

Table 4.4 shows type of contract certificate own by building contractors 65

Table 4.5 shows nature of involvement in the construction industry 67

Table 4.6 below illustrates the level of impact on productivity.....67

Table 4.7: shows the appropriate managing of risk in the industry 69

Table 4.8: Shows source of funding 70

LIST OF FIGURES

FIGURE **PAGE**

Figure 3.1 Map of Upper West Region.....49

ABSTRACT

Mass housing industry is highly risk prone, with complex and dynamic projects environment which create an atmosphere of uncertainty and risk. The industry is vulnerable to various technical, managerial, socio- political among other risks. The track record to cope with these risks has not been good in the industry. As a result, the people working there bear various failures such as;inadequate specifications, errors in designs etc. with the overall consequence of poor management of risk. The aim of the study was to examine risk management practice of mass estate housing projects and to develop a framework of recommendations towards effective risk management of such housing units. The research employed the use of the non-experimental descriptive cross sectional survey research design where three districts of the Upper West Region were considered; Wa Municipal, Jirapa and Nandom districts. Purposive sampling technique was employed in administering the questionnaires to 100 contractors.The research findings showed that about 98 percent of contractors do identify the risk associated with contracts they are about to execute while 96 percent of them do assess the impact level of the various forms of risk identified. Majority of the contractors also do analyze the risk before the execution of the project as well as 88 percent does risk monitoring and control. The respondents attest to the fact that risk factors exist in their operating environments and that they are quite aware of their potential role in lowering productivity. The following were identified as the prevailing risk factors; financial risk, management risk, environmental risk, technical risk, socio-political risk and others. The financial risk was however seen as the most nagging factor in the mass housing construction industry. The study recommends that before handing over the site all parties to the contract should brainstorm the possible challenges expected in the project and a regular in-house workshop with stakeholders to help them understand effective risk management processes in the life of the project.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The rapid increase in population with its consequence of urbanization in specific terms has made shelter needs one of the most critical challenges that confront the country currently; of which the Upper West Region is no exception. The situation of housing inadequacy is challenged in both quantitative and qualitative dimensions, hence requiring urgent attention (Housing Profiling 2011). In attempt to ensure sustainable housing and equitable distribution of houses across all 10 regions of Ghana, Governments in the past, as part of coordinated efforts to solve the housing deficit, engaged in the construction of: Low Cost Houses, Government Estate Houses and Rural Housing Co-operatives among others. The National Housing Policy(2015) has it that "In order to meet the housing challenge in the country, Government aims to establish a sustainable housing process which will eventually enable all Ghanaians to secure housing with secure tenure, within a safe and healthy environment and viable communities in a manner that will make a positive contribution to a democratic and integrated society, within the shortest possible time frame." Apropos this proposal, mass housing estate has therefore been acknowledged as a way towards meeting the housing deficit in the country; an enterprise not only to be embarked by Governments, but also the private sector estate developers.

Mass housing is the provision of large number of housing units for a selected or prospective group of people or in some case, the general public (Adedayo 2012). Mass housing projects in particular have more inherent risk than the traditional

method of procurement due to the involvement of stakeholders with varied interest in addition to economic, political, social and cultural conditions in which they are meant to prevail (Carbonara, Costatino, Pellegrino & Sciancalepore, 2011). In addition, although the complexity of the environment in which we live and act makes it very difficult to predict and quantify the risk involved, the development of risk management techniques should make it possible to better identify and reduce risk (Han-Suck Song 2009). Risk management therefore becomes crucial to the successful implementation of Mass Estate Housing.

Risk is an uncertainty inherent in plans and the possibility of something happening that can affect the prospect of achieving project goals. Risk is present in all the activities of project right from the conception stage to handing over stage. Risk management therefore includes the processes concerned with identifying, analyzing and responding to project risk. This can be done either by maximizing the results of positive events or minimizing the consequences of adverse events. In recent times, financial turmoil has revealed that risk management (Patel Ankit Mahendra, 2014) should not only be possible, but also necessary, to improve risk management at all levels of the economy: at household, cooperate, regional, national and international levels.

As Mass Housing Estate by itself is very complex and requires a cross disciplinary task; people with different skill set and expertise and the coordination of wide range of interrelated activities, with residents and neighbors are to be satisfied, design teams, contractors and consultants to be managed, time scales, cost and contingencies to be monitored and prospective tenants to be satisfied ((Brade, 1998; Shimpi, 1999),

in the Upper West Region where this study is conducted as a case, it is necessary to identify and implement risk management techniques in order to identify and analyze the risks factors associated with mass housing to ensure that standards are met and profits maximized through efficient and effective use of resources. This will make industry safe and attractive to Governments, stakeholders and other investors who would want to go into this area of development.

1.2 Statement of the Problem

In Ghana, majority of housing are produced informally by the private informal sector involving especially low income earners. As the conditions surrounding the provision of housing by low income earners are hardly addressed in the Ghana's Housing policy, the housing ministry itself fails to plan for a comprehensive approach to housingthat accepts the right of poor people to live in good conditions. The unequal distribution of power within the civil society has resulted in the skewing of public and private housing development to suit the needs of only the more powerful groups (UN Habitat 2011). Consequently, low income earners continue to perpetuate these self-help housing projects to meet their need but in an unguided manner that expose them to adverse risk conditions. Ferguson (2003) stated that self-help housing is typically unsupported and unguided and suffers from severe drawbacks.

The Government of Ghana, having realized the significance of mass estate housing as a way of meeting the needs of all people across all social classes, however, is faced with "the monstrous risk of how to clearly articulate and refine the process in such a way that, it can be implemented in a nationwide basis (Ministry of Works and Housing, 2000)". Against this background, this study seeks to identify the risk

associated with mass estate development and to make recommendation for effective risk management in the real estate section in the upper west region.

1.3 Aim and Objectives of the Research

The aim of this study is to examine risk management practice of mass estate housing projects and to develop a framework of recommendations towards effective risk management of such housing units.The specific objectives are as follows:

- to identify risk management practices in mass estate housing units in the Upper West Region;
- to identify the potential risk factors that has significant impact on mass estate housing units in the Upper West Region;
- to evaluate the impact of risk factors on the performance of mass estate housing projects in the Upper West Region; and,
- to develop a framework of recommendations towards effective risk management of mass estate housing units in the Upper West Region.

1.4Research Questions

To ensure that the aims and objectives of the research are achieved, the study will be guided by the following questions.

- What are the risk management practices in mass estate housing units in the upper west region?
- What are the potential risk factors that has significant impact on mass estate housing units in the Upper West Region?
- What is the impact of risk factors on the performance of mass estate housing projects in the upper west region?

- How can risk associated with mass estate housing units in the Upper West Region be effectively managed?

1.5 Significance of the Study

While the provision of mass estate units may seem easy and stress relieving, Lientz and Larssen(2004) are of the view that, the rapid development of housing schemes has efficiently facilitated the increase in construction risk. As believed, the impacts of construction risks are usually in terms of cost, time and quality of output. Risk Management, herein discussed, as applicable to mass estate units, though described as the most difficult area within construction management (Winch, 2002; Potts 2008), its application will improve project success and profit maximization. Not only will risk management increase financial turnovers and ensure the achievement of project goals within the upper west region, it will also shape the players involved (i.e. contractors consultants, clientsetc) in risk management; making them proactive and enhance their problem solving skills. Thus the present study will contribute to the existing body of literature including the aforementioned.

Estate developers could benefit from clear understanding and awareness of potential risks in the project. In other words, risk management contributes to a better view of possible consequences resulting from unmanaged risks and how to avoid them. Finally, the findings of the present on the likelihood of an undesirable eventsthat preempt project success, and recommendations concerning best risk management practices drawn herein, will be beneficial in the formulation of policies and strategies towards effective risk managementin themass estates in the Upper West Region.

1.6 Limitation of the Study

Time was a major constraint in this study. As a result of limited time within which to complete this work, the study was carried out using a case study approach. The study was further narrowed down to contractors and consultants in the region from whom primary data was obtained. Thisalso posed a limitation since there could be some biases regarding the informationobtained. In dealing with this limitation, the study adopted objective questionnaires andinterview toguide their perception of risk management practices. Again,respondents were assured of their confidentiality in order to give information thatrepresented the facts and figures on the ground and as important measure to these limitations, time and resources were effectivelymanaged to achieve the objectives of the study within the stipulated time frame forcompletion of the work.

1.7 Delimitation of the Study

Due to time constrain, the research considered technical risk and common source of risk which included: inadequate site investigation, incomplete Designs, inappropriate specification, design error, changes in project scope, and uncertainty of materials available for mass housing estate only and did not delve into other categories ofrisk like financial risk (payment delay, inflation) and environmental risk (i.e. natural disaster, weather implication). Emphasis is placed mainly on risk management on technical and common source of risk on mass housing estate and procedures fund in literature consulted for the purpose of this study.

1.8 Organization of the Study

This study is organized in five chapters. Chapter one presents the background of the study, the objectives of the study, research problems, significance of the study, limitation of the study, delimitation of the study. Chapter two, literature review involving risk management in the mass housing units, Classification of risk factors that undermines project success in mass estate and risk analysis and risk response. The Chapter threeexplains the research methods andmethodology that was employed in the study. Chapter four presents survey results and analysis of data that was collected. In chapter five thefindings, recommendations and conclusion of the study are presented.

CHAPTER TWO

LITERATURE REVIEW

2.1Introduction

As literature review, this chapter examines existing literature on definition of pertinent issues, conceptual and theoretical perspectives of risk in mass housing construction, the concept of risk management, benefits attached to risk management, limits of risk, risk management practices, potential risk factors that have significant impact on mass estate housing units, impacts of risk factors, and effective ways of managing risk associated issues on mass housing.

2.2 Definition of terms and basic issues

Mass housing was created by an act of the Massachusetts Legislature in 1996 as an independent public authority charged with increasing affordable rental and for-sale housing in Massachusetts. Since making our first loan in 1970, the agency has provided more than $19 billion in financing for the construction and preservation of affordable rental housing and for affordable loan products for homebuyers And home owners (Affordable Housing Trust Fund, 2010).

Construction projects are said to be unique and share distinct physical, organizational, and operational characteristics from one project to another. The physical, organizational, and operational features of projects have significant impact on the initiation, planning, procurement organization, decisions, and management and consequently contribute hugely to construction project delivery success or failure. Mass housing projects (MHPs) share attributes and characteristics that make their management inherently more difficult and distinct in comparison to “one-off”

traditional construction building projects and thus require distinct management approaches and skills in MHP delivery (Adinyira 2013) .

According to Enshassi and Burges (1991), the unique nature and characteristics of MHPs often influence managerial inefficiencies and communication ineffectiveness among the projects team in the delivery. The rapid increase in population with its consequence of urbanization in specific terms has made shelter needs one of the most critical challenges that confront the country currently; of which the Upper West Region is no exception. The situation of housing inadequacy is challenged in both quantitative and qualitative dimensions, hence requiring urgent attention (Housing Profiling 2011).

In attempt to ensure sustainable housing and equitable distribution of houses across all 10 regions of Ghana, Governments in the past, as part of coordinated efforts to solve the housing deficit, engaged in the construction of: Low Cost Houses, Government Estate Houses and Rural Housing Co-operatives among others. The National Housing Policy(2015) has it that "In order to meet the housing challenge in the country, Government aims to establish a sustainable housing process which will eventually enable all Ghanaians to secure housing with secure tenure, within a safe and healthy environment and viable communities in a manner that will make a positive contribution to a democratic and integrated society, within the shortest possible time frame." Apropos this proposal, mass housing estate has therefore been acknowledged as a way towards meeting the housing deficit in the country; an enterprise not only to be embarked by Governments, but also the private sector estate developers.

Based on the attributes of mass housing, it is clearly evident that the main underlining themes in most definitions of mass housing are large unit production, multiple site location, and repeated schemes. However, it failed to incorporate the managerial and contractual connotations of the project that make them distinct compared to traditional one-off construction building projects. In the context of this research, it is very central to highlight the definition of mass housing project as follows: The design and construction of standardized multiple domestic house-units usually in the same or several geographical locations, executed within the same project scheme and under the same management and contract. Edmonds and Miles (1984) recommended that an annual production rate of 10 house-units per 1000 populations for developing countries is very suitable to meet their present and future housing needs. On the basis of this, the study adopted a minimum delivery of 10 units per scheme as a precondition for the housing scheme to be accepted as mass housing delivery.

2.3 Features of mass housing estate projects

Mass housing projects (MHPs) share attributes that are significantly different from "one-off" construction building projects. These attributes of MHPs influence the operational, organizational, and managerial actions during the construction process. This invariably makes planning concepts and managerial interventions on "one-off" traditional building projects more likely non applicable to MHPs. For instance, it is well noted that whereas Gantt chart is more suitable for planning traditional building projects, line of balance is most suited for mass housing projects (Manu, et al., 2010)

Project features (PF) or characteristics thus refer to the physical and managerial attributes of projects which define the technical nature of the work. The lack of

consistency and agreement in the approach for classifying construction projects remains a critical challenge. The approach in determining the features by assessing the related cost, size of project, number of participants, volume of resources, and managerial and construction challenges has been the dominant criteria used (Crawford, 2005). It can be said that, in management practice, operational and organizational tasks are the key components of effective management systems and as such building efficient management concepts require understanding of the operational and organizational tasks requirement related to the project. This was influenced by the theoretical underpinning that all construction building projects share distinguishing "physical, operational, and organizational" features and these attributes have implications for its management and success. Also, Crawford et al. (2005) further contended that project management concepts must rigorously be pursued to embrace the unique attributes of projects life cycle models, methods, planning, execution, and organization so as to increase delivery success.

Risk management is an important part of the management process, which the construction of mass housing projects are not exception .This part is divided into four parts. The first part is a description of a project organization structure. Its purpose is to provide a reader with general information about a construction project and its organization. The second part introduces concept of risk management and provides definitions of terms used in this process. The three part looks at the various phase, stages and steps in the project life cycle. Finally, the theoretical concept of risk management process and methods used for risk assessment are presented.

A construction project is characterized not only by its size and complexity, but also by various events and interactions which take place during the life cycle of a project. The work environment is constantly changing due to the number of

participants involved, the project duration and the events along the way (Ewelina & Mikaela, 2011 cited in Sanvido *et al.* 1992). In the construction industry, the most common way of working is within project teams, which often are only temporary organizations. Winch (2002) describes a project as relying on human and equipment resources. Young (1996) defines a project as a collection of linked activities, carried out in an organized manner with a clearly defined start point and finish point, to achieve some specific results that satisfy the needs of an organization as derived from the current business plans. Kerzner (2003) projects are any series of activities and tasks that have a specific objective to be completed within specifications; have defined start and end dates; have funding limits; consume human and nonhuman resources and are multi-functional. A project has also been defined as, an endeavor in which human, material and financial resources are organized in a novel way, to undertake a unique scope of work of given specification, within constraints of cost and time, so as to achieve unitary, beneficial change, through delivery of quantified and qualitative objectives(Venter, 2005). A project may therefore be viewed as, the entire process required to produce a new product, plant, system or other specified result at a particular point in time and within an established budget (Archibald, 1976).These constellation will be different in each project, since all projects are unique. Human resources, the actors, working in the project form a project team. The aim of such a group is to achieve the objectives set for the project. Dependencies between members can be compared to a hierarchical structure. In such an organizational form, a formal leadership is executed by a project manager (Winch, 2002) who has the overall responsibility for the project, and organizes its structure and operation (Sears *et al.* 2008). Within the project team, the tasks are divided among the members, depending on their areas of expertise (Winch, 2002).

The main task for a project manager is to ensure that the project is properly managed in order to complete it in time, within budget and with required performance. These most important project factors are exposed to risks and uncertainties. The project manager should use an RMP in order to ensure that the risks have been identified, analyzed and managed. Perry (1986) some companies has a separate risk management department which is a highly specialized unit within the field of risks. Their role is to assist project managers in handling risk associated to the project. It means that risks are managed in the organization and the responsibilities are shared within the company.

Risk management has become an integral process in managing construction projects. Construction project activities are to be well calculated in-order for the deliverable to be of great use and benefit to its stakeholders. To complete most construction projects on time, minimizing cost and wastages, proper risk management techniques must be employed (Tchankova, 2002). According to Mills (2001), systematic risk management is expecting the unexpected or in other words it is a tool which helps control risks in construction projects and its objective is to introduce a simple, practical method of identifying, assessing, monitoring and managing risk in an informed and structured way.

Normally, in risk management process, the first steps will involves risk identification process which includes the prioritization process in order to identify and rank the risk based on its impact and seriousness. Risk that will have a greater impact on a project normally will be handled first and low impact risk will be handled later. Therefore, if measures or policies are not put in place throughout the project life cycle to ensure completion of construction projects on time, minimizing cost and wastages,

in order to achieve project objectives can greatly affect the project performance and cause uncertainty.

Risk management is probably the most difficult aspect of project management. A project manager must be able to recognize and identify the root causes of risks and to trace these causes through the project to their consequences. Furthermore, risk management in the construction project management context is a comprehensive and systematic way of identifying, analyzing and responding to risks to achieve the project objectives. The use of risk management from the early stages of a project, where major decisions such as choice of alignment and selection of construction methods can be influenced, is essential. The benefits of the risk management process include identifying and analyzing risks, and improvement of construction project management processes and effective use of resources (Nerija & Audrius, 2012).

The construction industry is heterogeneous and enormously complex. There are several major classifications of construction that differ markedly from one another: housing, nonresidential building, heavy, highway, utility, and industrial. Construction projects include new construction, renovation, and demolition for both residential and nonresidential projects, as well as public works projects, such as streets, roads, highways, utility plants, bridges, tunnels, and overpasses. The success parameters for any project are in time completion, within specific budget and requisite performance (technical requirement). The main barriers for their achievement are the change in the project environment. The problem multiplies with the size of the project as uncertainties in project outcome increase with size (Nerija & Audrius, 2012).

Large construction projects are exposed to uncertain environment because of such factors as planning, design and construction complexity, presence of various interest groups (owner, consultants, contractors, suppliers, etc.), resources

(manpower, materials, equipment, and funds) availability, environmental factors, the economic and political environment and statutory regulations (Nerija & Audrius, 2012). Construction projects can be unpredictable. Managing risks in construction projects has been recognized as a very important process in order to achieve project objectives in terms of time, cost, quality, safety and environmental sustainability. Project risk management is an iterative process: the process is beneficial when is implemented in a systematic manner throughout the lifecycle of a construction project, from the planning stage to completion (Nerija & Audrius, 2012).In the European Union construction is the sector most at risk of accidents, with more than 1300 people being killed in construction accidents every year. Worldwide, construction workers are three times more likely to be killed and twice as likely to be injured as workers in other occupations. The costs of these accidents are immense to the individual, to the employer and to society. They can amount to an appreciable proportion of the contract price (Nerija & Audrius, 2012).

2.3.1 Concept of Risk Management in mass housing estate

Risk is simply viewed as the probability or threat of damage, injury, liability, loss, or any other negative occurrence that is caused by external or internal vulnerabilities, and that may be neutralized through proactive action. Risk is often associated with uncertainty. Although the term RISK has come to bear some negative connotations, its management is not only about reducing downside potential or the probability of pain, but also about increasing upside opportunities or prospects for gain. Risk Management refers to a deliberate set of actions designed to identify, quantify, manage and then monitor events or actions that could lead to loss, which in most cases equates to financial loss (Lam, 2003). In fact, Risk Management in mass

housing is an active process requiring commitment and focus throughout one's managerial process. Risk Management is not just using derivatives to manage interest rate and foreign exchange exposures; it is about using a portfolio approach to manage the full range of risks faced by your institution. It is not also about establishing the right control systems and processes. It is about having the right people and the risk culture (Holmes, 2004)

Ewelina and Mikaela cited in Smith *et al.* (2006) provide a comprehensive description of the concept of RM and how it can be used in practice. According to the authors, risk management cannot be perceived as a tool to predict the future, since that is rather impossible. Instead, they describe it as a tool to facilitate the project in order to make better decisions based on the information from the investment. In this way, decisions based on insufficient information can be avoided, and this will lead to better overall performance. In the literature, RM is described as a process with some predefined procedures. The scope of its definition differs among the authors; however the core information is the same. From a number of definitions which can be found in the management literature Ewelina and Mikaela (cited in Cooper *et al.* 2005) explanation brings the essence of this concept: The risk management process involves the systematic application of management policies, processes and procedures to the tasks of establishing the context, identifying, analyzing, assessing, treating, monitoring and communicating risks (Cooper *et al.,* 2005).

Risk management process (RMP) is the basic principle of understanding and managing risks in a project. It consists of the main phases: identification, assessment and analysis, and response (Smith *et al.* 2006).All steps in RMP should be included when dealing with risks, in order to efficiently implement the process in the project (Smith *et al.* 2006).

Risk is generally uncertainty circumstances or events which can produce a positive or negative impact on a project, if it occurs. Jaffari's definition in the year 2001 was however complex as it considered loss/gain and magnitude. In other words risk is the exposure to gain or loss, or probability of it occurrence.Yakubu (2012) risk in construction projects may be defined as the likelihood of a detrimental event occurring to the project. Since the objectives of construction projects are usually stated as targets established for function, cost, time and quality, the most important risk in the construction of mass housing is failure to meet these targets. There are emphasis on the major objectives of survey on risk management actions, risk may be defined as the probability of occurrence of some unpredictable, uncertain and even undesirable events that may change the profitability on a given investment's prospect (Kartam, 2001)

Walewski and Gibson cited in RAMP (1998) risk in the construction industry is often referred to as the presence of potential or actual treats or opportunities that influence the objectives of a project during construction, commissioning, or at time of use. Risk is also defined as the exposure to the chance of occurrences of events adversely or favorably affecting project objectives as a consequence of uncertainty (Al- Bahar, 1990). Jaser (2005) defines risk as an uncertain event or condition that, if it occurs, has a positive or negative effect on a project objective. A risk has a cause and, if it occurs, has a consequence (Office of project management process improvement, 2003). Jaser cited in (Jaffari's, 2001) also defines risk as the exposure to loss/gain, or the probability of occurrence of loss/gain multiplied by its respective magnitude. Events are said to be certain if the probability of their occurrence is100% or totally uncertain if the probability of occurrence is 0%. In between these extremes the uncertainty varies quite widely. The Project Management Institute (1996)

introduced a simple definition for risk as a discrete occurrence that may affect the project for better or worse. In order to emphasize the major objectives of survey on risk management actions, risk has been defined as the probability of occurrence of some uncertain, unpredictable and even undesirable events that would change the prospects for the profitability on a given investment (Kartam, 2001).

Uncertainty is a situation in which a number of possibilities exist and which of them has occurred, or will occur, is unknown. Considering all risks are uncertain but not all uncertainty is risky (Yoe, 2000). Risks and uncertainties characterize all activities in production, services and exchange. They affect all the fundamental variables that determine planning, implementation, monitoring, adjustment, behavior and explain choices, and bring about decisions (Okema, 2001).Any definition of risk is likely to carry an element of subjectivity, depending upon the nature of the risk and to what is applied certainty exists only when one can specify exactly what will happen during the period that covered by the decision. This is not very common in the construction industry (Flanagan & Norman, 1993).In some situations, the risk does not necessarily refer to the chance of bad consequences. There may be the possibility of good consequences, and it is important that a definition of risk includes some reference to this point. Flanagan and Norman (1993) differentiated between risk and uncertainty. Risk has place in calculus of probability, and lends itself to quantitative expression. Uncertainty, by contrast, might be defined a situation in which there are no historic data or previous history related to the situation being considered by the decision maker. ADB, (2002) stated that in essence, risk is a quantity subject to empirical measurement, while uncertainty is of a non-quantifiable type. Thus, in a risk situation it is possible to indicate the likelihood of the realized value of a variable falling within stated limits-typically described by the fluctuations around the average

of a probability calculus. On the other hand, in situations of uncertainty, the fluctuations of a variable are such that they cannot be described by a probability calculus.

The Royal Society (Greene, 2001) viewed risk as the probability "that a particular adverse event occurs during a stated period of time, or results from a particular challenge." The Royal Society also states that "as a probability in the sense of statistical theory risk obeys all the formal laws combining probabilities". The problem with statistical theory is that it is only ever a guess, or an approximation of what is to occur. Risk can be considered as a "systematic way of dealing with hazards". If it is assumed that there is uncertainty associated with any prediction of hazard occurring, then there is only uncertainty because there is only ever a prediction of likely. Therefore for risk to exist there must be a hazard. The perception of hazards is entirely subjective. What one person find hazardous, his neighbor may not. This perception of hazard is centered around previous experience, cultural values and to some extent the aspect of specialist training in an area of field of expertise to which the hazard relates (Greene, 2001).

2.3.2 Types of risk

Dynamic risks concerned with making opportunities; for instance it might concern developing a new and innovative product. Dynamic risk means that there will be potential gains as well as losses. Dynamic risk is risking the loss of something certain for gain of something uncertain (Flanagan & Norman, 1993) and (NAO, 2001). Static risk related only to potential losses where people are concerned with minimizing losses by risk aversion (Flanagan & Norman, 1993). The unsystematic

and arbitrary management of risks can endanger the success of the project since most risks are very dynamic throughout the project lifetime (Baloi and Price, 2003).

2.3.3 Benefits of Risk Management

To maximize the efficiency of risk management, the risk management practice should be continuously developed during the entire project. In this way, risks will be discovered and managed throughout all the phases (Smith *et al.* 2006). The benefits from risk management are not only reserved for the project itself, but also for the actors involved. The main incentives are clear understanding and awareness of potential risks in the project. In other words, risk management contributes to a better view of possible consequences resulting from unmanaged risks and how to avoid them. (Thomas, 2009) Another benefit of working with risk management is increased the level of control over the whole project and more efficient problem solving processes which can be supported on a more genuine basis. It results from an analysis of project conditions already in the beginning of the project (Perry, 1986). The risk management also provides a procedure which can reduce possible and sudden surprises (Cooper *et al.* 2005).According to Construction Best Practice (2003), when risk management is well applied will result in a number of benefits such as:

- Minimizing uncertainty on projects or during changes in company organization.
- Better decision-making; Risk Management alone, or linked with a value management exercise, can ensure that strategic decisions are well-founded.
- Risk Management gives a hard focus on critical problems. For construction projects these will include, risks associated with design, construction and

maintenance/operation. Risk Management techniques will compliment a whole life costing approach.

- Risk Management contributes to better briefing.
- In the planning of work Risk Management allows projects with high risk to be balanced with projects of lower risk.
- Risk Management can help to ensure clear accountability-once risk are established, risk minimization can be assigned to individuals within the team.
- In the partnering context, a Risk Management exercise can help to give common purpose.

Different attitudes towards risk can be explained as cultural differences between organizations, where the approach depends on the company's policy and their internal procedures (Webb, 2003). Within the risk management, three company's approaches can be distinguished. The first one is the risk-neutral firm which does not invest much in risk management but is still aware of the most important risks. The second approach is the risk-averse, where no investments are made in order to reduce the probability of occurrence of risk. The last one is the risk-seeker where the organization is prepared to face all risks and is often called gambler. In the long term, the risk-seeking companies can get a lower profitability compared to risk-natural firms. This is because of the large investments and losses when repeating the risk management processes over and over again to ensure all risks have been managed before the risks actually occurs (Winch, 2002).

2.3.4 Limits of Risk Management

The level of risk is always related to the project complexity (Darmall and Preston, 2010). The fact that there are so many risks which can be identified in the construction industry can be explained by the project's size and their complexity. The bigger the project is, the larger the number of potential risks that may be faced. Several factors can stimulate risk occurrence. Those most often mentioned in the literature are financial, environmental (the project's surrounding, location and overall regulations), time, design and quality. Other influences on the occurrence of risk are the level of technology used and the organization's risks (Gould & Joyce, 2002).

2.3.5 Risks in Construction Projects

Due to the nature of the construction sector, RM is a very important process here. It is most widely used in those projects which include high level of uncertainty. These types of risk investments are characterized by more formal planning, monitor and control processes. The easiest way to identify risk is to analyze and draw a conclusion from projects which failed in the past. To make sure that the project objectives are met, the portfolio of risks associated with all actors across the project life cycle (PLC) should be considered (Cleland &Gareis, 2006). In the early stages of the project where planning and contracting of work, together with the preliminary capital budget are being drawn, risk management procedures should be initiated. In later stages, RM applied systemically, helps to control those critical elements which can negatively impact project performance. In other words, to keep track of previously identified threats, will result in early warnings to the project manager if any of the objectives, time, cost or quality, are not being met (Tummala & Burchett, 1999).

There are a number of risks which can be identified in the construction industry and which can be faced in each construction project regardless of its size and scope. Changes in design and scope along with time frames for project completion are the most common risks for the construction sector. The further in the process, changes in scope or design are implemented, the more additional resources, time and cost, those changes require. Project completion ahead of time may be as troublesome as delays in a schedule. Too quick completion may be a result of insufficient planning or design problems which in fact shorten the completion time but on the other hand lead to a low quality of final product and increased overall cost. Being behind schedule generates greater costs for both investors and contractors due to non-compliance with

contracted works (Gould & Joyce, 2002). And thus it is important to keep a balance in the concept of time-cost-quality tradeoff, which more widely is becoming an important issue for the construction sector (Zhang & Xing, 2010). Depending on the project scope, types of risks may differ among investments.

2.4 Project Life Cycle

A Guide to the Project Management Body of Knowledge (PMBOK® Guide) (PMI 2004) stated that a project can be defined as an attempt in a definite time period to create a product or service which is different in some distinguishing way from all similar products or services. In the context of this definition, a 'project' is usually viewed as the construction process, which starts from the inception stage and ends with the completion stage. It is a common practice in the construction industry to employ a team to control and manage construction processes; this team is known as the project management team.

Project management can be defined as the application of knowledge, skills, tools, and techniques to complete the project in order to meet its requirements. The project team manages the work of the projects, and the work typically involves fulfilling project requirements for scope, time, cost, risk, and quality (PMI 2004). Further, each project consists of work sequences or phases leading to the target and the desired level of management control. According to Stewart and Fortune (1995) the project management life cycle is domain specific in each field; for instance, development and construction of a civil engineering project is different from other projects like the development of an information technology (IT) system. Nevertheless, all project life cycles consist of a sequence which shows the activities from origin to completion.

It has been recognized for some time that projects exhibit a life cycle comprising of a number of discreet stages, which as identified by various authors can range from two to twelve . The former was related to the development of a product and was divided into two phases – product development and implementation, whereas the latter has been developed by the Royal Institute of British Architects (RIBA). It comprises inception, feasibility, outline proposals, scheme design, and detailed design, and production information, bills of quantity, tender action, project planning, and operations on site, completion and feedback (Smith *et al*., 2006).

In other branches of the construction industry the phases are identified as follows: pre-feasibility, feasibility, design, contract/procurement, implementation, commissioning, handover and operation. Different authors give these phases different names, for example, the pre-feasibility stage can be called the inception stage and the initial feasibility stage, the conception stage or the identification stage. However, the precise terminology used is unimportant. Generically, these life cycles and the phases identified are broadly similar (Smith *et al*., 2006).

Each activity or process, regardless of the area of business domain, has a beginning and an end. Similar concepts are used in the engineering world to systemize projects over time. The term project life cycle is used as a management tool to improve a project's performance. The scope of life cycles differs among industries and diverse terminology with a various number of phases used depending on the sectors. However, several terms are often used within one particular sector even though a number of phases can vary (Smith *et al*., 2006). Therefore, it is difficult to systemize and provide one common scope and definition of a project life cycle.

Smith *et al*. (2006) concluded that various forms of PLC frameworks described in the literature are a result of variety of project types. For construction projects, for instance, the PLC model can consist of eight succeeding phases including pre-feasibility, feasibility, design, contract/procurement, implementation, commissioning, handover and operation (Smith *et al*., 2006). In contrast, Pinto and Prescott (1988) present a four stage PLC developed by Adams and Brandt, and King and Cleland as the most widely used framework, where conceptualization, planning, execution and termination are the main phases. A similar model is used by Westland (2006) who identifies initiation, planning, execution and closure as principal project steps.

Yet another model was developed by Ward and Chapman (1995) which sets up concept, planning, execution and termination to constitute PLC. The same authors in another publication make a further division of each of the four phases into another number of stages and steps. Such fragmentation of the activities provides easier and more accurate potential risk identification and makes risk management processes more effective (Chapman and Ward, 2003). Due to the variety of project types, PLC requires adjustments and an individual approach. A number of further stages within each phase should be adjusted to a particular project depending on its scope and structure. Since each project is unique, a framework used in one project can turn out to be completely inapplicable in another. Table 1, shows the model proposed by Chapman and Ward (2003) that should be used as an example and not as ready-made template.

Table 2.1 Phases, Stages, and Steps in the PLC

Phase	Stages	Steps
Conceptualization	Conceive The product	Trigger event Concept capture Clarification of purpose Concept elaboration Concept evaluation
Planning	Design The product strategically	Basic design Development of performance criteria Design development Design evaluation
	Plan The execution strategically	Basic activities and resources basic plan Development of targets and milestones Plan development Plan evaluation
	Allocate Resources tactically	Basic design and activity-based plan detail Development of resource allocation criteria Allocation development Allocation evaluation
Execution	Execute Production	Co-ordinate and control Monitor progress Modification of targets and milestones Allocation modification Control evaluation
Termination	Deliver The product	Basic deliverable verification Deliverable modification Modification of performance criteria Deliver evaluation
	Review The process	Basic review Review development Review evaluation
	Support The product	Basic maintenance and liability perception Development of support criteria Support perception development

Source: **Chapman and Ward (2003)**

Bennett (2003) presents a PLC framework which is typical for construction projects. The framework differs from those general models mentioned above, and distinguishes phases and steps characteristic for the construction project. It consist of six phases of different lengths and starts with Pre-project phase followed by Planning and design, Contractor selection, Project mobilization, Operations, and Close-out and Termination phase as illustrated in Table 2. The construction industry requires a special approach due to the complexity of projects undertaken and thus such modified PLC should bring benefits to project management and its performance (Bennett, 2003). It is also this approach which will be used in this research.

Table 2.2 PLC for a construction project

Pre-Project Phase	Planning Design Phase	Contractor Selection Phase	Contractor Mobilization Phase	Project Operation Phase	Project Closeout And Terminati on Phase
Identifying business opportunity Choosing delivery system Choosing contract type	Establishing project objectives and draw up of project brief Actual design Preparing contract document	Tendering conditions Bid or not bid? Submitting offers	Preparation for construction phase	Monitor and control Resource management Documentation and management	Final inspection Project summery

Source: **Bennett (2003)**

2.4.1 Pre-project Phase

The purpose of the initial phase in a PLC is to develop an idea for a potential project (Bennett, 2009). Westland (2006) describes this step more in detail as developing a business opportunity which includes identification of a subject matter or problem which could be further developed into a project. Identifying business opportunities requires a number of assessments and discussions which should result in creating a project idea. Initial problem description, its scope, time frames and an outline of a plan for activities and steps in next phases of the PLC, are some of the factors which should be determined by the time the proposal is presented to a potential sponsor (Westland, 2006).

Moreover, in the pre-project phase a project delivery system is decided and chosen. It establishes relationships between the main parties or actors in the project: the owner, the designer and the construction organization. Decision is made to the type of contract to be used by the contractor and the mode of payment (Bennett, 2009).

2.4.2 Planning and Design Phase

The second phase in the PLC, presented by Bennett (2009), is the planning and design phase which is relatively longer than the others. This project development process consists of three sequential stages for more convenient phase completion and project delivery. In the first stage, the project objectives are defined, and alternative ways to attain those objectives are established and ascertain whether the project is financially feasible. After the planning and feasibility study, a project brief is developed, more details program statement is written, and various site investigations are made. The public input is sought and preliminary estimate prepared, funding

sources identified and a final decision on whether to proceed with the project is rendered (Bennett, 2009).

In the second stage, the design professional uses the result of the planning efforts to develop schematic programs showing the relationship among the various project components, followed by detailed design of the structural, electrical and other systems. This activity is which various engineering principles used to estimate loads and other requirements, select materials, determine component sizes and configurations and assure that each element is proper in relation to other elements (Bennett, 2009).

In the final stage, the output from the development effort is used to prepare the contract documents use in contractor selection and installation work at the construction site. The contract document includes detailed construction drawings and contract conditions containing legal requirements, technical specifications stipulating the materials and the manner in which they shall be installed and a set of other documents related to the process of selecting the contractor and finalizing the contract with the successful renderer (Bennett, 2009).

2.4.3 Contractor Selection Phase

In this stage a contractor is selected (Bennett, 2003). However it is not always price which decides who will be awarded the contract (Potts, 2008). In a selection process, a number of criteria are taken into consideration such as qualifications, resources held or bid price and compiled in a criteria matrix. Contractors who meet all the criteria have two major tasks to perform:

I. A series of planning steps carried out, including studies of various methods and equipment that would be employed and the development

of a preliminary project program setting forth an approximate time schedule for each major activity.

II. A priced proposal is prepared, including the direct costs of labour, materials, plant and subcontractors, various overheads charges and a sufficient added amount for profit (Bennett, 2009).

Such collected data are evaluated and the offer which scores highest is usually awarded the contract if no other criteria have been set.

2.4.4 Project Mobilization Phase

In between choosing contractor and beginning of construction there are a number of activities which need to be considered before installation work can begin at the project site. It is in the contractor's responsibility to apply for the necessary types of permits and licenses prior to construction works initiations. Moreover, detail program for the construction activities are prepared. The cost estimated converted to project budget and the system for tracking the actual project costs is established. The worksite organized with provisions for temporary buildings and services, access and delivery, storage areas and site security. It is further used to plan employment and other resource utilities over time (Bennett, 2009).

2.4.5 Project Operation Phase

During the operation phase, there are three key activities in addition to the construction itself: monitor and control, resource management, and documentation and communication. Monitor and control covers supervision of, among others, time, cost and quality (Bennett, 2009). The project manager is usually the person who undertakes this management process to keep track of undergoing activities. As

previously mentioned, time, cost and quality are key aspects of each project and hence managing them is an important activity. Time management is used to log actual time spent for execution of certain tasks. It also helps to allocate resources more effectively and control schedule of performing works (Westland, 2006).

The actual schedule and work progress is compared to the schedule drawn up in previous phases. If any discrepancies are detected, a person responsible should take an appropriate action in order to bring the project back into conformance (Bennett, 2009). Keeping track of the time aspect makes it possible to manage other key issues, finances and quality. Cost control is used to record all actual expenses within the project and gives control over a budget and out-of-pocket expenditures. Whereas quality monitoring is performed in order to deliver what was promised to the client (Westland, 2006), it also controls whether the work performed is in compliance with technical requirements stated in contract documents. In addition, the contractor is obligated to manage the work safety and in a way that minimizes adverse environmental impacts (Bennett, 2009).

In managing the project's resources, the contractor is concerned with assigning and supervising personnel and assuring that the labour effort is sufficiently productive to meet schedule, cost and quality goals. In addition, materials and plants must be managed so that these same goals are met (Bennett, 2009). Any irregularity in these matters may negatively impact the schedule, budget or quality, causing delays or cost overruns (Bennett, 2003).

Construction projects require large amount of paperwork, a special effort is required to documentation and communication effectively. This include various special drawings and samples that are submitted to the owner or design professional for approval prior to installation, the frequent need to respond to requests for changes in

the project after the on-site work has begun and the all-important process for periodically assessing the value of work completed and requesting payment for work (Bennett, 2009).It treats communication within the project and grandness of other documents. As in previous examples, proper management of this matter will make the project proceed in a timely, cost-effective and quality assurance manner (Bennett, 2003).

2.4.6 Project Handing over and Termination Phase

Most of PLC's end up at the execution phase where the final product is handed over after being accepted by the client. Performing a project summary requires additional resources, time and money, which investors tend to prefer to spend on new investments instead (Westland, 2006). However, project close-out and termination is important, among others, from a legal perspective. Before installation works can be considered as completed, there are still number of special activities to be performed before the contractor's responsibilities can be considered completed .There are various testing and startup tasks, the final cleanup, various inspections and remedial work that may result from them and the process of closing the construction office and terminating the staff's employment. In addition, a myriad of special paperwork is required, including approvals and certifications that allow the contractor to receive final payment, a set of as-built drawings made to the original design, operating manuals, warranties and a final report. The contractor will also be responsible for transferring and archiving project records and will conduct some sort of project critique and evaluation; operator training may also be part of the constructor's contractual responsibilities (Bennett, 2009). It gives possibility to draw conclusions for next projects to improve their performance. All initially planned activities such as

budget, schedule or scope are compared with the completed activities to assess how the product was delivered in comparison to the plan. Such a review can be performed sometime after the project handover in order to be able to assess all benefits (Westland, 2006).

2.5 Risk Management Process

Risk management is probably the most difficult aspect of project management. A project manager must be able to recognize and identify the root causes of risks and to trace these causes through the project to their consequences. Furthermore, risk management in the construction project management context is a comprehensive and systematic way of identifying, analyzing and responding to risks to achieve the project objectives. The use of risk management from the early stages of a project, where major decisions such as choice of alignment and selection of construction methods can be influenced, is essential. For this reason, there is, therefore, the need for an effective communication with the project team for better attainment project objectives. The benefits of the risk management process include identifying, analyzing risks and improvement of construction project management processes and effective use of resources (Nerija and Audrius, 2012). A number of variations of risk management process have been proposed. Boehm (cited in Raz &Michael, 2001) suggested a process consisting of two main phases: risk assessment, which includes identification, analysis and prioritization, and risk control which includes risk management planning, risk resolution and risk monitoring planning, tracking and corrective action. Chapman and Ward (cited in Tummala& Burchett, 1999) identified risk management approach as a multiphase `risk analysis' which covers identification, evaluation, control and management of risks. Simmons (1998) provided a definition

for the risk management as the sum of all proactive management-directed activities, within a program that is intended to acceptably accommodate the possibly failures in elements of the program. "Acceptably" is as judged by the customer in the final analysis, but from a firm's perspective a failure is anything accomplished in less than a professional manner and/or with less than-adequate result. Al-Bahar cited in (Ahmed *et al*, 1999) defined the risk management as a formal orderly process for systematically identifying, analyzing, and responding to risk events throughout the life of a project to obtain the optimum or acceptable degree of risk elimination or control.

Risk management is now widely accepted as a vital tool in the management of projects, although risk management has become firmly institutionalized across the industry sectors, it is only comparatively recently that this has extended to include the construction industry (Flanagan and Norman, 2003). The growth in the practice of risk management has been accompanied by a proliferation of standard and guidance information. There are British standards, guidance from professional bodies, public sector guidance, research published in academic journals and text books dedicated to the subject matter of risk management. There are several definitions to risk management offered by the various professional institutions and standards bodies. According to BSI Guide 73 (2003), risk management is defined as coordinated activities to direct and control an organization with regards to risk and generally includes risk assessment, risk treatment, risk acceptance and risk communication. The PMI's project Management book of knowledge (2000) describes risk management as the systematic process of identifying, analyzing and responding to project risk. It includes maximizing the probability and consequences of positive events and minimizing the probability and consequences of events adverse to project objectives.

It includes processes of risk management planning, risk identification, qualitative risk analysis, quantitative risk analysis, risk response planning and risk monitoring and control. BS6079 -1(2000) Guide to project management, does not offer an explicit definition of risk management as such, but states that the project manager should take positive steps to identify, assess and ultimately manage all risk inherent in the project, as an integral part of the project management process.

Despite the different definitions for risk management, Berkeley *et al* (cited in Zhi 1995) introduced a systematic approach to risk management, in four distinct stages: risk classification, risk identification, risk assessment, and risk response. Similar risk management steps were also introduced by A Guide to the Project Management Body of Knowledge (PMBOK® Guide) (PMI 2004) which stated there were four fundamental steps of risk management: risk identification, risk analysis (qualitative and quantitative), risk response planning, and risk monitoring and control. Other researchers, however, have shown less numbers of steps in risk management; Smith *et al* (2006), for example, set three steps for the risk management cycle: risk identification, risk analysis, and risk response. Moreover, Wang *et al* (2004) emphasized a systematic approach to risk management in one particular field, i.e. the construction industry, which consists of three main steps: risk identification, risk analysis and evaluation, and risk response.

2.5.1 Risk identification process

Risk identification (RI) is the process of determining risks that could potentially prevent the program, enterprise, or investment from achieving its objectives. It includes documenting and communicating project concerns. The sooner risks are identified, the sooner plans can be made to mitigate or manage them. Kuang (2011)

stated RI is fundamental to risk analysis and control and informs organizations about the areas that are exposed to risk. Assigning the RI process to a contractor or an individual member of the project staff is rarely successful and may be considered a way to achieve the appearance of RI without actually doing it(national academies press,2005). Against this background, it is important, however, that all project management personnel receive specific training in risk management methodology. This training should cover not only risk analysis techniques but also the managerial skills needed to interpret risk assessments. Winch (2002) asserted that RI is usually informal and can be performed in various forms depending on the organization and project team. It means that the identification of risks relies mostly on past experience that should be used in subsequent projects in order to find the potential risk; responsibility is therefore allocation is advised. This can be decided and arranged by the organization. In this case no method is better than the other since purpose is to establish the possible risks in a project. In long run, as added by Kuang (2011), RI facilitates the efficient management of risk.

The purpose of identifying risks is to obtain a list with potential risks to be managed in a project (PMI, 2004). In order to find all potential risks which might impact a specific project, different techniques can be applied. It is important to use a method that the project team is most familiar with and the project will benefit from. The aim is to highlight the potential problems, in order for the project team to be aware of them. Table 3 Shows risk identification techniques (Smith *et al.* 2006; Lester, 2007; PMI, 2004).

Table 2.3 Risk Identification Techniques

Information gathering methods	Workshops
	Brainstorming
	Interviews
	Questionnaires
	Benchmarking
	Consulting experts
	Past experience
	Delphi technique
	Risk breakdown structure
	Visit locations
Documentation	Databases, historical data from similar projects
	Templates
	Checklists
	Study Project documentation (plan, files etc.)
	Study specialist literature
Research	Stakeholder analysis
	Research assumptions
	Research interfaces

Source: **(Smith *et al*. 2006; Lester, 2007; PMI, 2004)**

Risks associated with the construction industry can be broadly categorized into the following as shown in Table 4 (Smith *et al.* 2006; Potts, 2008; Lester, 2007; Bing, et al, 2005; Webb, 2003; Darmall and Preston, 2010; Edwards, 1995; Jeynes, 2002).

Table 2.4 Risk Categories divided into Groups

Risk categories	
Groups:	**Risk:**
Monetary	Financial
	Investment
	Economic
Environment	Environment
	Natural, physical
Technical	Technical
Political	Legal
	Political
Project	Contractual ,client
	Project objectives
	Planning, scheduling
	Design
	Construction
Market	Market
Safety	Safety
	Security, crime
Human	Quality
	Operational
	Organization
	Human factor
	Labour, stakeholders
Materials	Resources
	Logistics

Source: (Smith et al. 2006; Potts, 2008; Lester, 2007; Bing, et al, 2005; Webb, 2003; Darmall and Preston, 2010; Edwards, 1995; Jeynes, 2002).

2.5.2 Risk Categorization and Risk Urgency Assessment

Two methods mentioned by PMI (2004) are not as commonly used as probability and impact. Risk categorization is a way of systematizing project threats according to e.g. their sources, in order to identify areas of the project that are most exposed to those risks. Tools which can be used in this method are work break down structure (WBS) or risk breakdown structure (RBS), and their role is to develop effective risk response (PMI, 2004). WBS breaks down large activities into small, manageable units and creates linked, hierarchical series of independent activities (Maylor, 2005). RBS categorizes risks and shows their dependencies (Dallas, 2006). The role of the second method, Risk Urgency Assessment, is to prioritize risks according to how quick response they require.

Lists with risks prioritized by applying qualitative methods, can be used to bring attention to significant problems to the project. Problems that are classified as a medium level risks can be a subject of a quantitative analysis to have better control over them. The threats that are assessed as low impact can be placed on a watch list and monitored. It will allow the project team to focus on more important issues. Risk categorization helps reveal the weak links in the project organization where more attention should be directed (PMI, 2004).

2.5.3 Risk Response Process

Risk response is crucial in risk mitigation; it determines what action, if at all it exists, to be taken to address risks evaluated in the identification, qualification, and quantification stages (Tchankova, 2002). The risk response process encompasses planning for an obligatory action to be considered in case a risk event occurs. It also entails taking planned action if required and following up with the consequences of

these actions to ensure that the risk plan results in the required outcome. A risk response is determined by proposing several alternatives to eliminate or mitigate an anticipated risk and assign an optimum alternative as a response (Turnbough, 2005). Zenghua and Dada (2011, 2010) emphasized that there four distinct ways of responding to risks in a construction project namely: risk avoidance, reduction, transfer and risk retention, whereas Smith, Merna and Jobbling (2006) identified three response techniques by combining avoidance and reduction.

2.5.4 Risk Control

Findings need be put into action following risks identification, assessment, and appropriate responses have been developed. Risk monitoring and control include implementing the risk plan, which is an integral part of the project plan. During monitoring and controlling, two key challenges are usually encountered; the first is putting the risk plans into action and ensuring that they are still effective. The second is producing significant documentation to support the process (Berenger and Agumba 2016). Risk Control aims at controlling deviations, minimize risks and increase the project value. Schatteman et al (2008) stated that no ready-made solutions are available to minimize risks. However the following corrective measures can assist in handling the risks associated with mass housing construction projects:

- Adjust plans the scope of work and estimates to counter risk implications.
- Monitor risks regularly, evolve alternate plans to manage predictable risks, when needed.
- Make appropriate decisions.
- Keep all concerned informed about possible risks.

To end with, this review showed that risk identification, risk analysis and assessment, risk response and control are crucial phases in risk management process in the mass housing estate. It presupposes that risks must first be identified before they can be controlled or mitigated.

2.3.1 Risk Avoidance/Prevention

Risk avoidance is sometimes referred to as risk elimination (Flanagan & Norman, 1993). If the risk is classified as bringing negative consequence to the whole project, it is of importance to review the project's aim, in other words, if the risk has significant impact on the project, the best solution is to avoid it by changing the scope of the project or worst scenario cancel it. These are many potential risks that the project can be exposed to and which can impact its success (Potts, 2008). This is why risk management is required at the early stages of a project instead of dealing with the damage after the occurrence of risk (PMI, 2004).

The avoidance means that by looking at alternatives in the project, many risk can be eliminated, if major changes are required in the project in order to avoid risk Darmall and Preston (2010). Suggest applying known and well developed strategies instead of new ones, even if the new ones may appear to be more cost efficient. In this way, the risk can be avoided and work can proceed smoothly because strategy is less stressful to users.

Risk avoidance in construction is not generally recognized to be unfeasible as it may lead to projects not going ahead, a contractor not placing a bid or the owner not proceeding with projects funding are two examples of totally eliminating the risks. There are number of ways through which risk can be avoided. E.g. tendering a very high bid, placing condition on the bid: pre- contract negotiation as to which party

takes certain risk; and not bidding on the high risk portion of the contract (Flanagan & Norman, 1993). Cooper et al (2005), list some activities that can help to avoid potential risk; more detailed planning, Alternative approaches, Protection and safety systems, Regular inspections, Procedural changes, Preventive maintenance, Training and skill enhancement, and Operation reviews.

2.5.5 Risk Reduction/ Mitigation

Going through an over view of the project, it is easy to identify problems which are causing damage. In order to reduce the level of risk, the exposed areas should be changed (Potts, 2008). This is a way of minimizing the potential risk by mitigating their likelihood (Thomas, 2009). One way to reduce risks in a project is to add expenditure that can provide benefits in the long term, some projects invest in guarantees or hire experts to manage high risk activities, these experts may find solutions that the project team has not considered (Darmall and Preston, 2010). Mitigation strategies according to cooper *et al* (2005).include: Contract terms and conditions, Crisis management and disaster recovery plans, Quality assurance, Contingency planning, and finally Separation or re-location of activities and resources.

Those risks which should be reduced can also be shared with parties that have more appropriate resources and knowledge about the consequence (Thomas, 2009). Sharing can also be alternative, by cooperating with other parties. In this way, one project team can take advantage of the other's resources and experience. It is a way to share responsibilities concerning risks in the project (Darmall and Preston, 2010).

2.6 Transfer

If risk can be managed by another actor who has a greater capability or capacity, the best option is to transfer it. Potts, (2008). Said that the risk should be transferred to those who know how to manage it. The actors that the risk can be transferred to are for example, the client, contractor, sub-contractors consultants, designers etc., depending on the risk character. As a result this could lead to higher cost and additional work, usually called risk premium (Potts, 2008).It must be recognized that risk is not eliminated; it is only transferred to the party that is able to manage it. (PMI, 2004). Shifting risks and the negative impact they bring is also an option when the risks are outside the project management's control, for example political issues or labour strikes (Darmall and Preston, 2010). The situation may also consist of catastrophes that are rare and unpredictable in a certain environment. (Winch, 2002). Such risks that are beyond the management's control should be transferred through insurance policies.

2.6.1 Retention

This is a method of reducing and controlling risk by internal management (Zhi, 1995). Handling risks by the company who is undertaking the project where risk avoidance is impossible, possible financial loss is small, probability of occurrence is negligible and transfer is uneconomic (Akintoyne & MacLeod, 1997). The risks foreseen or unforeseen, are controlled and financed by the company or contractor, when the risk can be transferred or avoided, the best solution is to retain the risk. In this case the risk must be controlled, in order to maintain the impact of its occurrence. (Potts, 2008). Retention can also be an option when other solutions are uneconomical (Thomas, 2009).there are two retention methods: *active and passive* (Jaser, 2005).

Passive retention: sometimes referred to as non- insurance, however, occur through negligence, ignorance or absence of decision. E.g. a risk has not been identified and handling the consequences of that risk must be borne by the contractor performing the work.

Active retention: sometimes referred to as self-insurance. It is a deliberate management strategy after a conscious evaluation of the possible losses and cost of alternative ways of handling risks.

2.6.2 Monitoring

Risk monitoring can be achieved in many ways according to the scale of the project risk involved, but the objective is always to provide management and all stakeholders with information they need to control that risk. Monitoring must never be confused with control, nor knowledge be mistaken as action. It is management deviation from plan so that collective action can be taken, but successful control relies on the scale and experience of the project manager and supervisors. Risk monitoring and control is therefore the process of identifying, analyzing and planning for new emerging risks, keeping track of identified risks and those on the watch list, re-analyzing existing/ identified risks, monitoring trigger conditions for contingency plans(if need be). Monitoring residual risks and then reviewing the execution of risk responses selected earlier on during the risk response stage of the risk management processes, while evaluating the effectiveness of these chosen monitoring and control processes. Risk monitoring and control processes apply techniques such as variance and trend analysis. All the phases or stages of the risk management process are processes that go through or are ongoing during the life cycle of every project. Other purposes of risk monitoring and control are to determine if:

- Projects assumptions are still valid and relevant
- Risk as assessed earlier on has changed from its prior or previous state, its analysis of trends
- Proper risk management policies, programmes and procedures are being followed
- Contingency reserves of cost or schedule should be modified in line with the risks of project.

Therefore, risk monitoring and control can involve choosing alternative strategies, executing a contingency or fallback plan, taking corrective action and modifying the project management plan. Risk monitoring and control also includes updating the organizational process assets (which include any or all of the assets that are used to influence a project's success during say the development of o project charter and subsequently project documentation) including project lessons- learned databases and risk management templates for the benefit of future projects.

2.6.3 Exercising control

Exercising control really has four elements. The first stage is to evaluate the current situation- *in other words what will happen if things continue as they are?* The second is to consider various collective measures that could be applied and to assess the pros and cons of adopting each alternative cause of action. The third stage is to select and implement one of the courses of action.

The fourth stage links back into the monitoring process since you need to check that the control action has had the desired corrective action on the project. However, inadequacy to control a risk properly becomes visible if one or more of the following occurs: Inability to make the right decision at the right time, Discrimination contract

document which tends to provide more advantage to the project owner, Misinformation, Inability to provide the proper response, Improper project planning and control, Ineffectiveness and inefficiency during construction and operation stage, Unsatisfied use

CHAPTER THREE

STUDY AREA AND METHODOLOGY

3.1 Introduction

This chapter comprises the profile of the study area, techniques and procedures engaged in carrying out the study. It also gives an in depth description of the research design, data requirements for the study as well as sampling procedures for data collection and mode of analysis of the data collected for better presentation, interpretation and discussion in subsequent chapters.

3.2 Profile of the Study Area

The Upper West Region of Ghana is bordered on the north by Burkina Faso, the south by the Northern Region and on the west by Ivory Coast. The population of the region grew from 576,583 in 2000 to 702,110 in 2010. With a growth rate of 1.9% the population is estimated to increase to 1.7 million by 2040. Almost 49.0% of the population are males and females represents 51.4% The age structure of the region indicates that, the proportion of the population aged 0 - 14 (under 15 years) is 41.7%, and those aged 15 - 64 and 65+ are 52.3% and 6.0% respectively.

The region occupies a total land area of 18,476 sq. km, which makes it the seventh largest among the regions in terms of land size. It has a population density of 38 people per sq. km. The region is 16.3% urban with an annual urban growth rate of 1.3%. The region experiences more outflows of people to other parts of the country than people migrating into the region, this therefore gave the region a negative net migration value of -209,414 in 2010. With regards to the economy, the labour force participation rate for population aged 15 - 64 is almost 71.5%.

Figure 3.1 Map of Upper West Region

Source; Upper West Regional Coordinating Council

Since its creation in 1983, the Upper West Region has had Wa as its capital and seat of government and administration. The Local Government Act of 1993 establishes and regulates the local government system in accordance with the 1992 Constitution. The Act stipulates the maintenance of districts in existence immediately before the coming into force of the 1992 Constitution.

The main administrative structure is the Regional Coordination Council (RCC), headed by the Regional Minister. Other members of the RCC include representatives from each District Assembly, regional heads of decentralized ministries, and representatives of the Regional House of Chiefs. The region is divided into nine administrative districts, as follows: Wa West, Wa Municipal, Wa East, Sissala East, Nadowli, Jirapa, Sissala West, Lambussie/Karni and Lawra. Wa West District was carved out of the Wa District and its capital is Wechiau. Wa East District has its capital at Funsi, and Sissala West district has Gwollu as the district capital.

The people of the Upper West Region are organized under chiefs at the lineage and settlement levels. Chieftaincy is a respected institution and is a major medium for community mobilization. In Sissala, the title Koro (e.g., TumuKoro) is used for the chiefs while Naa (e.g., Wa Naa) is used in the other districts. There are 21 traditional paramountcies – Jirapa-Lambussie has two, Lawra three, Nadowli seven, Sissala five and Wa has four. The major ethnic groups in the region fall under the broad generic categories of the Mole Dagbon and Grusi. The major languages of the region are Dagaare, Sissali, Wale and Lobi. Inheritance is patrilineal except among the Lobi who, like the Akan in southern Ghana, have a matrilineal inheritance system. Marriage is generally polygamous, with the extended family system sharing resources. Male dominance and a relatively low status for women are common in the region.

The predominant religions are Christianity, Islam and traditional African religion. Traditional life and beliefs, as elsewhere in the country, are more prominent in the rural areas. The notable festivals are the Damba festival in Wa, Dembenti among the Dagaabas, Kobine in Lawra and Kakube in Nandom. The style of architecture is similar to that of the Upper East Region. Houses are constructed mainly with mud, with mostly rectangular rooms. The houses are built in the form of compounds with gates. The walls are plastered with mud and cement is used as the main material for floors. The rooms are mostly decked with mud, and in certain instances, houses are built up to one storey and roofed with iron sheets or thatch made of grass.

3.3 Research Design

A survey methodology was chosen because it recognizes the importance of the context to both understand and explain the impact of mass housing development in

the Upper West Region. The study includes both qualitative and quantitative materials gathered from interviews. Triangulation of different related research techniques are employed in this study. This consists of a combination of mainly qualitative and quantitative methods of data collection and analysis. The two styles have different complementary strengths and a study that employs both is comprehensive. The shortcomings of one method are complimented by the positives of the other method (Neuman, 2000).

The selection of the right research design is crucial in the research process and for arriving at valid findings is dependent on how right the research design is. To this end, the non-experimental descriptive cross sectional survey research design is employed to adequately investigate the research problem. This study is primarily empirical in nature, thus in quest of identifying, describing and making coherence of observations found in the field rather than the development of exhaustive discussions or theoretical models of mass housing projects.

The research strategy that the study utilized is the descriptive technique/method. This descriptive research method intends to provide facts concerning the nature and status of a situation, as it exists at the time of the study (Creswell, 1994). It is also concerned with practices and relationships that exist, values, processes and viewpoints that are in progress, special effects that are felt, or activities that are just beginning and growing. Furthermore, such methods attempt to identify and explain current circumstances, actions or systems based on the reactions and impressions of the respondents of the research (Creswell, 1994). This research is also cross-sectional because of limited time. It is a study of a particular phenomenon (or phenomena) at a particular time

(Saunders et al., 2003). Therefore, cross sectional studies often employ the survey strategy, and seek to bring out risk management on mass housing estate.

3.3 Study Population

Polit and Hungler (1999) define a population as an aggregate or totality of all the objects, subjects or members that conform to a set of specifications. The group of people that a researcher wants to draw conclusion about can explicitly be defined by specifying which individual to include and which not to include based on a criteria (that is by defining a target population). In this study the populations are all individuals or stakeholders, the target population herein, is all contractors and estates developers (who constitute the top level management) in the Upper West Region, Who are concerned with risk management in the Construction Industry. However, this is practical impossible within the scope of this research due to reasons stated earlier and so the study targets three selected districts namely; Wa Municipal, Jirapa District and Nandom District of the Upper West Region were subjects are drawn as a representation of the study population according to the underscored sampling techniques. These target areas are selected purposively on the basis of knowledge of the inhabitants. It is essentials and the rationale of the study is more suitable for in-depth qualitative research in which the focus is often to understand complex social phenomena by drawing the most appropriate sample based on the purpose of the research (Marshall, 1996; Small, 2009).

3.4 Sampling Techniques

The process of selecting a portion of the population (target population) to represent the entire population is known as sampling (LoBiondo-Wood & Haber 1998:250; Polit & Hungler 1999:95). In this study, both probability and non-probability

sampling techniques were employed because of the differences in the characteristics of the target population. The non-probability sampling technique (purposive sampling) was used order to approach the problem with a specific plan of selecting predefined groups of people in the Region were the opinions of the target groups were obtained. The study also made use of probability sampling procedure (Accidental sampling) where each respondent is chosen entirely by chance and on the relative case of their access at any stage during the sampling process. This enabled the research to draw externally valid conclusions about the entire population based on the sample. The strength is in its quick in data collection and requires minimum advance knowledge of the population different from the frame. In addition, its straight forwardness also makes it comparatively easy to interpret data collected in this manner. The fact that there was not much information available about the population and data collection was efficiently conducted on easiness of access and the availability of respondents makes probability sampling suitable for this study. It also guaranteed that the cost of sampling to be small enough to make efficiency important.

3.4.1. Sample Units and Size

Sample size determination aims at selecting part of the population from which information will be drawn to form conclusions about the entire population. For a survey design based on accidental sampling, the sample size required is calculated using the formula for sample size determination stated below. This formula allows for a geographically dispersed sample to be used, with participants simultaneously responding to the study from the study area, hence taking advantage of existing social groups to achieve the study objectives.

The research targeted a sample size of about 100 people covering registered A1K1 to D4K4 contractors. The study population comprises members who are estate developers and contractors within the Upper West Region. Under the condition that only estate developers and contractors interviewed, the sample size is obtainable via the formula; $n=N/ [1+Ne^2]$ where "N" is the Sample frame and "e" the significance level or sampling error. Thus, with N=800 contractors, at 10 percent significance level which corresponds to 90 percent confidence level; and e=0.1, then $n= 800/ \{1+ 800(0.1)^2\}$ which is 88.9. The estimated sample size of 88.9 rounded up to the nearest 100 amounted to 100 contractors. Convenient sampling was used to select members of the sample frame.

3.5 Data Collection

The study utilized primary sources of data collection methods. These are the various sources through which the study gathered primary information from community members. Primary data in this regard refers to data that is collected from the field for the first time. Various tools and techniques were employed. Questionnaires were utilized as a framework of questions that are designed and administered to respondents. These Questionnaires were developed based on certain indicators that help assess the impact of mass housing estate on the socio-economic development of the Upper West Region. It contained both close and open-ended questions. The questionnaires captured the demographic characteristics of the respondents, risk management practices, potential risk factors, impact of risk factors and effective ways of managing risk factors. These questionnaires were administered to the sampled population which involves the estate developers and contractors in the region.

Key Informant Interviews were used in the identification and interviewing of key relevant persons in the study area. Individuals considered to be key informants appeared to be vested with issues concerning the area and the topic under study. The key informants will be contacted on individual basis. Key persons believed to have relevant information concerning mass housing and estate development in the region.

3.5.1 Questionnaires Design

The questionnaire survey was conducted to determine the opinion of contractors regarding risk management in the mass housing projects. Close ended questionnaires were formulated with a covering letters were self- administered to 100 contractors. A five-point likert scale and two to six- level scale were utilized where respondents were asked to indicate the best option from the list of questionnaires. The letter indicates the objectives of the research and explained to respondents/ participants that the results of the questionnaire would be used to manage the potential risk management on the mass housing estate in the upper west region. The questionnaires was composed of demographic information, project profile and respondent's opinion on risk management on mass housing estate to achieve the aim of the research.

3.5.1.1 Demographic Information

This part enables the researcher to gather information of the survey participant regarding gender, age group, level of education, number of years of professional experience and certifications. This information helped to establish the background and reveal the difference among participants.

3.5.1.1.1 Project profile

This area of the survey instrument sought information on the project profile; which included the value of the project undertaken by the participants; the duration of the project; the type of tendering and the type of funding for the project

3.5.1.1.2 Respondent's opinion on the risk management on mass housing estates

This section assisted the researcher to gather information from respondents with regard to the methods of identifying risk management practices in mass housing units, potential risk factors which have significant impact on project success and also help to come out with a framework of recommendation for effective risk management on mass housing projects.

3.5.2Validityand Reliability of Research Instruments

Validity refers to the degree to which and instrument measures what it is supposed to be measuring (Pilot and Hungler, 1985). High validity is the absence of systematic errors in measuring instrument. When an instrument is valid; it truly reflects the concept it is supposed to measure (Wood and Haber, 1998). Validity has a number of different aspects and assessment approaches (Pilot and Hangler, 1985). Below are some route to evaluating an instrument's validity;

- Content validity
- Criterion-related validity
- Construct validity

Questionnaires were reviewed by colleagues who are also pursuing their master's degree programmes at other universities in Ghana. The first was requested to identify whether the questions agreed with the scope of the items and extend to which these items reflect the concept of the research. The other was requested to identify that the instrument used is valid statistically and that the questionnaire was designed well enough to provide to answer the research questions.

3.5.2.1 Reliability of the research

Reliability of an instrument is the degree of consistency with which it measures the attribute it is supposed to be measuring (Pilot & Hunger, 1985). The less variation, an instrument produces in repeated measurements of and attribute, the higher its reliability. Reliability can be equated with stability, consistency or dependability of measuring tool. The test is repeated to the same sample of people on two occasion and then the scores obtain were compared by computing a reliability (Pilot & Hunger, 1985).

3.6 Data Analysis and Presentation

Combinations of qualitative and quantitative methods are used to analyze the data collected from the field. As the study deals with numbers in terms of the sample size, quantitative analysis is relevant. The analysis of data entailed a process of summarizing and aggregating information according to relevant themes in view of the research objectives. Micro-soft Excel as a statistical tool is used to carry out the quantitative data analysis.

CHAPTER FOUR

ANALYSIS AND DISCUSSION OF RESULTS

4.1 Introduction

This chapter focuses mainly on field data analysis and the discussion of findings. The chapter is divided into four sections namely demographic characteristics of respondents, risk management practices in mass housing construction projects, potential risk factors and impacts in mass housing construction and the ways of managing risk factors in mass housing in the Upper West Region.

4.2 Socio-Demographic Characteristics of Respondents

The following respondent's characteristics are discussed: sex, age, marriage as well as educational status of respondents. The aim is to determine how these characteristics influence the views of respondents on the impacts of risk management on mass housing estate on the socio-economic development of the Upper West Region. The demographic characteristics of respondents are central to the concept of assets. People may be poor because of their sex, age, education status, marital status among others. This limits their capital assets, material or non-material assets and access to some rights which can be used to support their construction activities. Age, sex, marital status, educational levels, and many others influence their levels of vulnerability in pursuing various livelihood activities especially farming, business activities and access to affordable low cost shelter in the region.

Table 4.1 Demographic Characteristics of Respondents

Characteristic	Group	Frequency	Percentage
Age	20-29	2	2.0%
	30-39	10	10.0%
	40-49	28	28.0%
	50-59	35	35.0%
	Above 60	25	25.0%
Total		**100**	**100%**
Sex	Male	94	94.0%
	Female	6	6.0%
Total		**100**	**100%**
Marital Status	Single	8	8.0%
	Married	62	62.0%
	Divorced	20	20.0%
	Widowed	10	10.0%
Total		**100**	**100%**
Level of Education	No Formal Education	54	54.0%
	Primary	21	21.0%
	Middle School/JHS	16	16.0%
	Secondary/Technical/Vocational	5	5.0%
	Tertiary	4	4.0%
Total		**100**	**100%**

Source: Field Survey, [October], 2017

Table 4.1 indicates the demographic characteristics of respondents interviewed. Majority of the respondents constituting about 94.0% are males whereas the remaining 6.0% constitute females in the Upper West Region. In terms of age, majority of the respondents (35%) were between the age group of 50-59 whilst the age group of 20-29 recorded the least respondents (2.0%).

Out of a total of one hundred (100) respondents, 54.0% had no formal education, 21.0% obtained primary education, and about 16.0% of the respondents had middle or Junior High School education whilst only 5.0% and 4.0% of the respondent in the study community attained secondary / technical or vocational and tertiary status respectively. With regards to marital status of respondents, about sixty-two (62) representing 62.0% were married; eight (8) respondents were single recording 8.0%, 20.0% and 10.0% representing 20 and 10 respondents are divorced and widowed respectively.

4.3 Risk management practices in mass housing projects

Risk is simply viewed as the probability or threat of damage, injury, liability, loss, or any other negative occurrence that is caused by external or internal vulnerabilities, and that may be neutralized through proactive action. Risk is often associated with uncertainty. Although the term Risk has come to bear some negative connotations, its management is not only about reducing downside potential or the probability of pain, but also about increasing upside opportunities or prospects for gain.

As indicated in data, majority of the respondents representing the whole sample size attested to the fact that, they do engage in the mass housing construction estate industry. Based on this one could conclude sufficiently that, all the respondents are into the mass housing construction projects in the region.

Table 4.2 longevity in construction industry

Duration	Frequency	Percentage
1-10 years	40	40%
11-20 years	15	15%
21-30 years	15	15%
31-40 years	30	30%
TOTAL	**100**	**100**

Source; Field Survey, [October], 2017

As indicated in the table 4.2, majority of the respondents are within the age group of 1-10 representing 40%. This means that most of the building contractors are in the industry not quite long and may have limited experience with respect to handling risk management issues. Coincidentally, all other age groups have fifteen (15) respondents depicting 15%. With regards to duration of contract, data revealed that, majority of the respondents constituting 50% are in the construction spanning between 21-30 years. This in effect can have an informed idea on risk management issues in the Upper West Region. It is also indicated in the data analysis that, management of risk practices are well known but not vigorously followed in their scheme of management which has serious consequences on production activities. About 92 respondents representing 92% attested to the fact that they do engage in risk management practices.

Table 4.3 some risk management practices in the Upper West Region

Item Recognition	Frequency	Rank
Risk identification	98	1
Risk assessment	96	2
Risk analysis	90	3
Risk monitoring and control	88	4

Source; Field Survey [October], 2017

From the data in table 4.3 indicates that, majority of the respondents in the study do actually involve in risk identification in their business setups, this constitute a strength to the development of the building construction industry as 98 of the respondents ranked risk identification as premium in risk management. In other breadth, 96 of the respondents from the sampled study do testified that they do undertake risk assessment procedures in their dealings. However, about 88 respondents in the study have been engaged in risk monitoring and control in the Upper West Region which is still a worry to the industry since that is a key component in handling risk. The study falls in line with the findings that, risk control aims at controlling deviations, minimize risks and increase the project value. Schatteman et al (2008) stated that no ready-made solutions are available to minimize risks. However the following corrective measures can assist in handling the risks associated with mass housing construction projects:

I. Adjust plans the scope of work and estimates to counter risk implications.
II. Monitor risks regularly, evolve alternate plans to manage predictable risks, when needed.
III. Make appropriate decisions.
IV. Keep all concerned informed about possible risks.

During an interview session with one of the respondents as to why he is not involve in risk monitoring and control, this is what he has to say;

> *"Enough resources are needed to employ experts in the monitoring and control since I have inadequate knowledge to the problem, refresher courses are also needed to enhance my capacity to handle risk monitoring and control activities in the industry".*

In furtherance, respondents in the analysis revealed the following as gains accrued when risk management issues are properly addressed; it will minimize uncertainty on projects or during changes in company organization, it provides a procedure which can reduce possible and sudden surprises, it increase the level of control over the project and efficient problem solving process, it allows projects with high risk to be balanced with projects with lower risk.

4.4 Potential risk factors and their impacts

In the European Union construction is the sector most at risk of accidents, with more than 1300 people being killed in construction accidents every year. Worldwide, construction workers are three times more likely to be killed and twice as likely to be injured as workers in other occupations. The costs of these accidents are immense to the individual, to the employer and to society. They can amount to an appreciable proportion of the contract price (Nerija and Audrius, 2012).

Risk management is probably the most difficult aspect of project management. A project manager must be able to recognize and identify the root causes of risks and to trace these causes through the project to their consequences. Furthermore, risk management in the construction project management context is a comprehensive and systematic way of identifying, analyzing and responding to risks to achieve the

project objectives. The use of risk management from the early stages of a project, where major decisions such as choice of alignment and selection of construction methods can be influenced, is essential. The benefits of the risk management process include identifying and analyzing risks, and improvement of construction project management processes and effective use of resources.

As contained in data analysis, a total of about 80 of the respondents representing 80% of the study population have agreed that risk factors exist in their operating environments and that they are quite aware of their potential role in lowering productivity. Again, it is revealed in research findings that, 20 of the respondents also representing 20% acclaimed that there are no risk factors in the mass housing construction industry in the Upper West Region.

Table 4.4 shows type of contract certificate own by building contractors

Certificate Type	Frequency	Percentage
D1K1	40	**40%**
D2K2	35	**35%**
D3K3	15	**15%**
D4K4	10	**10%**
TOTAL	**100**	**100**

Source; Field Survey [October], 2017

From data in table 4.4, it revealed that about 40 of the respondents indicating 40% are building contractors with D1K1 contract certificates, which clearly means that a good percentage of respondents in the study population are with the least rated certificates in the mass housing industry which has a threat to the development of the organization in the Upper West Region. It is also established in the findings that only

10 respondents representing 10% possessed D4K4 contract certificates, this invariably is not positive to the expansion and development of the industry.

As indicated in the study, a total of about 75 respondents depicting 75% attested to the fact that their organizations undertake risk management practices in their daily routine operations of their setups. The study also revealed that about 25% of the respondents in the sample population acclaimed that they do not undertake any risk management practices in their line of operation, when asked why in a Focus Group Discussion, this is what a respondent in Jirapa District has to say;

> *"As for risk management practices in my organization, it involves a lot resources to be carried out, this made me too financial nervous to undertake, it will drain my earnings even though I know risk management practices is good for the company".*

The study falls in line with the findings in literature that handling risks by the company who is undertaking the project where risk avoidance is impossible, possible financial loss is small, probability of occurrence is negligible and transfer is uneconomic (Akintoyne & MacLeod, 1997). The risks foreseen or unforeseen, are controlled and financed by the company or contractor, when the risk can be transferred or avoided, the best solution is to retain the risk. In this case the risk must be controlled, in order to maintain the impact of its occurrence (Potts, 2008).

4.4.1 Nature of involvement in the construction industry

With regards to nature of involvement, thus the particular aspect in which building contractors engaged in the mass housing estate industry, the following responses illustrated in the table below were given;

Table 4.5 shows nature of involvement in the construction industry

Item	Frequency	Rank
Construction	98	1
Teaching and Education	94	2
Research	88	3
Policy and Management	84	4

Source; Field Survey, [October], 2017

As indicated in Table 4.5, majority of respondents from the study community interviewed ranked construction as the main activity they engaged in. Again, about 94 respondents ranked teaching and education as the second most involved activity in the building and construction industry. It is also realized from the field that, 88 of the respondents in the sampled population ranked research as the third most involved component in the construction threshold while 84 of the respondents ranked policy and management as the least most engaged aspect in the mass housing construction industry.

4.4.2 Prevailing risk factors in mass housing construction

In furtherance, the following were identified and given priority as risk factors prevalent in mass housing construction during questionnaire administration in the study community; Mistakes and discrepancies in contract document, Design changes, Financial failure, Poor communication amongst project team, Delay in payment and Changes of government.

The study reveals that risk response and control are crucial phases in risk management process in the mass housing estate hence the above stated points must be given the desired attention it requires. It presupposes that risks must first be identified before they can be controlled or mitigated.

Table 4.6: below illustrates the level of impact on productivity

Potential Risk Factor	Frequency	Percentage
Financial risk	30	30%
Management risk	28	28%
Environmental risk	15	15%
Technical risk	15	15%
Socio-political risk	8	8%
Others	4	4%
TOTAL	**100**	**100**

Source; Field Survey, [October], 2017

As indicated in the table 4.7, (30) of the respondents representing 30% ranked financial risk as the most nagging factor in the mass housing construction industry. They mentioned variables like delay in payment, inflation, financial failure in the part of contractors, error in estimation among others as pressing and can hard hit by their failures. Closely following the financial risk is the technical risk, about 28 of the respondents indicating 28% attested in findings that technical risk has a toll on their businesses, variables respondents captured included incomplete designs, inadequate specifications, change in project's scope and inadequate site investigation. Again about 15 of the respondents in the sample population interviewed saw management risk as risks militating the operations of their businesses in the region. This in effect is to significantly conclude that, the various potential risk factors have a huge negative impact on the development of mass housing construction but when properly addressed will result in some benefits in the region and therefore the whole country. The findings therefore confirm studies conducted by Thomas,(2009) that the benefit of working with risk management is increased the level of control over the whole project and more efficient problem solving processes which can be supported on a more

genuine basis. It results from an analysis of project conditions already in the beginning of the project (Perry, 1986). The risk management also provides a procedure which can reduce possible and sudden surprises (Cooper *et al.* 2005).

4.5 Ways of managing risk in estate development

Risk management is crucial in risk mitigation; it determines what action, if at all it exists, to be taken to address risks evaluated in the identification, qualification, and quantification stages (Tchankova, 2002). The risk management process encompasses planning for an obligatory action to be considered in case a risk event occurs. It also entails taking planned action if required and following up with the consequences of these actions to ensure that the risk plan results in the required outcome. A risk management is determined by proposing several alternatives to eliminate or mitigate an anticipated risk and assign an optimum alternative as a response (Turnbough, 2005).

Table 4.7: shows the appropriate managing of risk in the industry

Responses	Frequency	Percentage
Yes	75	75%
No	25	25%
TOTAL	**100**	**100**

Source; Field Survey, [October], 2017

As indicated in the table above majority of the respondents interviewed agreed that, managing risk factors in mass housing construction is appropriate for the development of their establishment while 25 of the respondents in the study population representing 25% do not see the need to manage risk factors appropriately. The findings therefore

confirmed studies conducted by (Flanagan & Norman, 1993) that tendering a very high bid, placing condition on the bid: pre- contract negotiation as to which party takes certain risk; and not bidding on the high risk portion of the contract. Again, Cooper et al (2005), list some activities that can help to avoid potential risk; more detailed planning, Alternative approaches, Protection and safety systems, Regular inspections, Procedural changes, Preventive maintenance, Training and skill enhancement, and Operation reviews.

In addition, findings from analysis revealed that the most appropriate ways of dealing with risk associated issues is to embark on risk avoidance/prevention risk retention, risk reduction/mitigation, risk transfer and risk control. As to the means of funding their operations in the region, majority of the respondents cited financial inadequacy as the main constraint to the expansion of the industry in the region and further went on to postulate that, the unavailability of frequent refresher courses equally has a great impact on their operations. The figure below illustrates the source of funding to the building contractors in the Upper West Region.

Table 4.8:Shows source of funding

Source of Funding	Frequency	Percentage
Self-Funding	20	20%
Family And Friends	50	50%
Banks	20	20%
Government	10	10%
TOTAL	**100**	**100**

Source; Field Survey, [October], 2017

From the results in table 4.8, it reveals that 50% of the respondents heavily depend on family and friends to enable them fund their projects. About 20% of the respondent respectively relied on self-financing and bank loans whereas government only funds

10% of the mass housing projects. This means that majority of the respondents still depend on the traditional family and friends which is woefully inadequate to support the growth of the sector. During an interactive session with a respondent he acclaimed that;

> *"The banks requires of us huge and non-existing collaterals to enable us secure loans from to start fresh or complete existing projects and even upon meeting their requirement for a loan the interest and other charges on the loan is always too unbearable and hence anti-developmental to the industry".*

This is sufficient to reiterate the fact that most building contractors really go through a lot of hell in project execution, henceforth in an attempt to mitigate some of these challenges building contractors should embark on implementing workable programmes of work, expenditure control, budgetary control and adopting proper procurement methods.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter is the final section of the study. It presents a summary of the key findings of the study as well as the conclusions drawn and recommendations made to enhance the socio-economic impact of risk management on mass housing construction of the Upper West Region.

5.2 Summary of key Findings

The findings of the study are based on the objectives of the study. As a result, this section summarizes the key issues of the socio-economic characteristics of respondents, risk management practices in mass estate housing units, the potential risk factors that have significant impact on mass housing projects, and the ways of effectively managing risk factors in the Upper West Region.

5.2.1 Risk management practices in mass housing projects

Risk has come to bear some negative connotations; its management is not only about reducing downside potential or the probability of pain, but also about increasing upside opportunities or prospects for gain. The findings revealed that risk management practices are well known but not vigorously followed in their scheme of management which has serious consequences on production activities. Findings from the study indicate that, 92 respondents representing 92% attested to the fact that they do engage in risk management practices. In other breadth, 96 of the respondents from the sampled community do testified that they do undertake risk assessment procedures in their dealings. However, about 88 respondents in the study have been engaged in

risk monitoring and control in the Upper West Region which is still a worry to the industry since that is a key component in handling risk.

The study revealed the following as gains accrued when risk management issues are properly addressed; it will minimize uncertainty on projects or during changes in company organization, it provides a procedure which can reduce possible and sudden surprises, it increase the level of control over the project and efficient problem solving process, it allows projects with high risk to be balanced with projects with lower risk.

5.2.2 Potential risk factors and their impacts

Worldwide, construction workers are three times more likely to be killed and twice as likely to be injured as workers in other occupations. The costs of these accidents are immense to the individual, to the employer and to society. Furthermore, risk management in the construction project management context is a comprehensive and systematic way of identifying, analyzing and responding to risks to achieve the project objectives. The use of risk management from the early stages of a project, where major decisions such as preference of alignment and selection of construction methods can be prejudiced, is necessary. The benefits of the risk management process include identifying and analyzing risks, and improvement of construction project management processes and effective use of resources

The research also established that, about 80 of the respondents representing 80% of the study population have agreed risk factors exist in their operating environments and that they are quite aware of their potential role in lowering productivity. Again, it is revealed in research findings that, 20 of the respondents also representing 20% acclaimed that there are no risk factors in the mass housing construction industry in the Upper West Region. The study points to the fact that majority of respondents from

the study community interviewed ranked construction as main activity they engaged in. Again, about 94 respondents ranked teaching and education as the second most involved activity in the building and construction industry. It is also realized from the field that, 88 of the respondents in the sampled population ranked research as the third most involved component in the construction threshold while 84 of the respondents ranked policy and management as the least most engaged aspect in the mass housing construction industry.

5.2.3 Ways of managing risk in estate development

The risk response process encompasses planning for an obligatory action to be considered in case a risk event occurs. It also entails taking planned action if required and following up with the consequences of these actions to ensure that the risk plan results in the necessary outcome. A risk response is determined by proposing several alternatives to eliminate or mitigate an anticipated risk and assign an optimum alternative as a response. Findings from the study reveal that, majority of the respondents interviewed agreed, managing risk factors in mass housing construction is suitable for the development of their establishment while 25 of the respondents in the study population representing 25% do not see the need to manage risk factors appropriately.

The study revealed that the most appropriate ways of dealing with risk associated issues is to embark on risk avoidance/prevention risk retention, risk reduction/mitigation, risk transfer and risk control. As to the means of funding their operations in the region, majority of the respondents cited financial inadequacy as the main constraint to the expansion of the industry in the region and further went on to

postulate that, the unavailability of frequent refresher courses equally has a great impact on their operations.

5.3 Conclusion

The findings reported here in are thus useful for both practitioners and professionals to develop and match their task functional skills and behavioral competencies to the unique requirement of the mass housing project environment. It is also necessary for professionals to apply their knowledge and understanding of these attributes towards effectively contributing to the needed performance level necessary to trigger the needed delivery success.

There is enough evidence to the fact that the nature of mass housing projects and the inherent managerial and delivery challenges is very much recognized among professional hierarchy, practitioners, and stakeholders. However, the exact unique particularities of mass housing project are what is not well known and understood among practitioners and in literature. Against the background of limited studies on clearly delineating the unique attributes of MHPs, this study has been undertaken in an effort to bridge the gap in knowledge regarding the characteristics of mass housing projects and cost impact on the industry in the Upper West Region.

5.4 Recommendations

Experiences gained from the field survey and review of literature makes it possible for the following recommendations to be made on risk management practices in mass housing units, the potential risk factors and their impact mass housing projects, and the effective ways of managing risk factors.

- Personnel with risk management background should be employed alongside consultants to such projects should ensure that the site investigated and all necessary specifications made available for contractors to follow appropriately.
- Funding to such projects should be secured down and made available to enable the contractors execute the projects at stipulated schedule without encountering smooth implementation process.
- There should be regular project meeting among all stakeholders of the project thus the team members, to enable each member have the common point on how the project is to be co-executed.
- There should be an in-house workshop for the parties involve helping them understand risk management process in the mass housing construction industry by all building contractors and industry players.
- Before handing over the site to the contractor, the parties to the contract should have a round table discussion to brainstorm all the likely challenges expected to stall the project.

5.5 Suggestions for Further Research

In a case study such as this, recommendation for future research would address the issues generated from this study. Based on these findings, future research may start from a relatively higher level of knowledge. First, a replication of this study would be helpful in re-examine the validity of its findings for which the researcher was not able to investigate.

Further empirical studies using larger sample sizes and greater geographical diversity would be helpful in validating specific parts of the theoretical models

Finally an in-depth case study should be conducted in risk management in mass housing estate in the upper west region of Ghana.

REFERENCES

Adedayo Olatunde Folaranmi, (2012) vol.4 no 2 *Post Constructional changes in Housing units in Mass House Estate in Niger state*

Adinyira E, Ahadzie.D & Kwofie.T.E "Determining the unique features of mass housing projects (MHPs),"in Proceedings of the 5th West Africa Built Environment Research (WABER) Conference, Laryea. S and .Agyepong S.A Eds., Accra, Ghana, August, 2013. [6]

Berenger Y. R& Agumba, J.N (2016), Risk management in the construction industry: a new literature review. MATEC Web of Conferences 66, 00008 (2016), DOI: 10.1051/matecconf/20166*IBCC 2016* 600008.

Brade (1998), Shimpi, (1999) *risk mapping in: Shimpi: integrating corporate risk management. Swiss re- markets*

Carbonara, N., Costantino, N., & Pellegrino, R. (2013). *A Three-Layer Theoretical Framework for Analyzing Public Private Partnerships: The Italian Case. Organization, Technology and Management: An International Journal, 6*(2), 799-810.

Carbone T.A, Tippett DD (2004). Project risk management using the project risk FMEA. EngManage J; 16(4):28–35.

Chankova, L. (2002). *Risk identification: basic stage in risk management. Environmental Management and Health,* 13(3):290-297. Towers Perrin. 2008. *Towers Perrin Risk and Opportunity White Paper*. Available from: http://www.towersperrin.com[Accessed 05/01/2016].

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

Cooper, D.F.& Chapman, C.B. (1987). Risk analysis for large projects (Models, Methods and Management Marcel Dekker, New York.

Crawford, L, Hobbs B, & Turner J.R, Project Categorization Systems, Project Management Institute (PMI), Newton Square, Pa, USA, 2005.

Dada, J.O. (2010) Strategies for militating risk in construction projects.

Edmond, G.A & Miles D.W.J Foundations for Change: Aspects of the Construction Industry in Developing Countries, *Intermediate Technology Publications, London, UK, 1984*.

El-Dash, K. (2008). Construction risk management application and education selected. *Proceeding from the 12th International Congress on Project Engineering, 390-403.*

Elin Howe (2012).Risk management policy and procedures manual, *DDS Office of Quality Management, Department of Developmental Services, Commonwealth of Massachusetts.*

Enshassi .A & Burgess. R, (1991), "Managerial effectiveness and the style of management in the MiddleEast: an empirical analysis," *Construction Management and Economics,* vol. 9, pp. 79–92, 1991. [7]

Enshassi A (1997) "Site organization and supervision in housing projects in the Gaza Strip," *International Journal of Project Management,* vol.15, no.2, pp.93–99.

Enshassi A, Mohamed. S & Abushaban S, (2009). "Factors affecting the performance of construction projects in the Gaza Strip," *Journal of Civil Engineering and Management,* vol.15, no.3, pp. 269–280

Ferguson, B., 2003, Housing microfinance - *a key to improving habitat and the sustainability*

of microfinance institutions. Small Enterprise Development, Vol. 14 No. 1, pp. 21-31

Gehner, E. (2003). Risicoanalyse bij Projectontwikkeling Uitgeverij SUN, Amsterdam Project Management Institute. *Guide to the project management body of knowledge (PMBOK® Guide). 4th ed. Newtown Square: Project Management Institute; 2008.*

Han-suck song (2009). *Essay on risk and housing with focus on low income households.*

Housing profiling (2011)Owusu, S. E.,2005, *Housing Policy in Ghana: The Past, The Present and The Challenges of The Future, Strategizing Toward the Millennium Development Goal, Instituteof Local Government Studies (ILGS), ACCRA*

Kuang, Z. (2011). Risk Management in Construction Projects: Application of Risk Management in Construction Period. *Bachelor of Architectural Technology and Construction Management. Via University College, Horsens Campus, Denmark.*

Lester, A., (2007). Project management, planning and control, *5th edition. Oxford: Elsevier Ltd Light Press.*

Lientz&Larssen (2004). *Risk management for I T projects. How to deal with issues and risks USA Elsevier Inc.*

Lisa Turnbough, P.E. (2005). Risk management onlarge capital projects. *Journal of professional issues in engineering and practices*, 365-374.Manage Eng.; 19(2):60–68.

Manu, Ankrah. N, Proverbs. D and Suresh, ″ an approach for determining the extent of contribution of construction project features to accident causation," *Safety Science, vol. 48, no.6, pp.687–692, 2010.*

Matins Claudia Garrido, Morano Cassia Andra Ruotolo, Fereira Miguel Luiz Riberio and Haddad Assed Naked (2011). Risk Identification Techniques Knowledge and Application in the Brazilian Construction Vol. 2(11), pp. 242-252, November2011.

Ministry of Works and Housing, 2000, *National Shelter Strategy Part Two, Policy Planning and Evaluation Unit Ministry of Works and Housing*

Njagi Peter Maina, Mbabazi Mbabazize and Ackelinne Kibachia (2016), Evaluation Of Factors Affecting Effectiveness Of Risk Management In Public Housing Construction Projects In Rwanda Case Of Batsinda Housing Project. European Journal of Business and Social Sciences, Vol.5, No.01, April 2016. P.P.85 101.

Olamiwale, I.O. (2014). Evaluation of Risk Management Practices in the Construction Industry in Swaziland. Master of Quantity Surveying Thesis, Tshwane University of Technology, Pretoria, South Africa. Oxford: Blackwell Publishing

Patel Ankit Mahendra (2014). *Risk Assessment in Residential Construction Projects by SPSS ISSN: 2277-9655 Scientific Journal Impact Factor: 3.449 (ISRA), Impact Factor: 1.852*

Potts K. (2008) *construction cost management learning from case studies. Abingdon: Taylor Francis*

Raftery, J. (1994). Risk analysis in project management E. & F.N.Spon, London.

Schatteman, D., Herroelean, W., Vandvonder, S. & Boone, A. (2008). Methodology for integrated risk management and proactive scheduling of construction projects, *Journal of construction engineering and management*, 134(1): 885- 893.

Smith, N.J., Merna, T., & Jobbling P. (2006). Managing Risk in Construction Projects. (2nded). Oxford: Blackwell Publishing.

Sponcer, J. (1980) Modern Risk Management Concepta, BSFA Conference "Risk Management in Building", Sidney, pp 21-29.

Thomas P. (2009) *strategic management. A course at Chalmers University of technology.*

Wang MT, Chou HY (2003). Risk allocation and risk handling of highway projects in Taiwan.

Wang, J.X. & Roush, M. (2000). What every engineer should know about Risk Engineering..

Winch.G (2002).*Managing construction projects, an information processing approach, Oxford;Blackwell publishing.*

Wysocki R.K (2009). Effective project management: traditional, agile, extreme. Indianapolis:

Zenghua, K. (2011). Risk Management in Construction Projects. VIA University College, Horsens Campus, Denmark.

APPENDIX

UNIVERSITY OF EDUCATION, WINNEBA

COLLEGE OF TECHNOLOGY EDUCATION-KUMASI

FACULTY OF TECHNICAL AND VOCATIONAL EDUCATION

DEPARTMENT OF CONSTRUCTION AND WOOD TECHNOLOGY EDUCATION

SURVEY QUESTIONNAIRE FOR BUILDING CONTRACTORS IN MASS HOUSING PROJECTS

Research Topic: **Risk management on mass housing estate in the upper west region of Ghana. A case study of contractors in selected districts**

INTRODUCTION

Contraction industry is highly risky with complex and dynamic project environments creating an atmosphere of high uncertainty and risk. The mass housing projects are vulnerable to various technical, environment ,socio-political and business risks managing risk effectively is important if mass housing projects are to be problems associated with business failure and stay competitive.

In Ghana , the construction industry contributes significantly to economic growth contributing between 5 and 10 percent of the gross domestic product (GDP) employing up to 10 percent of the working population(Ghana statistical service 2011).

Additionally, the sector is responsible for about half of gross fixed capital formation. The aforementioned achievements can be undermined if risk associated with the construction sector are not managed properly.

This questionnaire seeks to solicit views from building contractors in the mass housing projects. This research is purely for academic work in partial fulfilment of the

award of the master of technology education (M.Tech) Degree. You are kindly requested to provide responses to the questions to enable the researcher contribute knowledge in the field of study.

All information given will be treated confidentially, and besides anonymity is guaranteed.

Thanks for your co- operation

Segdong Luke

0209249316/0549756503

segdongluke@yahoo.com

SECTION A: PERSONAL PARTICULARS AND PROJECT INFORMATION

1. Please indicate your gender. *Please tick [√] in the appropriate box.*

   male

   female

2. What is your age group? *Please tick [√] in the appropriate box.*

   Less than 30 years 30 – 39 years

   40 – 49 years 50 -59 years

   Over 60 years

3. What is your highest educational qualification? *Please tick [√] or write in the appropriate box.*

   Basic education

   SHS Certificate

   Bachelor's Degree

Master's Degree

Other Please write

4. Which of the contractor classification certificates do you have? *Please tick [√] in the appropriate box.*

D1/K1 D2/K2

D3/K3 D4/K4

5. What is the duration of the last project undertaken by your company? *Please tick [√] in the appropriate box.*

6 months 6 – 11 months

1 – 5 years 6 years and above

6. What was the source of funding of the last project undertaken by your company? *Please tick [√] in the appropriate box.*

Self-funded Family/ friends

Bank loan Donor funded

Ghana Government Other Please write

SECTION B: EXPERT OPION ON RISK MANAGEMENT INVOLVING MASS HOUSING PROJECTS

7. What is the level of significance of the following risk factors affecting mass housing projects? Please rate using a scale of 1-5 where; 1 represents very insignificant, 2 represents insignificant, 3 represents uncertain, 4 represents

significant and 5 represents very significant. *Please tick [√] in the appropriate box.*

Potential risk factor	Level of significance in mass housing projects				
	1	2	3	4	5
Technical risk					
Incomplete designs					
Inadequate specifications					
Change in project's scope					
Inadequate site investigation					
Financial risk					
Delay in payment					
Inflation					
Financial failure in part of contractor					
Error in estimation					
Environmental risk					
Adverse weather condition					
Difficulty to access the site					
Flood/earthquakes					
Seasonal changes					
Management related risk					
Change of top management					
Project team conflicts					
Poor communication					

Scheduling error

Socio-political

Difficulty in acquiring permit and approval

Language/ cultural barriers

Bribery and corruption

Pollution and safety rules

Change in laws and regulations

Other source of risk

Labour injuries

Damage to structure

Inexperience work force

Quality of materials

8. Please indicate the extent to which your organization undertakes the following risk management practices. Please rate using a scale of 1-5 where; 1 represents the practice is not all undertaken, 2 represents the practice is sometimes undertaken, 3 represents the practice is frequently undertaken and 4 the practice is always undertaken by your organization. *Please tick [√] in the appropriate box.*

Risk management practices	Extent to which the practice is undertaken			
	1	**2**	**3**	**4**
Risk planning				
Risk identification				

Risk analysis				
Risk allocation				
Risk monitoring and control				
Risk response				

9. What is the impact of the following categories of risks on mass housing projects? Please rate using a of 1-5 where; 1 represents the risk category has no impact, 2 represents the risk category has a very low impact, 3 represents the risk category has a low impact, 4 represents the risk category has a medium impact, 5 represents the risk category has a high impact and 6 represents the risk category has a very high impact. *Please tick [√] in the appropriate box.*

Risk categories	Degree of impact					
Technical risk	1	2	3	4	5	6
Inadequate site investigation						
Inappropriate specification						
Error in designs						
Failure to carry out works in accordance with the contract						
Environmental risk						
Bad weather condition						
Seasonal changes						
Natural disaster						
Financial market risk						
Payment delay						

Inflation

Improper estimations

Change in cost of materials

Project Management risk

Scheduling error, contractor

delays

Project team conflicts

10. What will you recommend as a way of reducing risk in mass housing estate in the region?

……

……

……

……

……

THANK YOU