
Research project paper



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College of Business and Economics
Department of Management

**Integrated Risk Management Practice in the
Construction Industry
General Contractors' Perspective**

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Studies in partial fulfillment of the requirements for the
Degree of Executive Masters of Business Administration (EMBA)

DECLARATION

I hereby declare that this submission is my own work towards the degree of Executive Masters of Business Administration (EMBA) and that, to the best of my knowledge, it contains no material previously published by another person nor material which has been accepted for the award of any other degree of the University. All sources of materials used for the research paper have been duly acknowledged.

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ENDORSEMENT

This research project paper titled “**Integrated Risk Management Practice in the Construction Industry - General Contractors’ Perspective**” has been submitted to Addis Ababa University College of Business and Economics, Department of Management, with my guidance and approval as a university advisor.

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Integrated Risk Management Practice in the Construction Industry - General Contractors' Perspective

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Acronyms

AICPA	American Institute of Certified Public Accountants
AIRMIC	Association of Insurance and Risk Managers
Alarm	National Forum for Risk Management in the Public Sector
APM	Association of Project Management
COSO	Committee of Sponsoring Organizations of the Treadway Commission
ERM	Enterprise risk management
GDP	Gross Domestic Product
ILO	International Labour Organization
IRM	Institute of Risk Management
ISO	International Standards Organization
MoUHC	Ministry of Urban Development, Housing and Construction
PMBOK	Project Management Body of Knowledge
RM	Risk Management

Abstract

Much important as construction is to the nation, it's a very risky industry. Risks in the construction industry are not limited to construction projects as it is largely presumed. Construction enterprises face all kinds of risks and risks are prevalent across the respective construction enterprises with the way these risks are managed greatly influencing the performance and competitiveness of such enterprises.

The study investigated integrated risk management practice in the construction industry of Ethiopian, particularly by general contractors. Results of a survey conducted on a sample of such contractors established that formal risk management is not well practiced in the industry with only 28.6% of them implementing formal risk management with risk management policy approved by the board of directors signifying absence of a structured approach to deal with the risks that greatly affect the performance and competitiveness of the enterprises.

The study has also found out that the major drivers as well as the major hindrances to risk management implementation in construction enterprises are mainly internal to the enterprises indicating that change in respect of risk management implementation in the construction industry has to come mainly from within the construction enterprises.

CHAPTER ONE

1 Introduction

1.1 Background to the Research

Ethiopia recognizes the construction industry as a fundamental economic sector which permeates most of the other sectors as it transforms various resources into constructed physical economic and social infrastructure necessary for socio-economic development. Much in consistence with the definition given by Ofori (1990), the construction industry is defined as an economic activity that embraces the process by which the socio-economic physical infrastructure, factories and buildings along with their related structures are planned, designed, procured, constructed or produced, altered, repaired, maintained, and demolished (MoUHC 2014).

Identified as stakeholders of the industry are public and private organizations and companies, project owners, firms and individuals working as consultants, main contractors and sub-contractors, material and component producers, plant and equipment suppliers, occupants, licensing and monitoring agencies and related parties (MoUHC 2014).

The Ethiopian construction industry is important in terms of its direct contribution to the economy, the employment opportunities it creates, its crosscutting effect in enhancing the development of other sectors through its backward and forward linkages as a consumer of raw and intermediate products and as a supplier of shelter necessary for all social and economic activities respectively and its key role in encouraging investment, domestic as well as foreign (MoUHC 2014; Poleske and Sivitanides 1989; Kofoworola and Gheewala 2008). Cognizant of such key role, the government of Ethiopia has taken a number of initiatives (MoUHC 2014) in an effort to strengthen the construction industry in the last decade which include:

1. Development of the Construction Sector Capacity Building Program (2002-2006).
2. Formulation of the 'Industrial Development Strategy' (August, 2002), which highlights the importance of the construction sector, and provides direction to Federal and Regional authorities.
3. Development and initiation of the Engineering Capacity Building Program Road Map (2005-2009).
4. Adoption of a Finance Law and a subsequent procurement guideline for service and works as part of ongoing Civil Service Reform.

5. Establishment of Vocational Training Centers, expansion and improvement of training institutes and universities so as to address shortage of skilled manpower;
6. Promotion of professional and trade associations
7. Mobilization of donor support in financing infrastructure projects in support of the local economy;

Such measures coupled with the double-digit economic growth during the decade under consideration have fuelled considerable growth in the construction industry. The industry has thus witnessed remarkable growth in terms of its size as well as its contribution to the economic activity of the country.

In the five years period from 2002 to 2006 E.C., the number of contractors registered with the Ministry of Urban Development and Construction Works, Construction Industry Development and Regulatory Agency has increased from 2418 to 4003 signifying a 66% growth. While the absolute net increase for the period is 1589, the largest difference came from the general contractors who increased by 1016. The structure of the construction industry over a five year period to 2013/14 is given in table 1. Looking deep into the structure of the industry, however, the number of grade one contractors of all categories still constitutes the smallest portion, below 4% in 2013/14, signifying the significant imbalance between the number of big projects that are being initiated in the country in all sectors and the existing domestic capacity to take up such projects and sustain the rapid growth that the country is actually experiencing and potentially envisioning.

Table 1: Structure of construction industry over five years' time (Ethiopia 2002 - 2006 Abstract 2015)

Category	2009/2010	2010/11	2011/12	2012/13	2013/14
Building Contractors	1169	1430	1464	1617	1718
Electromechanical	5	8	23	3	0
General Contractors	1238	1104	1592	1510	2254
Specialized Contractors	1	-	1	1	2
Road Contractor	5	9	15	25	29
	2418	2551	3095	3156	4003

In terms of its contribution to the economy as well, the construction industry has registered an average growth of 12.43% in the last decade and so has its contribution to the gross domestic product (GDP) increased from 4.5% to 5.3%, though still lagging behind the Sub-Saharan average of over 6%, yet an important improvement. The industry's particular role in poverty reduction by increasing employment expansion through small and medium enterprise development is notable (MoUHC 2014). This role of the

industry is particularly significant to the country not only with the number of jobs it creates, though it stands to be a major employer in the country. It creates jobs to the young and particularly to “the excluded” (de Souza 2000 in ILO 2001), those with little education or skill including women who happen to be from the poor section of society.

Apart from emphasizing the role of the construction industry in expanding economic and social infrastructure, generating job opportunities and enhancing expansion and development of other economic sectors of the country, the Government through its policy document for the construction industry’s development envisages the industry’s potential not only to save foreign exchange outflow to international consultants and contractors, but also to contribute towards the foreign exchange earning of the Country by going international (MoUHC 2014). As the policy document has rightly put it anyway, this is conditional upon the reorganization and competitiveness of domestic consultants and contractors.

Unfortunately, however, the industry appears to be far-off from this expectation. The performance of the industry in terms of efficiency and effectiveness is not as such encouraging with substantial number of projects suffering from time and cost overruns and scope and quality problems. This was attributed to a number of constraints and challenges related to owners, contractors, designers and regulators, which the Ethiopian construction industry is facing at present. Rent-seeking and corruption, shortage of trained manpower, inefficient construction project management and lack of technology transfer, absence of conducive environment that enhances competition, lack of efficient input supply chain, lack of appropriate financing facilities, absence of collaboration among industry stakeholders, regulatory gaps, and absence of industry development policy to provide direction were among the challenges constraining growth of the construction industry (MoUHC 2014). A number of specific challenges and problems related with bid participation, contract award, performance, and payment procedures were also identified to constrain the efficiency and growth of construction contractors in particular (HABCON 2011).

All these challenges and constraints are, however, simply risks which may obstruct the successful achievement of the objectives of the construction contractors/firms and/or their projects. The impact of such challenges in the performance of the contractors is compounded significantly due to lack of appropriate risk management. Whereas a number of specialized areas such as quantity surveying, marketing management, construction procurement and finance, construction law and construction claims have been identified as in short supply in the market and affecting the performance of the construction industry, unfortunately, there was no mention of capacity deficiency in risk management in the industry development policy document (MoUHC 2014). This fact is owing to the lack of awareness on the significance of risk management not only on the part of the contractors but also with the policy makers.

In fact all the challenges and constraints are in the nature of the construction industry. The construction industry is considered one of the most risky businesses with complex and dynamic project environments creating an atmosphere of high uncertainty and risk (Ehsanet al. 2010). The complex nature of the activities and the relationships in the industry expose the industry to immense risks. One classification of risks which the construction industry face includes the following: i) Acts of God, e.g. floods, hurricanes; ii) Physical risks, e.g. labor injuries, fire, damage to equipment; iii) Financial and economical risks, e.g. inflation, unavailability of funds; iv) Political and environmental risks, e.g. changes in rules and regulations, political uncertainty; v) Design-related risks, e.g. defective design, and vi) Construction-related risks, e.g. change orders, labor productivity, etc. (Al-Bahar1990).

Significant exposure to such broad category of risks compromises the achievement of objectives in time, within approved budget, and to the expectation of customers. This situation affects all stakeholders negatively in a number of ways, a situation which calls for remedial steps to properly manage the risks in the industry.

Implementation of a formal risk management system i.e. the proactive identification of the various risk factors that adversely influence the achievement of the objectives of the company/firm, the proper assessment of such risks quantitatively and qualitatively in terms of the likelihood of their occurrence and their impact in the event of happening, and prioritization of the risks in terms of their importance and in view of the capacity of the company, and planning on the best ways to respond to the risks that matter (putting in place appropriate risk response mechanisms to prevent them from happening or to minimize their impact) is proclaimed in the literature to contribute much to the improvement of the performance of such companies and the achievement of their objectives to the satisfaction of all the stakeholders. According to Bennerman (2008), risk management can lead to a number of benefits at project as well as organizational level including:

- Identification of favourable alternative courses of action,
- Increased confidence in achieving project objectives,
- Improved chances of success,
- Reduced surprises,
- More precise estimates (through reduced uncertainty),
- Reduced duplication of effort (through team awareness of risk control actions).

These are but factors that help improve quality, competitiveness and cost thereby leading to enhanced performance and profitability of contractors.

1.2 Statement of the Problem and Research Questions

The importance of a formal risk management structure/system for a successful accomplishment of company objectives and projects is long acknowledged. However, we still witness failures in project delivery which can be traced back to lack of formal/structured risk management systems. Local contractors could not be competitive enough that they are losing substantial number of projects to their international counterparts (Zenebe 2015). Inaccurate analysis and evaluation of risks involved in the projects is one possible explanation for the unsuccessful bid prices local firms' offer. Local contractors' performance in terms of quality, cost and time and overall implementation capacity remain at a critical condition despite the government's expectation for the local construction industry to play a significant role in the realization of the Growth and Transformation Plans of the Country (MoUHC 2014).

With regard to risk management in the construction industry of Ethiopia, some unpublished thesis papers conducted on construction project related subjects (Getachew 2009; Wakjira 2011; and Yimam 2011) found out that formal risk management is barely practiced in the construction industry, specifically in construction projects. Absence of comprehensive identification of the various risks involved in a construction project and the understanding of and accurate evaluation of their respective impacts on the construction of the project could lead construction firms to an inaccurate decision on a course of action due to inaccurate risk loading. Moreover, no advance planning and preparations could be made to properly and efficiently respond to when such risks transpire. By then crisis management becomes the issue which may prove not only costlier than the contingency provided but also disastrous. There is, therefore, a need for the better understanding of risks and their identification, measurement and management in the construction industry of the country and construction firms in particular.

While the previous studies mentioned in the paragraph above provided an insight into the risk management practice in the construction industry of Ethiopia, the focus of most of them was risk management from the perspectives of project owners and not contractors. Those studies which examined contractors' risk management practices on the other hand appear to be shallow in two terms:

1. Risk management is assessed from the perspective of construction project risks. However, construction firms/companies are also exposed to risks other than project risks which may not only affect the accomplishment of projects but also endanger even the very existence of the company itself.

-
2. Whereas all the subject studies have found out that formal risk management is not practiced in the construction industry, none of them attempted to explore the factors that contribute to such situation.

This research explored the practice of integrated risk management in construction companies which spans across all levels, of which project risk management is an important component in such project-based industry and firms. The risks which contractors perceive as most important as well as the tools and mechanisms used in their management are explored. Moreover, the research has made an attempt to find out some of the factors which impede the implementation of risk management in the construction firms in Ethiopia by identifying the major driving and hindering factors for the introduction and practice of risk management.

The following research questions have thus been formulated in order to provide answer to these needs:

1. What is the perception and level of awareness of contractors to risk and risk management practices?
2. What processes, tools and mechanisms do contractors employ in the management of risks of their enterprises?
3. What major factors drive or hinder the practice of risk management by contractors?

1.3 Research Purpose and Objectives

Integrated risk management refers to the coordinated activities to direct and control an organization with regard to risk i.e. the effect of uncertainty on objectives. Integrated risk management is viewed as a corner stone of good corporate governance and therefore results in better service delivery, more efficient and effective use of scarce resources and better project management (Collier et al. 2007); affects organizational performance (COSO 2004), and contributes to the demonstrable achievement of objectives and improvement of performance (ISO31000:2009). Thus, many organizations are embracing integrated risk management. The implementation of integrated risk management can similarly help construction enterprises in Ethiopia to improve their performance and competitiveness.

The purpose of this research is, therefore, to assess the practice of integrated risk management by construction enterprises, particularly general contractors, to help in improving decision making and improve performance and competitiveness.

Accordingly, to achieve this purpose, a set of four specific objectives have been set for the research as follows:

1. Investigate the level of awareness and perception to risk management,
2. Identify the risk management process, tools and mechanisms employed in the management of risk,
3. Identify the major drivers and impediments for integrated risk management implementation,
4. Provide recommendations to enhance integrated risk management implementation and practice based on the findings of the research.

1.4 Research Design

This section presents an outline of the various methods that were adopted to achieve the objective of the research. The detail of each method is provided in the related chapter in which it was applied. This section therefore provides a brief on each method. A comprehensive literature review covering the construction industry and risk management in the construction industry was undertaken to establish the theoretical background and the constructs of the research. This provided an overview of the state-of-the-art in risk management and served as the basis for examining risk management practice in construction enterprises. This was followed by a preliminary questionnaire survey of selected contractors to validate the constructs associated with the subject as obtained from the literature review.

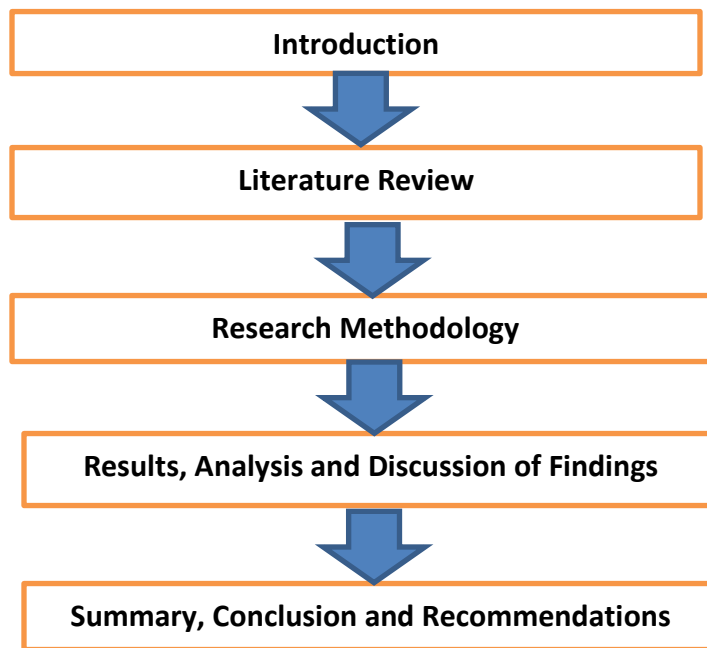
1.5 Significance of the Research

The research would be of high significance in that it would raise the level of awareness of the construction industry's stakeholders particularly contractors on the importance of integrated risk management practice in improving the performance and competitiveness of construction enterprises and on the risk management standards and best practices available in the literature.

Moreover, by identifying the major drivers and impediments for the practice of risk management, the research highlights areas of change that should be undertaken by industry stakeholders including policy makers in order to positively influence and enhance risk management practice by contractors.

1.6 Organization of the Research

The research is organized into five chapters as follows:



Chapter One presents an overview of the research. Covered in this chapter are the background of the research area, the research problem, objectives, the significance of the study; and the scope and limitations of the study.

Chapter Two covers a discussion of literatures on the topic. Conscious effort shall be made to explain the conceptual frameworks and theories of risk management in general and risk management in the construction industry.

Chapter Three discusses in detail the methodology that were employed in conducting the research; the design and methods used for data collection as well as the approach adapted in analyzing data gathered.

Chapter Four analyzes data collected through the survey, discusses the relevant issues and brings out the findings of the survey. Finally, chapter five presents a summary of the findings of the research and conclusions and recommendations are drawn therefrom.

CHAPTER TWO

2 Literature Review

In this section of the paper existing literature on risk management in general and in the construction industry in particular will be reviewed. This will help to provide valuable insight into the concept and how to adopt the practice of risk management to the Ethiopian construction industry. Section one of the Chapter will provide overview of the construction industry and its business environment. Section Two will deal risk management in general and particularly in the construction industry in detail.

2.1 Overview of the Global Construction Industry

2.1.1 Definition

The scope and activities of the construction industry have been defined differently by different authors. Gruneberg (1997) has defined construction broadly to encompass construction input production, professional services including architecture and construction management and the building of the physical built work. According to The International Standard Industrial Classification (Department of Economic and Social Affairs 2008), however, construction is defined narrowly to include “general construction and specialized construction activities for buildings and civil engineering works. It includes new work, repair, additions and alterations, the erection of prefabricated buildings or structures on the site and also construction of a temporary nature... Specialized construction activities, on the other hand include specialized construction activities (special trades), i.e. the construction of parts of buildings and civil engineering works without responsibility for the entire project. These activities are usually specialized in one aspect common to different structures, requiring specialized skills or equipment, such as pile driving, foundation work, carcass work, concrete work, brick laying, stone setting, scaffolding, roof covering, etc.” This definition represents only the last segment of Gruneberg’s definition above i.e. the actual building of the physical built work. On the other hand, Moavenzadeh (1978, pp. 98) seems to settle in between by defining the construction industry as “a sector of the economy which, through planning, design, construction, maintenance and repair, and operation, transforms various resources into constructed facilities”

Products of the construction industry generally include dwellings, office buildings, stores and other public and utility buildings, farm buildings etc., or the construction of civil engineering works such as motorways, streets, bridges, tunnels, railways, airfields, harbours and other water projects, irrigation systems, sewerage systems, industrial facilities, pipelines and electric lines, sports facilities etc. These

have been classified variously by different authors. Wells (1984) classifies them as infrastructure, civil engineering, buildings, and maintenance and repair of existing facilities. According to World Bank (1984) products are classified into two i.e. building which include housing, offices, hospitals, factories, and so forth, and civil works involving the infrastructure for water supply, transport, irrigation, power generation, and so on. Others have also classified them as residential, commercial, industrial, infrastructure, and repair and maintenance.

While the different definitions may serve different purposes, for the purpose of this study the actual construction activity as defined by Department of Economic and Social Affairs (2008) is taken.

2.1.2 Construction Contractors

Contractors as generally referring to companies/firms undertaking construction activities can be classified or categorized in different ways. In a more general classification, contractors are classified as general contractors (main/prime contractors) and subcontractors. A construction project is awarded to a general contractor. They contract out a portion of their job to be carried out by an outside firm specializing in specific project activities, subcontractors, while they remain responsible for managing the project such as contract administration with clients, project financing, material and equipment procuring, and monitoring the project progress (Yoke-Lian 2014). On the other hand, subcontractors rely on general contractors for virtually all of their work and the relationships they maintain with general contractors in their geographic area (McCord and Gunderson 2013).

Construction contractors are also categorized according to their licensing classifications which differ in line with the rules and regulations of the respective countries. According to the Directives No. 19/2013 for the Registration of Construction Professionals and Contractors of the Ministry of Urban Development and Construction of Ethiopia (MoUHC 2013), contractors can be registered and licensed as general contractors, building contractors, road contractors, and specialized contractors. While building contractors are qualified to undertake building construction and supplementary works to buildings and road contractors for construction of roads and other related civil engineering works, general contractors are registered to undertake all kinds of construction activity, without any limit as to the type of the work they do. It is understood that the various activities in which general contractors are involved, buildings, road and other civil engineering works, present different features and situations. They differ in the skill they require, the materials they consume, the equipment they use, the spatial area they cover, etc. and the management they require. Thus, general contractors face as varied risks as the type of projects they take, a situation they need to recognize and accordingly design tailored risk management tools and techniques.

For the purpose of this research, general contractors are to be understood as defined by the Ministry of Urban Development and Construction.

2.1.3 Importance of the Construction Industry

The construction industry is one of the biggest industries in the whole world at national as well as at global level. The industry is a major and integral part of the national output, accounting for a sizeable proportion in the Gross Domestic Product (GDP) of both developed and underdeveloped countries (Crosthwaite 2000, Horta et al. 2013). According to Economywatch (2010), the industry contributes around one-tenth of the total global Gross Domestic Product (GDP). While Global Construction (2020) maintains that the construction sector worldwide accounts for over 11% of global GDP, Horta et al. (2013) state that the global construction industry makes up approximately 9% of the world's GDP. Further, the value added of construction is in the range of 7% to 10% for highly developed economies and around 3% to 6% for underdeveloped economies (Lowe 2003 cited in Betlejewsk and Potkány 2015).

This sector is the largest industrial employer in most countries, accounting to around 7% of the total employment worldwide. According to a report by ILO (2001) based on employment data for 2000, the global distribution of construction employment between the high and the low-income countries is almost the exact reverse of the distribution of output. While the high-income countries produce 77 per cent of global construction output with 26 per cent of total employment, the rest of the world (comprising low- and middle-income countries) produces only 23 per cent of output but has 74 per cent of employment signifying the importance of the industry in terms of generating employment opportunities to the growing young population of developing countries. Construction is said to be a job which one can do without much schooling and as such has the ability to “absorb the excluded” (de Souza 2000 in ILO 2001), providing employment for those with little education or skill, including women, many of them from the poorer sections of society.

The construction industry is important not only in its contribution to the GDP and employment but also in its role in economic development. The industry has the potential to play as an engine of economic growth and development. The roads, dams, irrigation works, schools, houses, hospitals, factories, and other construction works of the industry, the World Bank (1984) underscores, form the physical foundations on which development efforts and improved living standards are established. As emphasized by Crosthwaite (2000), the construction industry produces the facilities that house a wide variety of human activities, as well as the infrastructure that connects these facilities into an increasingly complex network. According to Low (1994), the industry's contribution to capital formation through the creation of such physical facilities accounts for 7-13% of the GDP while that of most industrialized countries ranges between 10-

16%. He further adds that construction represents between 45 and 60%, of all fixed capital formation in most countries.

The importance of the construction according to Ofori (1994) is also found in the strong linkage the industry has with other sectors. Through its backward linkages the construction industry generates demand for inputs including raw, semi processed, and processed materials, exhibiting close relationship with the manufacturing and the commerce sectors that supply the materials and equipment required by the construction sector (e.g. cement, steel etc.) and the financial sectors for its financial services. Through its forward linkages the industry further generates demand for its outputs with practically all other sectors of the economy. The most striking output of the construction industry is infrastructure, considered the soul of development and growth because of its direct bearing on the economy. Infrastructure facilitates business like no other mechanism. In fact infrastructure is a major differentiator between developed and developing economies, with poor infrastructure development affecting the speed at which business is done in developing economies while the reverse is true with the developed economies. Construction generates the highest multiplier effect through its extensive backward and forward linkages providing substantive growth stimulus throughout the economy (Park 1989). Such is the effect of fluctuation in construction demand. Demand for labour and materials is affected as is the demand for the outputs of the construction industry thereby affecting the economy in many ways.

The industry is expected to further grow at faster rate with the growth of world economy. As projected by Global Construction 2020 (2011), by 2020 construction will account for 13.2% of world GDP. According to global construction survey by KPMG (2013), governments' infrastructure plans are the single biggest driver of market growth while economic growth, urbanization and population increases are also remain influential. The Construction sector will be at the heart of global economic growth and has a lead role to play in ensuring that construction is cost-effective, makes best use of the world's scarce resources and builds infrastructure and communities for the 21st century (Global Construction 2020). The construction industry being no more a local market due to globalization, construction companies particularly from the developed countries have already internationalized themselves in pursuit of the benefits of the global market (Horta et al. 2013). Many are targeting international expansion according to a global construction survey conducted by KPMG (2013) in which 47% of major worldly construction companies said they plan to move into new geographies, with the most popular destination being Africa.

2.1.4 Business environment of Construction

The environment within which construction organizations operate may be classified as external and internal. The external environment represents anything outside the internal environment of the

organization. The nature and performance of the construction industry is influenced by the environment negatively or positively through the opportunities and threats it presents. According to Langford and Male (2001), the external environment of a firm can be broken down into two, the general environment and the task environment, referring to the macro environment and microenvironment respectively.

The general environment comprises of the wide-ranging economic, technological, sociocultural, demographic, political and legal, and global forces that affect the organization and its task environment (Langford and Male 2001). These factors, individually or combined, have a universal effect over the economy as a whole but their effect and significance could be different from one industry to the other. Changes in the general environment pose threats or create opportunities as to preclude or enhance the achievement of the long-term objectives of companies operating in the construction industry at different degrees depending on the level of preparedness of each company to such risk factors.

On the other hand, the task environment comprises of those variables that would have a direct and immediate impact on the organization's activities. This is the industry environment and represents more specific characteristics and is the primary source of opportunities and threats for the organization that operate within the industry (Langford and Male 2001). Forces of the task environment result from the actions of suppliers, distributors, customers, and competitors, and have a significant impact on short-term decision-making.

The internal environment consists of the forces operating within an organization and is controllable. It stems from the organization's culture and value system, mission and objectives, management structure and nature, and human resources.

An organization must continuously monitor and adapt to the environment if it is to survive and prosper. The successful organization will identify, appraise, and respond to the various opportunities and threats in its environment (Kew and Stredwick 2005 cited in Üç, M. and Kaja, A. 2013).

2.1.5 Unique Characteristics of the Construction Industry

Apart from general industry forces discussed above, the construction industry has a number of industry as well as project related unique features which differentiate it from other industries that impact the companies operating in the industry positively or negatively.

These unique features are not mutually exclusive; each feature independently or in any combination trigger various issues which influence the industry/the project either positively or negatively depending on how they are managed.

2.1.5.1 Industry-related features

Included in this category are a number of characteristics that typically reflect the conditions and nature of the industry and which influence an organization as a whole. Some of these features are discussed below.

2.1.5.1.1 Complexity in Construction

An important characteristic of construction as emphasized by many authors is its complex and dynamic nature (Bertelsen 2003, Gidado 1996, Baccarini 1996); etc. Complexity is defined as featuring the following properties:

- Containing multiple parts;
- Possessing a number of connections between the parts;
- Exhibiting dynamic interactions between the parts; and
- The behaviour produced as a result of those interactions cannot be explained as the simple sum of the parts (emergent behaviour).

It is a common statement that the construction process is one of the most complex and risky businesses undertaken. According to Baccarini (1996), construction may be considered the most complex undertaking in any industry. Complexity in construction as Schalcher (2009) understands comes in two forms, system complexity and process complexity. Similarly, Bertelsen (2003) held construction to be complex as the construction system and process feature the common characteristics of complex systems.

Construction as a system consists of a varying number and type of elements, as well as a varying number and types of relationships between those elements. The characteristics and the behavior of systems are primarily determined by the interaction among the elements and the interaction between the system and its environment. Such interactions could be of tasks, teams, technologies or inputs. Its dynamics relates to its adaptability to any kind of change - internal/external, globalization, new laws and regulations, new technologies, competition, etc.

Process complexity relates to the number of unique inputs to a process and the complexity of the process itself. Complex processes are characterized by incomplete, fuzzy and changing goals that finally become completed and bindingly specified during the process itself. Processes with long process durations are particularly influenced by changing legal, technical and financial boundary conditions. Another dominant characteristic of complex processes is the incompleteness and uncertainty of the relevant basic information. Many process activities and decisions are based upon random data, assumptions and estimations. This lack of reliability directly increases the risks (threats and opportunities) and these

uncertainties compound to influence the anticipated outcome of a complex process. It is evident that the scope of the end product has to be adopted and optimized due to these constantly changing constraints and targets. Thus, the process itself cannot follow the theoretical logic of an ideal procedure: activities have to be repeated and decisions have to be taken into account again, which leads to a nonlinear sequence of the process steps with many interrelated feed-back and feed-forward loops (Schalcher 2009).

Three types of complexities can be identified in a process: input complexity, output complexity and workflow complexity. Input complexity relates to the number and variety of inputs that go into the process, the components that are inherent in the operation of individual tasks and originate from the resources employed or the environment (in which it is executed?) as categorized by Gidado (1996). Inputs include manpower, materials, plant and machinery and information and uncertainty factors in this regard, according to Gidado (1996) could be due to lack of complete specification for the activities to be executed, Unfamiliarity of the inputs and/or environment by management, Lack of uniformity of work, and Unpredictability of the environment. The greater the number and variety of inputs, the greater the complexity. Output complexity is driven by demand from customers. In construction, users frequently change their requirements during production, leading to unclear goals, uncertainty in production, and unpredictable, unquantifiable risks (Hobday 2000). Workflow complexity, on the other hand, stems from interdependence among tasks and relates to those complexities that originate from bringing different parts together to form a work flow (Gidado 1996). Construction involves carrying out multiple activities that are related to each other in both obvious and subtle ways. Some tasks cannot be executed until other tasks have been completed, some must be carried out in parallel, and so on. Should the tasks get out of sync with each other, the whole process may be jeopardized (Frame 2003).

Schalcher (2009) discussed complexity in the construction system applying sustainable construction criteria which is the relationship of the industry with the environment and its stakeholders. The checklist of stakeholders of the industry is often large and would include owners, users, the project manager, facilities manager, designers, shareholders, legal authorities, employees, subcontractors, suppliers, process and service providers, competitors, banks, insurance companies, community representatives, neighbours, general public, government establishments, visitors, customers, regional development agencies, the natural environment and the press (Newcombe 2003, Smith and Love 2004). The industry depends on all these stakeholders for its resources, services, information as well as its market. Stakeholders also depend on the industry for their built requirements and needs. In the process, there are intricate interactions and interdependencies between and among the construction industry and its stakeholders.

These stakeholders with their varying interests view the construction industry and its activities differently. For many, construction is an industry which benefits society by fulfilling its needs for functional and aesthetically attractive built environment in and on which to live and carry out all sorts of economic and social activities, generating substantial employment and creating wealth. In the other part of the story, however, construction happens to be the conspicuous user of energy and primary resources with major impact on the environment from loss of habitat and ecosystem, damage to the landscape, potential subsidence problem, noise, and dust. As such, construction is a major culprit to resource depletion, contributes to global warming and climate change, produces significant quantities of waste in the construction and demolition process, and causes pollution and hazardous substances in the natural and built environment posing risk to the environment locally, regionally and globally.

These diverse stakeholders with their different and often conflicting interests have the power to be either a threat or a benefit to the construction organizations and their activities (Gibson 2000). Thus all sort of change - internal/external, globalization, new laws and regulations, new technologies, competition, etc. are some of the influences on the industry. The industry at the same time changes and reorganizes itself in response to such various and opposing pressures and influences from stakeholders.

2.1.5.1.2 Fragmented nature of the industry

The construction industry is often identified as fragmented. An industry is said to be fragmented where no company has a dominant position and is able to influence considerable outcomes within the industry. A large number of small and medium-sized companies and a small number of large companies usually populate a fragmented industrial structure (Langford and Male 2001).

The low entry barriers in the industry intensified by the labour intensive nature of the industry and hence the relative ease to start a business with little or no capital (Zou and Sunindijo 2015), the localized project based production (Langford and Male 2001), local regulation which may force companies to comply with standards that may be location-specific, or politically sensitive the need for flexibility and the uncertainty for the main contractor of future demand for construction and in obtaining continuous work as a result of the cyclical nature of the construction business and hence the need to manage scarce resources, and the growth in specialized trades in response to the need to accommodate the different features and requirements of each project (Pryke 2009) are some of the possible reasons for the fragmentation of the construction industry.

The general absence of monopoly generally means that levels of competition are greater (Ofori 1980). The low entry barrier allows many new entrants to a market. This keeps increasing the total volume of the industry capacity which then leads to intense and fierce competition and low profit margins due to the

sheer number of construction and engineering businesses (Arditi et al. 2000) unless the available job opportunities increase in the market.

As Carassus (2001) emphasized, it is a problem especially in the construction industry where insufficient profit is a structural weakness. Low profitability is thus one of the major causes for construction companies' failure/bankruptcy. Furthermore, fragmentation of the construction industry is an often-quoted obstacle to innovation. Innovation in construction is the act of introducing and using new ideas, technologies, products and/or processes aimed at solving problems, viewing things differently, improving efficiency and effectiveness, or enhancing standards of living' (CERF 2000, p. 2).

On the other hand, as we will see it in the next section, the fragmentation of the industry in what may seem a paradox may be taken as a strength providing construction companies with the necessary flexibility and ability to adapt to changing economic and social environments (Carassus 2001).

2.1.5.1.3 Cyclical demand and structural flexibility of the sector

Unlike other types of business which can create the demand for their products and services, construction demand is not generated by construction firms. Demand for construction service is directly related to the state of economic activity of a nation. It's, to a very large degree, reliant on what happens in the national economy and which, in turn, is affected by global events (Ofori 1980, McCabe 2010). Furthermore, the construction industry is often used as an economic pressure valve' to regulate capital investment in relation to the prevailing economic conditions (Loosemore 2003). Accordingly, if the state of the economy is good, then the sense of well - being and optimism will result in a higher demand for goods, services and the general infrastructure – all of which will stimulate demand in construction(McCabe 2010).

The high dependency of construction business on general economic conditions means that the construction industry is exposed to substantial demand swings. The fact that this is identified as one major reason for bankruptcies of construction companies reflects the construction industry's high vulnerability and sensitivity to the economic cycle. The volatility of demand is exacerbated as most of the work is obtained on the basis of tender. Uncertainty in demand and the drive to ensure continuity of work flow by pursuing for available jobs in the market and acquiring new contracts (Rice and Heimbach, 2007), the tender based procurement method of construction service and the large number of small firms explain the high level of competition in the construction market. Lack of certainty in future work and the competitive tendering of procurement also have another consequence. As construction enterprises bid for any business that is available in the market, usually with no due consideration to their capacity and resources and alignment to corporate strategic objectives, they incur much money and effort in the

bidding process. Thus, repeated failures in the bids lead not only to loss of money and effort expended in the process but also to loss of business and subsequent bankruptcy. On the other hand, the contractor may win more tenders than they can manage with their production capacity, a situation which may lead to over-expansion, a risk by itself which increases the chance of business failure (Enshassi, Al-Hallaq and Mohamed 2006). Over-expansion may also mean a different type of work and a different geographical location which the enterprise is not used to. According to Schaefer (2006), over-expansion happens to be one of the leading construction business failures. Paz (2006) also strengthens this idea by quoting a saying in the industry which goes like —“profits thrill and volume kills”.

Thus, to succeed in such volatile and uncertain industry, construction companies need to be able to read the ongoing trends in the economy and pursue strategies that are flexible and responsive to changes in demand. As Holt et al. (2008) emphasized, to maintain competitive advantage an organization must do three things more effectively than its competitors: recognize changes in demand that could have an adverse impact on its operations, be flexible enough to respond to changes in customer needs and demands, and understand its own capabilities relative to demand. This, however, is not an easy task. In Steven McCabe’s words, “To do this successfully requires either unique insights (something that can be notoriously difficult), or to be ‘fleet of foot’ in being able to shift resources or, as is often the case, relying on the subcontracting system to fulfill short - term needs”. In this respect, as highlighted by Loosemore (2003), construction firms continue to place a premium on structural flexibility by outsourcing the majority of their productive capability and retaining a few core managers.

2.1.5.1.4 Sub-contracting is common

A major feature of twentieth century construction has been the growth of sub-contracting. The level of sub-contracting has risen over the years owing to the increase in the volume and extent of complex and specialist construction works. Sub-contracting can account for as much as 90% of the total value of the project in some cases (Hinze and Tracy 1994, Kumaraswamy and Matthews 2000) that large construction companies just manage the construction process rather than undertake actual productive functions (ILO 2001). Specificity, uncertainty, geographical dispersion, output variety, and technological specialization are the major variables in the decision of subcontracting. The major motivations for sub-contracting were summarized by Murdoch and Hughes (1996) to include the following:

- Assigning the non-wage costs of employment, such as training, sick pay and pension rights.
- Coping with the increasingly diverse range of skills needed to deal with growing complexity on projects.

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- Off-setting the risks associated with responsibility by transferring them.
 - Securing the services of specialist staff of proven reliability.
 - The perceived threat posed by unionized direct labour.
 - Reducing costs by employing labour from firms local to the project.
 - Achieving more economically the varying skill combinations needed on different projects.
 - Reducing the cost of employing and developing the expertise of specialist workers who cannot be given continuity of work.

Sub-contracting benefits the main contractor providing him the capacity to undertake work beyond its scope in terms of size and specialization. Subcontracting also enables the main contractor to achieve economies of scale as he engages expertise on the basis of need, thereby lowering overhead costs (Eccles 1981, Gunnarson and Levitt 1982 cited in Winch 1989). Overall, the main contractor enjoys greater financial benefits, higher efficiency and greater flexibility (Winch 1989, 1998). The sub-contractor as well achieves economies of scale by offering its services to a number of main contractors (Eccles 1981). Moreover, sub-contracting provides an opportunity to learn additional skills and knowledge to the contractor in his capacity as a main contractor working alongside the same specialist sub-contractors on many projects, and as a sub-contractor working with more experienced and big international contractors (Abdul-Aziz 1993).

As a downside, sub-contracting increases the main contractor's management cost, as sub-contractors need to be supervised, coordinated and monitored (Yik et al. 2006). Worse even, as sub-contractors normally work on multiple projects concurrently to maximize their benefits, this can usually lead to conflicts and disputes causing the cost of managing the sub-contractors to escalate (Gray and Flanagan 1989) and in fact can influence the successful completion of the particular project (Parfitt and Sanvido 1993). The more sub-contractors involved in a particular project, the complex the relationships and the higher the coordination costs, which is aggravated if the sub-contractors, in turn, may have to sub-contract portions of their work to other firms as "sub-sub-contractors" and so on, giving rise to a hierarchical sub-contracting arrangement. Moreover, excessive reliance on sub-contractors can place the main contractor at greater risk in the event that any one of them fails (Gray and Flanagan 1989). The case of one contractor defaulting because of the failure of another as "the sub's general in default" or "the general's sub in default" has been indicated as interesting reasons for construction firm failures in the list of SBA's

Default Codes (Foust 1989). Differing management styles and different cultures of the parties may also lead to communication breakdown and confrontation.

2.1.5.1.5 Project-based nature of the Construction Industry

Project-based firms use projects to provide unique services to their clients. Projects are by definition unique, custom-made to each customer, and temporary, with a definite beginning and ending. Construction forms a significant portion of project-based industries. Construction projects display a number of unique features which increase uncertainty in construction. The unique nature of projects and their immobility leads construction companies to establish dual structures, the construction company and its project organizations located at each project site (Gonzalez-Diaz et al. 2000). In project-based organisations, projects compete for the same scarce resources giving rise to resource conflicts.

No matter they are constructed with the same or similar materials, by the same or different teams and by the same or different methods of construction, construction projects still remain unique due to a number of factors including the site location, design, specific circumstances, stakeholders and so on. As a result, unlike other industries, the construction industry cannot take advantage of standardization. The site-specific nature of construction means location inflexibility and immobility and uncertainty in site conditions, e.g. weather and ground conditions, and uncertainty in supply of inputs locally. Further, with most of the transformation process taking place on the site, this requires the mobilization of resources to project sites, all geographically dispersed project site demanding their own new working center. The unique and temporary nature of projects obliges for project teams to be created and disbanded with each project (Barrett and Sexton 2006). The temporary nature of the project teams and the short-term relationships between organizations coupled with the lack of standardization in construction makes the transfer of innovations and learning from project to project and firm to firm extremely difficult (Construction Productivity Network 1997 cited in Barrett and Sexton 2006). On the other hand, the long duration projects take is another source of uncertainty in construction as it increases the possibility of new circumstances arising; laws and regulations, exchange rates, interest rates, and demand for the product may change demanding changes on the original plan or causing substantial change in cost or in value.

Finally, as a construction project must usually be priced before it is produced, there are great uncertainties for the contractor in the pricing process. Such uncertainties are further aggravated by the way contracts are awarded, competitive tendering, with contractors cutting corners to reduce their tender prices, the reason for the opportunistic behaviours contractors are usually blamed. Furthermore, the relative value of

each product tends to be large in relation to the size of the contractor undertaking its construction so that the risks for that firm are considerable (Hillebrandt 1984).

2.2 Risk Management in Construction

A number of authors have emphasized the very risky nature of construction. Flanagan and Norman (1993) stated that the construction industry is exposed to more risk and uncertainty than perhaps any other industry. For Ehsan et al. (2010) as well, risks and uncertainties inherent in the construction industry are more than other industries. Risks and uncertainties in construction emanate from the internal and external environment of the industry discussed at length in the previous section which comprises a number of uncertainty elements which according to Miller (1988) are classified as general environment, industry and firm-specific variables.

The general environmental uncertainties correspond to factors that affect the business context across industries. Political instability, government policy instability, macroeconomic uncertainties, social uncertainties, and natural uncertainties are amongst the general environmental uncertainties.

Task/Industry uncertainties, on the other hand, are mainly related to the unique characteristics of construction discussed in the previous section. The complex nature of construction process creating a host of uncertainty factors in terms of the input, workflow and output components and the complex relationships among the multitude stakeholders which can be adversarial and so hinder, or supportive as to enhance the objectives on the construction enterprise. Severe competition driven by the fragmented nature of construction leading to uncertainties in profitability; high dependence of the industry in economic conditions of a country and the resulting uncertainties in demand and volume of business are some of the industry uncertainties. Miller (1988) discusses of three major classes of uncertainties that the industry uncertainties involve:

- Input market uncertainty - quality uncertainty, shifts in market supply, and changes in the quantity used by other buyers
- product market uncertainty - changes in consumer tastes, availability of substitute goods, and scarcity of complementary goods, and
- competitive uncertainty - rivalry among existing competitors, new entrants, and technological uncertainty

Firm uncertainties relate to internal factors which are specific to the firm. The primary categories of firm-specific uncertainties are operating, e.g. labor uncertainty, input supply uncertainty, and production

uncertainty; liability, e.g. including product liability and environmental pollution and contamination; research and development - uncertainty surrounding the time frame for completing the project and the nature of the project's output; credit e.g. default by clients on their debts to a firm; and behavioral uncertainties relating to the principal-agent problem of conflict of interest.

Due to its project-based nature, risk impact will come for the construction organization either from the various external and internal risk categories of the organization considered above or they will come up through the project execution organization – the projects, programs, and portfolio with everything that happens at the project, program, or portfolio level felt by the organization (Jordan 2013). Risk from project execution organization is likely to be significant because of dependencies among projects:

- reliance on similar new technologies or applications,
- dependence on the same resources, especially outsourced or specialized staffing,
- significant project risks listed in common by several projects,
- potential failure modes shared by projects, and
- reliance on uncertain external events or expectations.

Baloi and Price (2003) emphasize the critical importance of risk management as competition and complexity in construction increase indicating the direct relationship between effective risk management and construction success. Construction organizations' efficiency and effectiveness largely depend upon how managers scan the external project environment, identify the critical factors and accordingly adapt their organizations.

Despite the significant risks and uncertainties construction involves, however, the construction industry is depicted as having a poor reputation in coping with risks by many authors (e.g. Kangari and Riggs (1989), Ahmed et al. (2002), and Baloi and Price (2003)). Many contractors are unfamiliar with the external risk environment which Baloi and Price described as global risks and do not have the experience and knowledge to manage them effectively. Thus risk analysis is either ignored or done subjectively by simply adding a contingency according to Kangari and Riggs (1989) as a consequence of which the industry is plagued with problems: conflicts, poor quality, late completion, poor cost and business performance.

2.2.1 Risk and Risk Management Concepts

Every human endeavour (at all levels: individual, business or society) involves decision making which even in what it seems instinctive involves a choice of among different alternatives. The future being largely unknown, and particularly so in the current dynamic environment characterized with continual change, such decisions are usually made with limited information based on assumptions, expectations, estimates and forecasts and within a limited time frame (Raftery 1994). Whereas people make all the effort to decide on the best alternative, chances are that the decision could end up suboptimal or even a failure. Thus, we can say that every walk of life involves indefinite number of such risks as there are decision; hence, the pervasive nature of risk.

The business environment and the way organizations do their business have dramatically evolved over the years. Whereas it is very impractical to be exhaustive, we have witnessed a range of developments that can impact organizations positively and negatively including globalization, the increasingly growing interdependence between economies in a regional and global plan, the dynamic macroeconomic context, fierce competition, limited resources for unlimited needs, the need to adapt to technological changes, the challenges generated by climate change, and the growing complexity of the factors which influence economic and financial results of the business (Dobrotă 2012).

Labbi (2005) also elaborates that risk to organizations has increased with the acceleration of the pace of business. He mentions the dramatic shifts in the way companies interact, driven both by new technologies and new business methods, the increased use of information technology raising productivity, while simultaneously introducing new sources of uncertainty and complexity, leaner value chains far more dependent on carefully orchestrated coordination of a complex network of supply chain partners, shorter product life cycles in many industries making rapid product obsolescence the norm, more automation of business processes meaning small problems can easily escalate in the absence of monitoring and management, and increased outsourcing not only making firms more dependent on third parties, but also making it more difficult to detect and respond to risk events.

This highlights the tremendous risks organizations face in the present business environment. The management of such risks is thus imperative for everyone and particularly so for business organizations

2.2.1.1 Definition of Important Terms: Risk, Uncertainty, Risk Management

2.2.1.1.1 But, what actually is risk?

Seemingly a common word, risk doesn't have a commonly accepted meaning. As emphasized by Dorfman (2007), the definition of risk varies depending on the person who defines it. The definition of

risk used to be associated with adverse effects. The Oxford English Dictionary, for instance, defines risk as a chance or possibility of danger, loss, injury or other adverse consequences. Similarly, Rejda (2008) defined risk as uncertainty concerning the occurrence of a loss. Whereas the traditional view associated risk with negative outcomes, threat or hazard, modern risk thinking have emphasized that the outcomes of risk can also be positive i.e. an opportunity.

The International Standards Organization (ISO) in its guide to risk related definitions under ISO Guide 73:2009 Risk Management – Vocabulary, defines risk as effect of uncertainty on objectives further defining an effect as a deviation from the expected which may be positive, negative. Similarly, to the Institute of Risk Management (IRM), risk is the combination of the probability of an event and its consequence, also emphasizing that consequences can range from positive to negative.

One can thus discern from all the definitions that risk is uncertainty and that it represents any deviation from the expected which deviation can be downside or upside as the fundamental aspects of risk, as summarized by Sigel (2011). Downside risks result from negative risk events deterring or delaying the achievement of the objectives of an entity; positive risk events on the other hand enhancing or expediting the achievement of the objectives of the entity represent the upside deviation. Other important aspects of risk emphasized by many authors are that a downside risk event for one business segment might be an upside risk event for a second business segment, that multiple risk events can occur simultaneously, and that risks are inter-related such that the occurrence of one risk event can trigger other risk(s) (Sigel 2011, Duckert 2011). Risk is contextual. It arises in the context of a situation that exists or is likely to occur at some point in the future (Edwards and Bowen 2005).

Whereas uncertainty is the essence of risk, a distinction is, however, made between risk and uncertainty. Heerkeens (2002) defined uncertainty as an absence of information, knowledge, or understanding regarding the outcome of an action, decision, or event. While both involve the future and create opportunities for gain and a potential for loss, risk relates to future events with measureable probability of occurrence; but uncertainty involves events which are completely unknown (Pritchard 2001, Clemen 1996). The distinction is made clear in the words of Knight (1921) as follows: "To preserve the distinction... between the measurable uncertainty and an un-measurable one we may use the term risk" to designate the former and the term uncertainty for the latter."

In the construction industry, risk is defined in relation to projects and their objectives. Kliem and Ludin (1997) define risk as the occurrence of an event that has consequences for, or impacts on, projects. While Godfrey (1996) defines risk as a source, a chance of an adverse event, Wideman (1986) defines risk in terms of the effect of an event, as adversely affecting project objectives. On the other hand, according to

Smith (1999), risk exists when a decision is expressed in terms of a range of possible outcomes (not necessarily negative) and when known probabilities can be attached to the outcomes. Ward (2000) also takes a similar line defining risk as "cumulative effect of the probability of uncertain occurrences that may positively or negatively affect project objectives". Two of the main international professional bodies governing project management, namely the Project Management Institute (PMI), and the Association of Project Management (APM), have also developed very similar definition of risk.

–Risk is an uncertain event or condition that, if it occurs, has a positive or negative effect on the project objectives” (PMBOK 2008).

The APM defines risk as –an uncertain event or set of circumstances that should it occur, will have an effect on the achievement of project objectives”(APM 2000).

Construction being a project-based industry, construction management appears to be absolutely biased towards the project. This is reflected in the large proportion of academic research, and published work which focus on the management of construction projects, with lesser attention on the management of the construction business [Winch 1989, Betts and Lansley 1993]. The focus on projects may appear to be natural considering the fact that each project represents an important percentage of the contractor’s revenue and operations and thus the considerable impact each individual project may exert on the business success of the contractor, presenting a kind of make-or-break situation. This bias towards project management, has also an important influence on risk management in the industry, that risks in the industry are narrowly defined in relation to project objectives and risk management is biased towards project risk management as against enterprise-wide risk management

However, the objectives of the construction enterprise and that of the construction project fundamentally differ. Bernard (1981) enumerated a number of economic and non-economic objectives of a construction company including profit, growth, reputation, employee satisfaction and internal and external politics. On the other hand, a construction project has as its objectives achieving the cost, schedule, and quality of the project which by the very nature of the project are short-term. Thus, project success by itself may not necessarily lead to enterprise success (Cleland and Kimball 1987). It is in fact possible for a company to fail while being very efficient (Hofer and Schendel 1978)]. Sanders and Cooper (1990] argue in this respect that contracting organizations continue to experience a high failure rate notwithstanding the extensive research in the management of construction projects because of the industry's total orientation towards project management and not business management. As a result of the obsession with project management, therefore, long-term objectives and corporate issues receive far less attention, as Abraham (2004) emphasized. If the organization’s definition of success is wrong then the context within which

decisions are made will be wrong and that can easily become the trigger that leads to a failure (Graham Feb. 21, 2013 Online).

The bias towards the project doesn't appear justifiable approaching the subject from a different angle as well. Lasker et al. concisely defined the construction business as comprising of three major functions including acquiring the work, building the work, and keeping track of the work. Each of them further involves a number of activities. Acquiring the work mainly consists of planning, marketing, estimating, pricing, selling, contracting, and bonding. On the other hand, building the work consists of ten separate areas including pre-construction planning, budgeting, scheduling, job mobilization, documenting, quality, productivity, safety, material management, and project closeout. The "tracking the work" portion of construction business mainly consists of accounting, administration duties, tax reporting, cash management, asset management, billing, and legal issues. Project management is about building the work. All the other main functions and activities, however, reside mainly at the enterprise level. Furthermore, as Dinsmore (1999) stated, in enterprises that run multi-projects, construction included, the enterprise will have even much more concerns related to the projects – standardization, methodologies, strategic alignment of projects, support systems, and integrated project systems.

Thus, examined from the point of view of the objectives of construction enterprises and from the functions of construction business, the absolute bias in the industry towards the project doesn't appear to be justifiable. As emphasized by Winch (1989), construction projects are tools for value delivery and the accomplishment of organizational objectives and goals and thus effective project management could be a source of competitive advantage. However, the effective management of the construction projects depends first upon the effective management of the firms which contribute to that project (Winch 1989). After all, the project is a temporary organization, while the firm is a continuing capacity to create the built environment (Winch 1989). Survival and competitiveness of the construction enterprise depends on the achievement of its long-term objectives which again depends on success in the overall management of the business of the enterprise and not only on project management. Thus, risk in the construction industry needs to be defined in terms of the strategic objectives and the overall business of construction enterprises and not in relation to projects

While the author of this paper doesn't intend to give his own definition of risk or pick a particular one, for the purpose of this paper, risk will be understood as carrying opportunities as well as threats in terms of their effect on the objectives of an organization and as residing not in particular areas(s) only, but across all levels of the organization and that treatment efforts should be considered accordingly.

2.2.1.1.2 Risk Management

In as long as we live in a world of uncertainty risk cannot be eliminated. Organizations therefore need to manage all the factors that increase and reduce those risks so that they can pursue strategic advantage at minimum costs (Borghesi and Gaudenzi 2013).

In as much as there are many definitions of risk there are equally various definitions of risk management in use (Smallman 1996). In line with the traditional definition of risk as an adverse effect, Rejda (2008) has defined risk management as “a process that identifies loss exposures faced by an organization and selects the most appropriate techniques for treating such exposures”.

According to the ISO Guide 73 risk management refers to the coordinated activities to direct and control an organization with regard to risk. A more detailed definition by the Institute of Risk Management (IRM) similarly describes risk management as: “the process by which organisations methodically address the risks attaching to their activities with the goal of achieving sustained benefit within each activity and across the portfolio of all activities” (IRM 2002).

We have seen in the previous section the project orientation of the definition of risk in the construction industry. Such is with the definition of risk management. Flanagan and Norman (1993) have also defined risk management in terms of negative risk as “a discipline for living with the possibility that future events may cause adverse effects”. Wang et al. (2004) have also defined risk management as “a formal and orderly process of systematically identifying, analysing, and responding to risks throughout the life-cycle of a project to obtain the optimum degree of risk elimination, mitigation and/or control”. Similarly, the Project Management Institute has defined risk management from a project’s perspective as “It is the systematic process of identifying, analyzing, and responding to project risks. It includes maximizing the probability and consequences of positive events and minimizing the probability and consequences of adverse events to project objectives and is divided into six steps: planning, risk identification, qualitative risk analysis, quantitative risk analysis, risk response planning, and risk monitoring and control” (PMBOK 2008).

Not only the definition of risk management but also risk management practice as well as the bulk of written materials and publications on risk management are directed at the project. Project risk management approach treats projects as independent entities rather than temporary parts of a company's ongoing activities with no consideration to the company. However, despite the widespread use of project risk management, construction business is characterized by high exit rate and failure. Some of major causes of the high exit rate include low profitability, high level of risks, and severe competition in the construction business, and high dependency on general economic condition. The industry is subjective to

general economic condition so that it is not easy for construction contractors to avoid the negative effects when there are unfavourable impacts in economy. Kangari (1988) also added industry forces that cause failure in construction as including (1) The amount of construction activity; (2) interest rates; (3) inflation; and (4) new business activity. The foregoing makes it very clear that the main reasons for the high exit and failure rates in the construction industry have to do with risks and uncertainties associated with the unique characteristics of construction business discussed in the previous section of this paper and less so with project failures. The foregoing points indicate that construction enterprises have to emphasize more on enterprise-wide risks and enterprise risk management which is rather comprehensive encompassing all risks of the enterprise including project risks as well and treating risks in an integrated manner while improving on their project risk management.

So much so, despite the lack of a common and consistent definition, however, the various definitions of risk management share certain similarities, that:

1. It is a formal process.
2. It employs a systematic approach.
3. It aims to identify risks to an operation or business.
4. It evaluates the importance or impact of those risks on the operation or business.
5. It provides mechanisms to control the individual risks to an acceptable level of overall exposure.
6. It is iterative and continuous, not a one-off event.

The purpose and focus of risk management also remains similar which is as emphasized by Collier et al. to enhance the likelihood of success, and reduces both the probability of failure and the uncertainty of achieving the organization's overall objectives.

FORMAL AND INFORMAL RISK MANAGEMENT

Two basic approaches to risk management may be identified, formal and informal (Smith et al. 2006) with each influencing the risk management process and procedures. Informal risk management refers to all informal and intuitive actions and decisions to mitigate risk driven by instinct, common sense, ordinary knowledge and/or arbitrary rule of thumb. Informality in the risk management system implies less explicit structure, no separate phases in the process, informal documentation and less clearly defined objectives and deliverables for the process (Ward 2006). In contrast to formal risk management, the

informal approach is a more subjective, affective and sentimental process. The informal risk Management approach is described as inadequate by many authors (AICPA 2009; Smith et al. 2006)

In formal risk management, on the other hand, disciplined, structured and comprehensive procedures provide guidance to the risk management process that they can be used at all levels of the organization by any member. Such an approach provides uniformity in approach, consistency and objectivity to the risk management process. To obtain a maximum benefit, risk management must become a systematic process applied in a disciplined manner (Pritchard 2001).

TRADITIONAL VS INTEGRATED RISK MANAGEMENT

Considering the scope of risk management applications, two approaches are evident, traditional risk management and integrated risk management. The traditional management of risk focused on those negative risks specific to a particular function or job in the organization. Risks and uncertainties are treated in isolation from one another. Little consideration is given to the risk management activities in other areas though risks across business units are highly interrelated. It is tactical rather than strategic focusing on business unit level risk management with no due regard to organization level activities (Lewis 2012). It is a fragmented approach in which risk information is not shared and risk management is not integrated across the organization. Such a functional approach to risk management often creates “silos” that can be difficult to manage across the organization (Lewis 2012; Marchetti 2012).

The “silo” approach to risk management has three disadvantages. With its unrealistic assumption that only one risk event occurs at a time, it doesn't provide a complete presentation of the risk profile of the organization. The impact on the organization of the possible simultaneous occurrence of multiple risks, the interaction of such risks exacerbating each other or triggering one another is not considered. Moreover, risk assessments and risk decisions taken at business unit level result in duplication and wastage of resources increasing the overall cost of mitigation. Further, information is not shared among business units across the organization that lessons may not be learned from costly mistakes and creating the chance for others to repeat the same mistake. Also, with each business unit developing its own risk scenario, making different assumptions, the organization may be making internally inconsistent projections regarding the market (Sigel, 2011).

In contrast, integrated risk management in which overall risks are managed in aggregate, holistically rather than independently, is the new paradigm to risk management (Lewis 2012) and represents a move to a systemic approach (Borghesi and Gaudenzi 2013). Integrated Risk Management is known by many names: Business Risk Management, holistic Risk Management, strategic Risk Management, and

Enterprise Risk Management (Borghesi and Gaudenzi 2013). Integration refers to the aggregation of all risks faced by an organization and the strategic combination of risk management techniques to manage that risk. As emphasized by De Loach (2000), it is enterprise-wide meaning that it applies to every area of the organization with functional, departmental or cultural barriers eliminated. A holistic approach is taken to manage all key business risks and opportunities, financial and non-financial or quantifiable and unquantifiable, with the intent of maximising shareholder value for the enterprise as a whole. Integration across risk types allows the production of organizational risk exposure and facilitates decision on the risk tolerance limits. Integrated risk management takes into consideration the downside as well as the upside risks of a decision that it enhances entrepreneurial efforts (Sigel 2011, Lewis 2012).

There are a number of reasons why it is important to analyze and manage risk in a holistic, integrated fashion. Many unfavourable events extend beyond the company's individual functions and boundaries and thus tend to become more difficult to foresee and monitor. According to Labbi (2005), examining risk factors in isolation makes it difficult to understand interaction effects. This can increase risk management costs, since firms may unnecessarily hedge certain risks that are in reality offset by others. Moreover, a fragmented approach to risk management increases the likelihood of ignoring/overlooking important risks. It is important to consider the impact of risks for the organization as a whole. Otherwise, mitigation attempts may only introduce new risks or shift the risk to less visible parts of the organization. For Lam (2003), integrated or enterprise risk management has three major benefits. It enhances organizational effectiveness by providing the top-down coordination necessary to make the various functions work efficiently and enabling the treatment of not only individual risks but also the interdependencies among such risks. It also improves risk reporting by assigning responsibility and introducing consistent reporting requirements allowing for aggregation of risks to provide an enterprise-wide picture. Moreover, Lam asserts that organizations which adopted such approach have experienced significant improvement in business performance as it supports key management decisions including capital allocation, product development and pricing, and mergers and acquisitions and thereby leading to reduced losses, lower earnings volatility, increased earnings, and improved shareholder value.

Further, failure to consider risk interactions can also cause firms to grossly underestimate their risk exposures. Different risks, which initially manifest themselves inside certain areas of the organization can have their consequences cascading through many other aspects of the internal and external management of the individual business (Borghesi and Gaudenzi, 2013).

De Loach, (2000) in Pavodani and Tugnoli (2005), has summarized the differences between the integrated perspective of risk management and the silo approach by concluding that the traditional approach risk

management is fragmented, reactive, focused on threats, discontinuous, functional and based on costs, while the comprehensive approach is integrated, proactive, focused on threats and opportunities, continuous and characterized by a logic process.

Risks are managed at different levels in the organization with different objectives, utilizing appropriate styles and techniques. Merna and Al-Thani (2005) identify three hierarchical levels of risk and risk management namely, strategic, tactical, and operational corresponding to the three levels of corporate organizations i.e. corporate, strategic business unit, and project levels. On the other hand, Pandian (2006) identifies five hierarchical risk management levels:

1. Process-level risk management
2. Project-level risk management
3. Program-level risk management
4. Strategic business unit (SBU)-level risk management
5. Enterprise risk management (organization-level risks)

Risks are managed at all these levels as the ownership, nature, and solution of the risks at each level differs. Risk owners change depending on the layers, and the whole process of risk management changes accordingly. Along the hierarchical levels, risks and risk management perspectives shift from strategic to more engineering and tactical at the lower levels.

Risks that are beyond the purview of a particular level are escalated to appropriate levels of management, from the level where they are identified, from process to project, from project to program, from program to SBU, from SBU to enterprise, the risk may be elevated up. Elevation is an organized process and should be carried out to fit risks to where they belong.

As mentioned elsewhere above, construction enterprises operate in a risky and complex environment with risks coming from all directions. It is therefore imperative that they manage these risks in a holistic and integrated manner. As emphasized by Tworek (2012, p. 2), construction enterprises need an integrated risk management system which enables them to proactively and correctly identify the risks they face, quantify risks and then respond to them appropriately. Integration as elaborated by Jajuga (2007) cited in Tworek (2012) is “firstly, about incorporating risks into a corporate management process and, secondly, about integrating risk management processes of individual business lines and, thirdly, about integrating management processes for various types of risks” (Jajuga 2007, p. 380, cited in Tworek 2012).

In consideration of its perceived and practical benefits, many organizations are embracing the integrated approach to risk management. The purpose and focus of this paper being on integrated risk management practice by contractors, all discussion on risk management pertains this approach.

2.2.2 Risk Management System

Establishing and implementing an effective risk management system requires among other things the commitment of the top management of the organization, a framework for ensuring that risks are evaluated and monitored consistently across all business units, and clear definition of the risk management strategy and the roles and responsibilities of individuals allowing both upward and downwards communication and feedback. The system should also be subject to continuous improvement and review to take account of changed circumstances. All these would require substantial investment in terms of management time and resource. The importance of creating an environment with *'no blame'* culture which rewards rather than penalises the identification of risks in fact is not to be overemphasized. Risk and risk management should be embedded into everyday activities across the organization.

Successful risk management as summarized by Hopkin (2010) is:

- proportionate to the level of risk within the organization;
- aligned with other business activities;
- comprehensive, systematic and structured;
- embedded within business processes;
- dynamic, iterative and responsive to change.

2.2.2.1 Risk Management Framework

A risk management framework represents the infrastructure within which risk management process operates (Sigel 2011). As elaborately described in the ISO 31000:2009, risk management framework represents the set of components that provide the foundations and organizational arrangements for designing, implementing, monitoring, reviewing and continually improving risk management throughout the organization. The risk management framework includes the policy, objectives, mandate and commitment to manage risk as well as the plans, relationships, accountabilities, resources, processes and activities of risk management which all need to be tailored to the specific situation of each organization. The risk management framework must be embedded within the organization's overall strategic and operational policies and practices (ISO 31000). Integration in risk management means that the risk management framework should enable the aggregation of risk information thus emphasizing the commonality of risk data but also should provide flexibility allowing for different risk assessment matrices to be used as appropriate in different business unit of the organization. The integrated risk

management framework should also support common library of risks which only supports the capture of common risks but also the common patterns of mitigations so that a consistent, holistic approach to risk mitigating can be achieved.

Embedding risk in organization operations and achieving greater engagement of staff across the organization can be achieved by:

- Including risk management accountabilities and expectations in internal performance management systems, both informal and formal, to support a culture whereby risk and opportunities are proactively managed and learnings are shared - all staff expected to manage risks in their own area, and within their capacity and delegation of authority.
- Ensuring risks identified by the organization are allocated a “risk owner” to oversee the management of a risk, a sufficiently senior person to properly direct and implement risk controls and assess their effectiveness. Any subsequent mitigation should be communicated to the staff member who identified the risk.
- Ensuring local processes focus on risks being managed at as low a level as reasonably practicable, but also ensure processes are there in place for risks that are beyond a staff member's capacity or delegation of authority are escalated to a more senior management for consideration, review and appropriate management action and direction.
- Ensuring senior executives and senior management accept responsibility for promoting risk management within the organization, designing the organizations risk management framework and for the day-to-day activities associated with coordinating, maintaining and embedding the framework in day to day business.

Several benefits are associated with a well designed and implemented risk management framework a few of which are that it:

- provides a standard vocabulary for the treatment of risk;
- provides standard measurements (benchmarks), for example to monitor risk over time;
- provides well described processes for use in the treatment of risk;
- provides a framework to monitor the conformity of data use with the obligations derived from the informed consent;

-
- ensures that all the critical aspects of risk are included;
 - helps organizations select and implement risk mitigation tools;
 - helps organizations make resource allocation decisions.

A variety of risk management frameworks have been developed by different authors and risk management bodies. Some are targeted to specific projects and industries, e.g. Project Management Body of Knowledge (PMBOK® Guide) by the Project Management Institute (PMI), USA (2004), the PRAM Guide by Association for Project Management (APM), UK (1997), the SHAMPU framework by Chapman and Ward (1997). Many others are, however, generic which will be discussed in detail shortly. These risk management frameworks are not intended to create uniform risk management systems, Healey (2005, p.123). Systems should be developed according to the needs, objectives and business of the particular organization and risk management frameworks allow the user scope for choosing appropriate techniques. A risk management framework helps in the implementation of risk management in an organization by organizing and structuring the approach towards designing a suitable risk management system (Smith et al. 2006).

Selecting one framework and applying it across the organization establishes a common language and understanding of risk, significantly enhancing the organization as ability to effectively communicate risk, opportunity, mitigation and prospects. It ensures:

- a common ground and discipline
- consistent approach and point of view
- allows the approach to be applied at a macro as well as a micro level
- a foundation of a common dialog across levels of management
- a holistic view of risk

2.2.2.1.1 Enterprise Risk Management – Integrated Framework

This was issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO), a private sector initiative, headquartered in the USA, and jointly sponsored and funded by five institutions, American Accounting Association, American Institute of Certified Public Accountants, Financial Executives International, Institute of Management Accountants, and the Institute of Internal Auditors, in 2004. It establishes a framework for enterprise risk management and provides guidance to business and other entities to help them develop and apply their enterprise risk management activities. The framework

identifies and describes eight interrelated components necessary for effective enterprise risk management which include (COSO 2004): internal environment, objective setting, event identification, risk assessment, risk response, control activities, information and communication, and monitoring.

2.2.2.1.2 **ISO 31000:2009, Risk management – Principles and guidelines**

ISO 31000:2009, Risk management – Principles and guidelines is another risk management framework codified and issued in 2009 by the International Organization for Standardization (ISO), a non-governmental organization made up of representatives from the national standards bodies of 161 countries, and headquartered in Geneva. ISO 31000:2009 provides generic guidelines for the design, implementation, maintenance, and improvement of risk management processes throughout an organization.

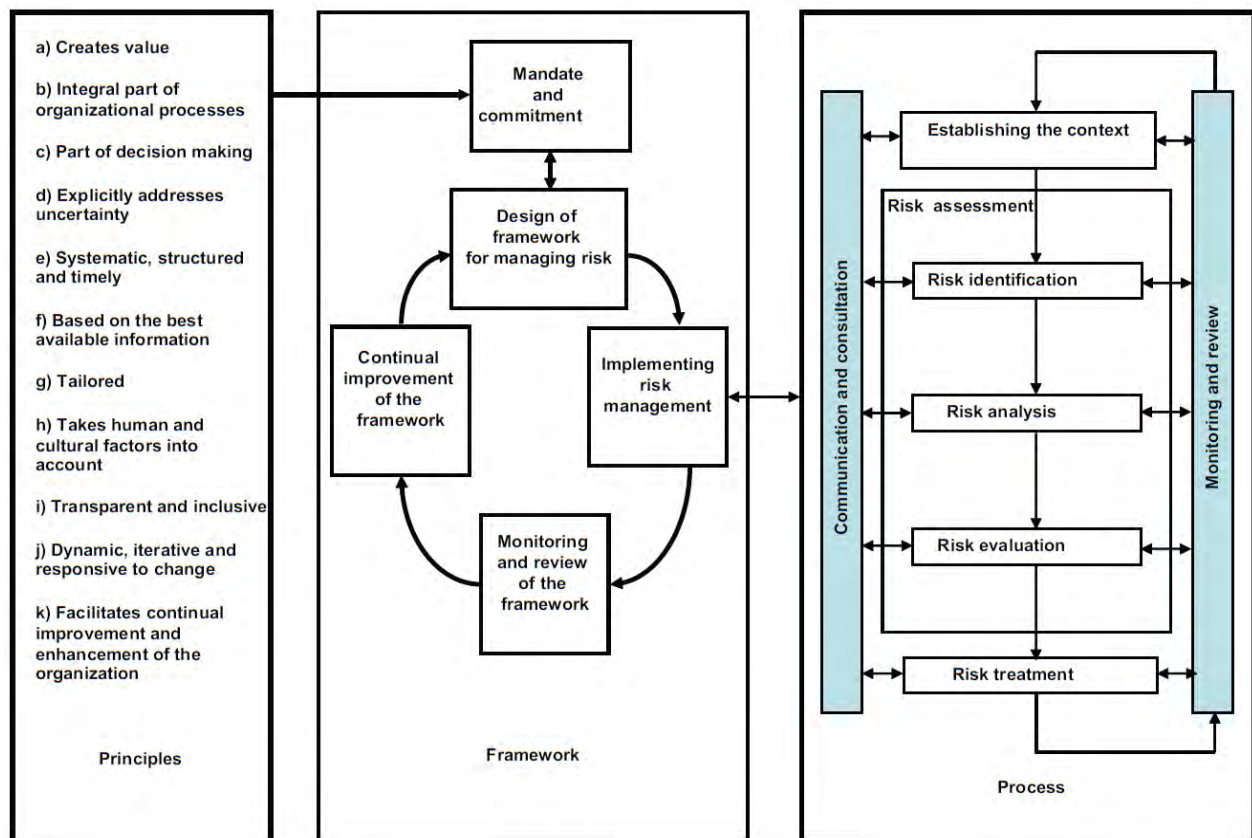


Figure 1: Integrated Risk Management Principles, Framework and Processes (ISO 31000:2009)

It can also be used by all organization regardless of size and business sector to the management of any type of risk. ISO 31000:2009 has been developed on the basis of an existing standard on risk

management, the Australian/New Zealand standard on risk management, AS/NZS 4360:2004. The AS/NZS 4360:2004 (presently existing as AS/NZS ISO 31000:2009) outlined a risk management process whereas the ISO 31000:2009 addresses the entire management structure including design, implementation, maintenance, and improvement of current processes.

2.2.2.1.3 The Risk Management Standard

The Risk Management Standard, a result of work by a team drawn from the major risk management organisations in the UK, including The Institute of Risk management (IRM), The Association of Insurance and Risk Managers (AIRMIC), and The National Forum for Risk Management in the Public Sector (Alarm), was published in 2002. It was developed in response to the need for a standard to ensure that there is an agreed:

- terminology related to the words used,
- process by which risk management can be carried out,
- organisation structure for risk management, and
- objective for risk management.

Following the publication of the ISO 31000 in 2009, the Institute of Risk Management (IRM) issued a new document entitled “A Structured Approach to Enterprise Risk Management (ERM) and the Requirements of ISO 31000” in conjunction with AIRMIC and Alarm. This document generally adheres to the principles of the ISO standard and gives an up-to-date guide to implementing enterprise risk management (ERM) in accordance with the ISO standard (Anderson et al. 2004).

While there is a general convergence between different guidelines and standards Ward (2005), with differences mainly on semantics and classification of elements, the ISO 31000 is regarded as brief, clear, generic in nature and of universal applicability compared to the COSO ERM which is lengthy, complex to understand, with heavy accounting, financial management and audit bias, and of narrow applicability mainly in the US.

ISO 31000 is the most recently published guidelines and it was developed by experts from more than 30 countries. Many critics claim it is state-of-the-art framework. In Shortreed’s words, “The ISO framework is current best practice for risk management frameworks (Shortreed 2010 cited in Fraser and Simkins 2010). It incorporates all the best principles contained in COSO, Project Management Institute (PMI), the Australian and New Zealand Standard (AS/NZS 4360:2004), and all the other leading international standards (Shortreed 2010 cited in Fraser and Simkins 2010).” It also provides with one

vocabulary for risk management, Guide 73:2009, essential to the successful sharing of information, establishment of metrics, and communicating results.

Furthermore, this international standard is more widely embraced (RIMS 2011). As the Chair of ISO/TC 262 on risk management, Kevin Knight, represents ISO 31000 has been adopted as a national standard by more than 50 national standards bodies covering over 70 % of the global population. It has also been adopted by a number of UN agencies and national governments as a basis for developing their own risk-related standards and policies, especially in the areas of disaster risk reduction and the management of disaster risk (Knight 2015). The leading and most commonly agreed guideline to holistic risk management is ISO 31000 (Fraser, Simkins and Narvaez 2014).

As a member of the ISO, Ethiopia has already adopted a number of the ISO standards and would do so in future. Moreover, a number of Ethiopian companies are also pursuing ISO certification in one way or the other with some already awarded including a few construction companies. ISO 31000:2009, on the other hand, is a paramount standard to which all such other ISO and IEC (International Electrotechnical Commission) standards that concern themselves with aspects of risk and risk management must align with. Thus, given no risk management standard is being adopted at national level in Ethiopia, the author of this paper believes the adoption of the ISO 31000 standard as very practicable and appropriate considering the above mentioned attributes and advantages of the ISO 31000 over other standards. Accordingly, the risk management process adopted by ISO 31000 will be considered in detail in this paper.

2.2.3 The Risk management process

ISO 31000 Risk Management – Principles and guidelines describes risk management process as systematic application of management policies, procedures and practices to the activities of communicating, consulting, establishing the context, and identifying, analysing, evaluating, treating, monitoring and reviewing risk. The ISO 31000:2009 risk management process comprises of seven core stages which collectively form a logical sequence of activities necessary for a robust approach to the implementation of enterprise risk management (Chapman 2011) as illustrated in Figure 2 on page 38.

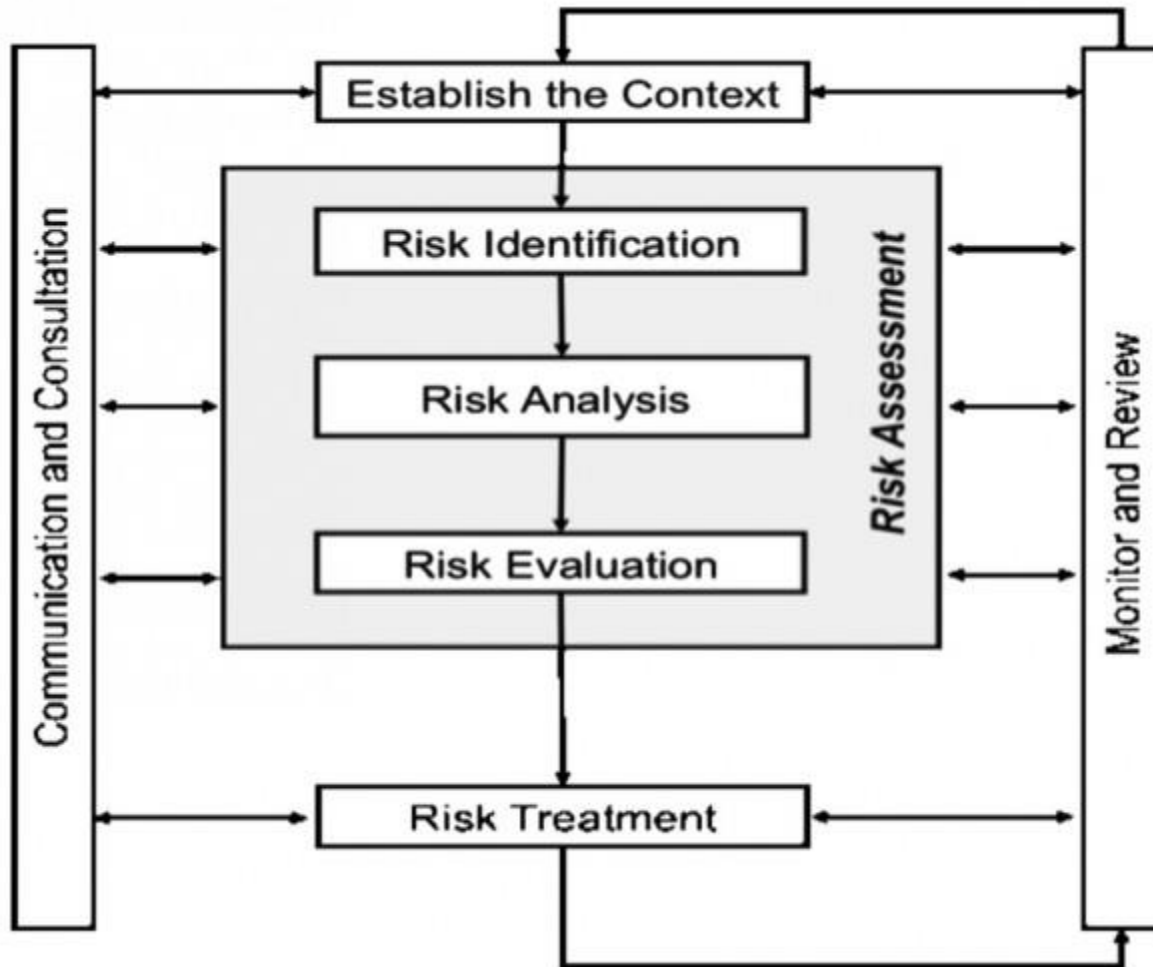


Figure 2: The risk management process (ISO 31000:2009)

As it can be observed from the figure, all steps in the risk management process are interconnected with each other with two-end arrows to emphasize that the individual stages within the practice of risk management as a whole are iterative in that it is frequently necessary to revisit earlier stages when more information becomes available or circumstances change. Each stage relies on inputs from earlier stages.

2.2.3.1 Establishing context

As discussed elsewhere above, the purpose of risk management is to ensure the achievement of the objectives and goals of the organization. In establishing the context, therefore, organizational objectives are established in regard to the environmental context of the organization in which the objectives are pursued. Risks cannot fully be identified if these objectives and strategies are not clearly defined. This ensures that risk decisions always support the broader goals and objectives of the business, encouraging long-term and strategic thinking. ‘By establishing the context, the firm articulates its objectives and

defines the external and internal parameters to be taken into account when managing risk, and sets the scope and risk criteria for the remaining process (ISO31000:2009).

In defining the external context, consideration should be given to the social, regulatory, legislative, cultural, competitive, financial, and political environment, including: the strengths, weaknesses, opportunities and threats, and the relationships with, perceptions and values of, external stakeholders such as clients, as they relate to the business. With regard to the internal context as referring to the internal environment in which the organization functions and seeks to achieve its objectives, on the other hand, consideration should be given to factors such as: policies, objectives and strategies in place to achieve objectives; governance, structure, roles and accountabilities; capabilities (e.g. capital, time, people, processes, systems and technologies); the relationships with and perceptions and values of internal stakeholders; the organization's culture; standards, guidelines and models adopted by the organization; and form and extent of contractual relationships; and the risk tolerance and appetite of the firm. Some of the most commonly used, easy and practical methods to analyse the external and the internal context of an organization include Financial analysis tools (ratios), risk management process diagnostic, the SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis and PEST (Political, Economic, Socio-Cultural and Technological) analysis (Bensoussan and Fleisher 2008, Chapman 2011).

Once the external and the internal context for risk management are defined, the context of the risk management process also needs to be established. This involves,

- defining the goals and objectives of the risk management activities;
- defining responsibilities for and within the risk management process;
- defining the scope, as well as the depth and breadth of the risk management activities to be carried out, including specific inclusions and exclusions;
- defining the activity, process, function, project, product, service or asset in terms of time and location;
- defining the relationships between a particular project, process or activity and other projects, processes or activities of the organization;
- defining the risk assessment methodologies;
- defining the way performance and effectiveness is evaluated in the management of risk;

Further, the organization should define risk criteria to be used in evaluating the significance of risk. The criteria should reflect the organization's values, objectives and resources. They are derived from the standards, laws, policies, and other requirements to which the organization subscribes. Risk criteria should be consistent with the organization's risk management policy, be defined at the beginning of any risk management process and be continually reviewed. The risk criteria define the acceptable level of risk for a specific activity or event. When defining risk criteria, factors to be considered should include the following (ISO 31000:2009):

- the nature and types of causes and consequences that can occur and how they will be measured;
- how likelihood will be defined;
- the timeframe(s) of the likelihood and/or consequence(s);
- how the level of risk is to be determined;
- the views of stakeholders;
- the level at which risk becomes acceptable or tolerable; and
- whether combinations of multiple risks should be taken into account and, if so, how and which combinations should be considered.

2.2.3.2 Communication and consultation:

Risk communication and consultation can be defined as any two-way dialogue between stakeholders about the existence, nature, form, severity, or acceptability of risks. It is concerned with engaging internal and external stakeholders throughout the risk management process to gain their input to the process and their ownership to the outputs. It is also important to understand stakeholders' objectives, so that their involvement can be planned and their views can be taken into account in setting risk criteria. Thus, throughout the risk management process, various written and verbal communications between the risk manager, risk owner and stakeholders will continue to occur.

Stakeholder perception of risks may vary due to differences in assumptions, conceptions, and the needs, issues or concerns as they relate to the risk or issue under discussion. Communication and consultation aim at ensuring that stakeholders have access to relevant information about such risks. As such, therefore, effective communication and consultation provides stakeholders a common ground for an informed, valid decision throughout the risk management process (Knight 2010). As emphasized by Mulligan et al. (1998), communicating risk successfully is neither a public relations nor a crisis communications

exercise. Its aim is not to avoid all conflict or to diffuse all concerns. Risk communication seeks to improve performance based on informed, mutual decisions with respect to risk.

This phase of the risk management process is particularly important to construction enterprises which are characterized by multitude of stakeholders of conflicting interests and complex relationships as discussed in section 2.1.4.1.1 of this paper. The perceptions of stakeholders on the construction industry significantly vary in line with their varying and often conflicting concerns, interests and objectives. The set of players and the main players in a construction activity and their characteristics shift with each project and over time and through the different stages of the project life cycle (Ward and Chapman 2008). According to Ward and Chapman (2008), stakeholders are a major source of uncertainty in construction operations. Thus, construction enterprises need to improve and manage their relationships with stakeholders through effective and continuous communication and consultation all along the risk management process as depicted in Figure two.

2.2.3.3 Risk identification

Risk identification is an important step as the other steps in the risk management process such as analysis and response are only successful if potential risks are identified properly (Toakeley and Ling 1991, Wang et al. 2004). According to Chapman (2011), the purpose of this step is to identify both the threats to the business with the potential of reducing and removing the likelihood of the business reaching its objectives, and the opportunities, which could enhance business performance. External factors which may include economic, political, socio-cultural, technological and environmental as well as internal factors including infrastructure, personnel, process and technology may affect successful achievement of objectives (Marchetti 2012). The output is a risk register which clearly defines and explains each risk which is referred to and incrementally developed throughout the overall risk management process (Chapman 2011; Jordan 2013).

It is important that the risk identification be as comprehensive and that as many risks as possible are identified (Kalia and Muller 2007). No risk is too small not to be included in the list of identified risks. Any risk that is left unidentified at this stage would not be included in the risk analysis stage and therefore would be excluded from the whole risk management process that problems may enlarge and result in severe consequences or opportunities may be lost and result in missed benefits causing for the risk management to fail (Yan 2006, Hillson 2005, Morgan and Anderson 1997).

A well-structured systematic process needs to be used in order to ensure a comprehensive identification of the risks of an organization (Standards Australia 2004). Such systematic approach to risk identification requires developing a sound understanding of the strategic and operational objectives of the organization

including critical success factors as well as the opportunities and threats related to the achievement of these objectives, analysing the functions undertaken within the organization to identify the significant risks that follow from these objectives (Chapman 2011).

Successful risk identification also requires the involvement of all employees of the organization. It should not be the function of senior management or the risk management team only. Apart from bringing together different areas of expertise to the identification and analysis of risks and allowing those with day to day experience of the hazards to provide valuable input, such participatory environment allows workers to have ownership of the risks and the solutions, improves trust, communication and teamwork increasing the likelihood that works would be committed to implementing instituted control measures (Islam and Tedford 2012).

Various tools and techniques are available for identifying risks including organizational charts, flow charts, event chain diagrams, brainstorming, examination of local and overseas experience with similar activities, checklists, interview and focus group discussions, site visits/inspections, scenario analyses, SWOT analysis, force field analysis, constraints analysis, value management, failure modes and effects analysis, hazard and operability study (HAZOPS), surveys and questionnaires with some proving more effective with some industries (Borghesi and Gaudenzi 2013; Hillson 2005). No one particular risk identification method would be sufficient to identify all the risk exposures of an organization that a combination of methods may need to be used to ensure that identification is as complete as possible.

The identification of different individual risks, however, is not it all. It is important to understand that risks do not occur in organizations or projects singly or in related groups, but in random collections. Moreover, risks interact with each other that the occurrence of one risk can have a wide-ranging effect elsewhere in the organization not only by making other risk(s) more or less likely, increasing or decreasing its/their impact, but also by even creating new risks or precluding others (Hillson 2005, Jordan 2013). Jordan (2013) identifies two types of relationships between risks:

1. Risk driven relationships in which the risk itself drives associated risks; as one risk changes its profile, it drives changes in associated risks.
2. Action driven relationships in which the actions that we take to threat and control the risk drive changes in related risks.

Jordan further emphasizes that both situations can exist for the same risk and relationships are not always negative that opportunities may also be created as a result.

Further, the dynamic and fluid nature of the environment within which an organization operates lends itself to the fluidity of risks that risks identified to a business in the past will not be entirely the same as the risks identified to the same business today or next time. Exposure to risk would change as an organization changes, grow and expand, with new risks emerging, existing risks changing or ceasing to be relevant. Thus, risk identification is and should be an on-going process and not a one-off exercise (Valsamakis et al. 2000:92, Chapman 2011).

2.2.3.3.1 Risk Classification / Categorization

Risk classification refers to the broad grouping of risk which organizations are exposed to. Such classification of risk can be used to give an insight into the various types of risks, their concentration, and can also be used for structuring the identification of risk and placing the identified risks on to a consistent reference framework (GEHNER 2008). Organizations being unique in terms of their culture, industry, and business strategy/model, risk categories may be named differently, and certain risks may be included in different categories from one organization to another (Marchetti 2012, Valsamakis et al. 2000).

Risks may broadly be classified as pure risks and speculative risks (Valsamakis et al. 1996, Athearn et al. 1998, Kreitner et al. 1990) irrespective of the type of business of the organization. Pure risks are those risks that concern the possibility of loss or no loss. Operational, reputation, compliance and legal risks are included under this category. On the other hand, speculative risks present a chance of gain or loss and are thus taken by choice for their attractive features (Williams and Heins 1985, Rejda 2008, Haseeb et al. 2014, Flanagan and Norman 1993). Pure and speculative risks have been referred to as static and dynamic risks by Flanagan and Norman (1993). Examples of speculative risks include market, credit, interest rate, liquidity, and country risks.

Another broad grouping of risks an organization may face based on their sources is as external and internal risks (Tahet al. 1993). External risks consist of variables outside the direct control of the organization and cover virtually everything around the organization – its physical location, its relationship with external stakeholders, and its markets (Jordan 2013). Competitive, economic, geographic, political, regulatory, and technological risks are included under this category. Internal risks, on the other hand, are the risks that an organization faces from within – risks associated with operating the business. Internal risks are as their name indicates driven internally and are affected by the organization's own actions. Financial, operational, strategic, and compliance are the common categories of risk identified as internal risks (Jordan 2013).

Depending on whether they affect the long-term, continued existence and prosperity of the organization or its day-to-day activities for a shorter time frame, risks may be categorized as strategic or operational.

One method of risk classification is to reflect broad business functions, grouping risks relating to production, information technology, finance, and so on (Greene and Serbein 1983, Doherty 1985). It is also usual to categorise risks into dynamic/static, corporate/individual, internal/external, positive/negative, acceptable/unacceptable and insurable/non-insurable (Baloi and Price 2003).

The above reveals that the same risks can be categorized differently and distinctions cannot be absolute because of different approaches and cultural differences. It has thus to be emphasized that any such categorization could not be expected to be perfect as risks cannot be neatly categorized (Edwards and Bowen 2005; Duckert).

2.2.3.4 Risk Analysis

A significant number of risks are identified in the risk identification stage. Given the limited resources for risk management, all such risks cannot be tackled at the same time, hence the need for prioritizing the list of risks in some way. Prioritization enables the effective use of scarce resources as well as enables management attention to be focused on the more important individual risks and also on those parts of the organization most at risk. The primary purpose of risk analysis is to gain understanding of the risks by assessing both the threats and the opportunities to the business, in terms of their probability, impact and other attributes of the risk (ISO 31000, KPMG 1998, Chapman 2011). If managers do not assess risks formally, they may underestimate or overestimate either or both the likelihood and impact of the risks thereby leading to risky and costly decisions (Keil et al. 2000).

Risk analysis can be conducted using quantitative and/or qualitative approaches. Quantitative analysis may determine a level of risk by means of a value that measures the risk in numerical terms. Some of the methods that may be used in quantitative risk assessment include expected value analysis, decision trees, probability analysis, faulty trees, event trees, sensitivity analysis, risk simulation, and statistical inference. However, there are several disadvantages in trying to determine the level of risks in quantitative terms only. First, it would require great attention to the accuracy of data that measure the risk. Second, the risks that are measured would be limited to the availability of the quantitative data in hand. Third, many risk variables such as political, personnel and regulatory and the intangible consequences of risks such as bad reputation or negative media coverage are often difficult to capture through quantitative techniques and yet can cause significant exposure to an organization (Schwartz and Smith 1997).

In this sense, it can be more practical to use a qualitative approach that uses description rather than numerical means to define a level of risk. Examples of qualitative risk analysis are for the ‘consequence’ [insignificant, minor, moderate, major, catastrophe] and the ‘likelihood’ [rare, unlikely, possible, likely, almost certain] scales. Sources of information that can be used in a qualitative risk analysis are past

history, knowledge, experience, relevant publications, reasoning and current circumstances of the business and the environment (Knight 2006). Risk Assessment Matrix' that intersects the likelihood and consequences of each risk that may occur (Figure 3) may be used to determine the level of management required and the response time required to deal with those risks. According to the 'Risk Assessment Matrix', risks that are 'extreme' must be brought to senior executive directors' attention for research and action management planning in detail immediately. Risks that are 'high' should be brought to the attention of senior management with heightened need for action management planning. Risks that are 'moderate' should be managed by specific monitoring or response procedures of the business. Risks that are 'low' should be managed through routine procedures in an organization as such risks would be unlikely to need specific allocation of resources.

		Consequence				
		Insignificant 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
Likelihood	A Almost Certain	High	High	Extreme	Extreme	Extreme
	B Likely	Moderate	High	High	Extreme	Extreme
	C Moderate	Low	Moderate	High	Extreme	Extreme
	D Unlikely	Low	Low	Moderate	High	Extreme
	E Rare	Low	Low	Moderate	High	High

Figure 3: Risk Assessment Matrix

The likelihood that a risk might occur should be assessed by taking into account the current condition and processes to mitigate the chance of the consequences occurring. The impact is considered as the potential financial, reputational or other consequences of the risk in any single year. The Financial Management and Accounting Committee (FMAC 1997) states that the assessment of the potential impact of a particular risk may be complicated by the fact that a range of possible outcomes may exist or that the risk may occur a number of times during a given period of time.

While each approach has its own strengths and weakness and neither is superior to the other, the best approach is to use a combination of quantitative and qualitative risk analyses to best fit the type of detail and information required about different types of risk, the effectiveness to capture the inherent uncertainty is of paramount importance (Baloi 2012).

For a successful risk analysis process, the risk analysis process should be comprehensive and include, as far as possible, an assessment of all of the risks in the risk register developed in the preceding stage. It should also involve personnel who could make an informed and well-reasoned analysis of the risks. Furthermore, consistent definitions of probability and impact should be adopted and sufficient time allocated to the analysis process (Chapman 2011).

2.2.3.4.1 Perceptions of Risk and Risk Attitudes

Risk decisions are influenced by how risk is perceived, and how it's processed by individuals, groups, and organizations. Given the same information on risk exposure for a situation different people will likely respond differently. What is an acceptable risk to one may not be acceptable to another as they hold different views and have different understandings of a particular risk's components, sources, probabilities, consequences and preferred actions. The explanation partly lies in differences in risk perception and risk attitudes.

For Rohrman (2008), risk perception refers to people's judgments and evaluations of hazards they (or their facilities, or environments) are or might be exposed to. On the other hand, risk perception has been defined by Kiel et al. (2000) as "a decision maker's assessment of the risk inherent in a situation. Risk attitude, on the other hand, refers to the notion that many decision makers have consistent tendencies to either take or avoid actions that they feel are risky (Kiel et al. 2000). Hillson and Murray-Webster (2005) also define risk attitude as "a chosen state of mind with regard to uncertainties that could have positive or negative effect on objectives ... risk attitudes are usually adopted sub-consciously.—and describe risk attitudes as risk averse, risk tolerant, risk neutral, and risk seeking.

Different authors have tried to find explanations for the differences in risk perception and risk attitude of individuals. According to Janmool and Watanabe (2014) risk perception is a dynamic process and can be determined by a number of factors including the perceived probability of the risk, the perceived probability of receiving risk impacts, perceived severity of catastrophic consequences, perceived ability to control the risk, perceived benefit from the activity/project related with the risk, people's concerns and previous experiences. According to Slovic et al. (1981), inaccurate perceptions of risk can be had due to availability biases. An important element in here is the occurrence and experience of risks. One result of misjudgement of risks with regard to their occurrence is that usually frequently occurring events are generally easier to imagine and recall, also explaining people's misperceptions and faulty decisions with regard to certain natural hazards that are relatively less risky. People can also misjudge the frequency of occurrence of risks. Moreover, Slovic et al. emphasise that biased media coverage providing a distorted picture of the world of hazards, a "It won't happen to me" view considering oneself as immune to many

hazards, and the ‘Out of sight, out of mind’ conception to risk can influence people’s judgement as to the availability of such risks.

Regarding the factors that influence individual risk attitudes, Hillson and Murray-Webster (2005) enumerate the following: 1) level of relevant skills, knowledge or expertise; 2) perception of probability or frequency of occurrence; 3) perception of impact magnitude, either severity of negative threats or size of positive opportunities; 4) degree of perceived control or choice in the situation; 5) closeness of the risk in time; 6) potential for direct consequences.

Whereas Rohrmann (2008) remarks that risk perceptions steer decisions about the acceptability of risks and are a core influence on behaviours before, during and after a risk, Hillson and Murray-Webster (2005) emphasize the importance of understanding the effects which the attitudes of individuals can have on the risk process, in order to be able to move on to manage these effects appropriately considering that the entire risk management process is undertaken by people, acting either individually or in groups. At the same time, Kiel et al (2000) indicate that there is a relationship between risk perception and risk attitude as both interact with each other as well. More specifically, it appears that risk attitude may have an impact on risk perception, with an individual having a high risk-taking attitude tending to underestimate the risks involved in a situation, and thus more likely to recognize and weigh positive outcomes, thereby overestimating the probability of a gain relative to the probability of a loss, whereas a risk-averse decision maker will weigh negative outcomes more highly, leading to a heightened perception of risk.

Perception of risk and risk attitudes have critical roles in risk decisions starting from defining what risk is to identifying risks and the sources of risks, the analysis and evaluation of risks, and hence the selection of appropriate methods to respond to risks and in fact the need for monitoring and review of risks and the overall communication and consultation needed on risks and risk management. According to Akintoye and Macleod (1997), people's beliefs, attitudes, judgments and feelings are believed to influence risk perception to a certain extent. Response and strategies for dealing with risk are thus dictated by risk exposure and risk perception, while the former is fairly quantifiable, the latter difficult to quantify. As a paper by Carmona, M. et al. (2014) titled ‘Inventory – Assessing risk perception criteria’, a deliverable to a working paper on ‘Risk perception and risk cultures in Europe’ put it, how we deal with risk is contingent largely to how well we understand it and how we perceive it.

As emphasized in the relevant sections above, the construction industry is exposed to numerous internal and external risks. How each of these risks are perceived by the management of the construction enterprises influences what strategies to take, how to compete in the market, their pricing decisions, their project selections, whether to go international and so on. At the project level risk perception influence

cost and time estimates (Hlaing, Singh and Ehrlich 2008, and Anisur Rahman and Chileshe 2012). The accurate perception of the management of construction enterprises to the successful achievement of their business objectives is not therefore to be overemphasized. As stated by Slovic et al., (1981), if managers have faulty perceptions of risk, then their management efforts are likely to be misdirected.

For a successful risk management effort, therefore, relevant stakeholders need to be informed about the risks. The purpose of the communication and consultation in the risk management process is to influence the perception and attitudes of stakeholders so that they can participate in decision-making about risk issues in an informed manner. Perceptions and beliefs, once established are difficult to change as fast and thus communication and consultation efforts should not be undertaken with the expectation to bring about immediate convergence of perceptions to one appropriate view. So is with risk attitudes (Hillson and Murray-Webster 2005). For effective risk communication, a sound understanding of risk perceptions and attitudes is indispensable. This helps risk communicators to effectively establish communication efforts, properly select pieces of information and their formats, and foster information sharing among relevant parties (Janmaimool and Watanabe 2014).

2.2.3.5 Risk Evaluation

As its name suggests, this involves evaluation of the results of the analysis stage. This stage is central to understanding the likely risk exposure or potential opportunity arising from a business activity. ISO 31000:2009 describes risk evaluation is a process that is used to compare risk analysis results with risk criteria established in the context setting stage in order to determine whether or not the risks need treatment and the priority for treatment implementation or if a decision to undertake further analysis may be appropriate. The risk criteria relates to the desired risk profile of an organization expressed as risk appetite i.e. the amount of risk an organization is willing to accept in pursuit of value and may be expressed as an acceptable balance between growth, risk and return. Risks evaluated as falling within the established threshold are tolerated i.e. no specific treatment is necessary other than monitoring. Those risks considered unacceptable, however, would be subject to treatment.

There are a series of mechanisms available to evaluate risk, which may be used singularly or in combination. These include probability trees, expected values, utility functions, decision trees, Markov chain analysis and investment appraisal techniques (Chapman 2011).

The nature of the decisions such as whether a risk is tolerable (do not need treatment) or not (needs treatment) would depend on the predefined external and internal context, risk management context and the objectives of an organization. In this sense, degree of control over each risk, cost, benefits, opportunities, and effects on stakeholders are some of the criteria to be considered while evaluating risks

(Knight 2010). Furthermore, such decisions should be made in accordance with legal, regulatory and other requirements.

Some of the reasons why a risk may be tolerated include the following (Knight 2010):

- The opportunities presented outweigh the threats to such a degree that the risk is justified.
- The level of the risk is so low that specific treatment is not appropriate within available resources.
- The risk is such that there is no treatment available. For example, the risk that a project might be terminated following a change of government is not within the control of an organization.
- The cost of treatment, including insurance costs, is so manifestly excessive compared to the benefit that toleration is the only option. This applies particularly to lower ranked risks.

Chapman (2011) states that a satisfactory risk evaluation process should adopt a recognized and reliable method of aggregation, make assumptions in the evaluation process explicit, be supported by risk management expertise and conduct sensitivity analysis on the results in order to see what the outcome would be if any one figure is changed.

2.2.3.6 Risk Treatment

Having identified and assessed risks, the next stage is to take action, to decide how to respond. The effectiveness of responses will determine whether the risk exposure of the organization is influenced for better or worse, resulting in increased or decreased threat and opportunity (Hillson 2005). When determining on an appropriate risk response strategy, a number of factors should be considered: the type and nature of the risk, manageability and amenability to reduction or control, the degree of severity of impact, available resources, cost-effectiveness, risk-effectiveness (Hillson 2005 and Marchetti 2012). The objective is to align residual risk to the chosen risk appetite or to maximize the benefits from a given opportunity.

According to ISO 31000, risk treatment involves selecting one or more options for modifying risks and implementing those options, and as such the risk treatment options are not mutually exclusive. Once implemented, treatments provide or modify the controls. It involves identification, assessment, preparation, and implementation of the range of options for treating risks (Knight 2010). Treatment options may include: (1) accepting the risk; (2) avoiding the risk; (3) reducing the risk; and (4) sharing (transferring) the risk. Moeller (2007) states that organizations should consider the costs and benefits of each potential risk response and which of these strategies best align with their overall risk appetite in developing a risk strategy for each of their risks.

According to Chapman (2011) for a risk treatment process to be considered adequate, the purpose of the risk treatment process needs to be made clear and adequate time allotted in selecting appropriate treatment methods which achieve the purpose, with the possible limitations of such method identified and stated. Moreover, as the magnitude and hence the potential impact of risks would not remain static as a result of changes in the business environment, risk treatment decisions need to be subject for monitoring and review.

Avoidance of risk may mean removal, elimination, exclusion and termination of risk. Risk avoidance is concerned with lessening the likelihood that risk events would occur by limiting the chance that the risk event will occur in the first place. This may be done by undertaking a different course of action including a decision not to start or continue with the activity or project that gives rise to the risk or with the removal of the source of the risk, e.g. abandoning operating in a given product or geographic market where the associated risk is considered to be unacceptable. Divestment of assets in highly uncertain markets and postponement of market entry until the industry uncertainties decrease to an acceptable are further strategic responses to avoid risk and uncertainties (Miller 1988). According to Knight (2010) likelihood reduction may be through the selection of alternative approaches, procedural changes, quality assurance, procedures, operational reviews, regular audits, training and skills enhancement, and contract terms to prevent undesired outcomes such as legal liability of accidents or injuries.

Reducing or mitigating the risk can be achieved by taking steps to reduce the likelihood of the risk event occurring and/or taking steps to lessen the consequences of the risk to a tolerable level. Likelihood and consequence reduction is directed to minimising the occurrence and impact associated with a certain risk. Preventive maintenance is an example. According to Chapman and Ward (1997), risk reduction strategic actions include acquisition and mergers, moving to a new market, developing a new product/technology in an existing market, and business process engineering. Miller (1988) adds the use of market power to deter entry and control competitors, vertical integration as an attempt to control input or demand uncertainties, and political activities (e.g., lobbying for or against laws, regulations, or trade restraints) as further strategies to reduce and control risk.

Sharing the risk involves transferring the responsibility or consequences associated with a particular risk to another party (Heerkens 2002). Transfer doesn't eliminate or reduce the risk, it only transfers the consequences. Contracts and insurance are the most common means of transferring risk.

Contracts can be used to transfer risk through the use of appropriate terms, exclusions and waivers. Fixed-price contract (lump sum contract) where a buyer transfers the risks to the supplier, cost-plus contracts where contractors transfer risks to the buyer, and a warranty agreement which specifies the

obligations of the seller in the event that the goods or services do not perform properly are some approaches risks could be transferred through contracts from one party to the other (Frame 2003). In construction, risks are transferred through indemnity agreements. Risks commonly known as Acts of God (Earthquake, tsunami, massive landslides etc.) for instance are handled as ‘force majeure’ under contractual terms because no party is supposed to be able to manage them and, consequently, bear the associated costs (Baloi 2012).

Insurance is another common means of transferring risks so as to cover the cost of major losses as a protection against financial catastrophe in return for paying a premium to an insurance company. Property, personnel, liability, income, performance, etc. losses may be transferred through insurance. But not everything can be insured or insured fully because no insurer may be willing to accept the risk or would only accept the risk at exorbitant premiums, that there are residual risks which fall back to the organization.

It is worth noting here that by transferring the risks organizations are taking another risk of whether the chosen body to share the risk will manage the risk effectively or not (Heerkens 2002, Standards Australia, 2004c).

Acceptance of risks refers to a conscious decision to retain or tolerate the risks adopted when either it is more economic to do so or there is no alternative, as the option to transfer, reduce or avoid the threat is not available. Under this strategy, the organization ‘self-insures’ its risks (Spedding and Rose 2008).

According to Knight (2006), a risk maybe tolerated if: (a) the level of the risk is so low that specific treatment is not appropriate within available resources; (b) the risk is such that there is no treatment available, such as risk of termination of a project due to change of government; (c) the cost of treatment is manifestly excessive compared to the benefit; or (d) the opportunities presented outweigh the threats to such a degree that the risk is justified.

Organizations handle such risks by putting aside resources and building backup capabilities to enable them deal with some unfortunate events (Frame 2003; Moeller 2007). The major challenge for organizations is determining what level of resources to set aside, with more of it shifting resources from productive use and less, exposing the organization to possible catastrophic consequences (Frame 2003).

2.2.3.7 Risk Monitoring and Review

With changes in the objectives of the organization or the internal and external environment in which they operate, new risks may emerge or existing risks may change resulting in changes in risk priorities. Factors that may affect the likelihood and consequences of an outcome may change, as may the factors that affect

the suitability or cost of the various treatment options. Thus, it would be imperative the risk horizon be continually monitored in order to see that risk management decisions put to implementation were correct and have been implemented appropriately and that the underlying circumstances have not changed so much as to require revised plans for managing risks. Either of these situations will trigger the risk management cycle. The purpose of the monitoring and review is thus to monitor risks, the effectiveness of the plan, strategies and management system that have been set up to control implementation of the risk treatments.

Monitoring and review are defined by the ISO31000 as follows:

- a. Monitoring: Continual checking, supervision, critically observing or determining the status in order to identify change from the performance level required or expected; and
- b. Review: Activity undertaken to determine the suitability, adequacy and effectiveness of the subject matter to achieve established objectives.

Monitoring and review is an on-going part of risk management that is integral to every step of the risk management process. It is undertaken by risk owners, management and the board (or equivalent), taking on board new information that becomes available, and learning lessons about risks and controls from the analysis of successes and failures. Four commonly employed formal risk monitoring activities: the employment of status reports, the use of issues logs, the conducting of evaluations, and the use of periodic risk audits.

For risk monitoring to be successful in surfacing risk events, the monitoring effort must be focused on the right sources of information, the information must be timely and the people reviewing the information must be able to make sense out of it (Frame 2003).

2.2.4 The Importance of Managing Risks or Benefits of Risk Management

Implementing a systematic risk management process has both long-term and short-term benefits. As discussed in the respective sections of the paper, each stage of the risk management effort, right from identifying risks, assessing risks to coming up with mitigation strategies, has its own benefits. Risk management as a system results in a number of direct and indirect benefits to the organization with some which are not easily quantifiable.

- Valuable risk management information enables improved decision with respect to strategic and operational choices and supports efficient allocation of scarce resources by balancing risks and rewards of alternative strategies (Gehner 2008, Hopkin 2010).

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- A rigorous and consistent risk identification and assessment would enable an organization anticipate a threat which competitors might miss and prepare for it with an appropriate response mechanism, thereby improving safety, avoiding/minimizing business interruption and resulting in significant cost savings and preventing wastage of time and effort in firefighting.
 - It enables the organization to thoroughly understand risk inherent in its activities, its underlying drivers and its effective management through the right mitigation strategies (Shortreed 2010 cited in Fraser and Simkins 2010; Meulbroek 2002) allowing it to accept risk which its competitors may avoid and pursue opportunities with greater confidence;
 - By integrating decision making across all risk classes, it eliminates the typical silo approach to risk management thereby reducing inefficiencies and limiting internal conflicts that exist due to lack of coordination between the various risk management units, thus enabling the organization to manage risk at a lower cost (Meulbroek 2002).
 - It leads to improved communication and stakeholder relationships developing productive business relationships with suppliers and contractor as well as financiers; enhancing customer loyalty; generating local support for operations from positive community relations; building employee trust – increasing morale and productivity, retaining and attracting talented staff and reduction in dispute levels; enhancing regulatory and legal relation; and enhancing positive media relations (Spedding and Rose 2008). This will enhance the reputation of the organization and lead to improved finances from: reduced insurance premiums, easy access to capital with better terms and pricing; reduced fines; and fewer enforcement action costs.
 - The comprehensive effort involving the participation and contributions of various stakeholders and their experiences and insights in the development of an effective risk management system and the subsequent sharing of lessons learnt and documentation of successful risk treatment plans during its implementation enhances organizational learning with such collective know-how being used as a training material and a reference for future risk management endeavors.
 - Risk management will lead to more efficient operations, less disruption to normal efficient operations, reduction of uncertainty in relation to change and improved decisions in relation to evaluation and selection of alternative strategies. In other words, a key part of risk management is improved organizational decision making.

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- As a cornerstone of good corporate governance, risk management results in better service delivery, more efficient use of scarce resources and better project management (Collier et al. 2007) thereby enhancing customer satisfaction and leading to improved performance (COSO, 2004, Gordon et al. 2009, MS ISO 31000:2010, Salman and ZainUl-Abideen 2010).

In general, an effective risk management system will result in improved decision making, efficient allocation and effective use of resources, achieving best practices, protecting and enhancing reputation, increased safety, ensuring regulatory compliance, avoiding financial surprises/losses, reducing earning volatility, and improved bottom line thereby creating value to the organization and contributing to the achievement of its objectives (Spedding and Rose 2008, Chapman 2011, Shortreed 2010 cited in Fraser and Simkins 2010, The Economist 2007). Such significant advantages and benefits of a superior approach to managing risks provide a competitive advantage to an organization enabling it to excel in the competition and succeed in achieving its objectives and enhancing value.

2.2.5 Drivers/Barriers to risk management

2.2.5.1 Risk Management Drivers

Traditional risk management was driven to deal with various threats from within and outside the organization. In contrast the new paradigm as discussed elsewhere in this paper is aimed at achieving the objectives of the organization and in creating and protecting value not only by responding to threats but also by enabling the organization to pursue opportunities. Risk management is gaining increased focus because of various influences which can be external or internal to the organization. Hill et al. (2010) identified the following as major macro-influences driving such increased need for risk management:

- the increased separation of the ownership of entities from the management of those entities,
- the complexity of modern society, with many inter-relationships and interdependencies,
- the increased threat of litigation for perceived contractual and service failures,
- increased attention to environmental and sustainability issues, including the effects of climate change,
- governmental regulatory requirements for risk management processes, and regulatory penalties for non-compliance, and

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- the presence of influential standard setters promoting good governance and risk practices in major corporates, [e.g. regulators, rating agencies, stock exchanges, institutional investors, and corporate governance oversight bodies].

Hudin and Abdulhamid (2014) compiled a number of external and internal drivers identified by various researchers. Among the external drivers are included corporate governance, compliance to regulations, technology advancements, competitive advantage, corporate companies' failures, good business practice, complexity of risks, shareholder requirements, globalization, and improved communication. Identified as factors internal to the organization driving enterprise risk management, on the other hand, are the presence of Chief Risk Officer and internal auditor, strong support from top management, encouragement from the Board of Directors, types of firm, company turnover, company size, corporate governance, compliance to rules and regulations, and pressure from external auditors. Hudin and Abdulhamid (2014) added that organizations may also implement a risk management practice due to the acknowledgement of the potential benefits of risk management, emergence of new business trends, increased occurrence of risk events, and the awareness of company vulnerabilities. Lewis (2012) and Spedding and Rose (2008) have also identified list of drivers which are more or less similar.

The authors emphasized that future risk management activities are influenced according to what drives the risk management and thus need to be adjusted accordingly. Otherwise, in Hudin and Abdulhamid's words, "regardless of the maturity of risk management theory, the wrongly implemented risk management practices will only become a false safety net to organizations". The risk management system needs thus to be geared to achieve what it set for in the first place and procedures and measures put in place need to be consistent and aligned to the driving objectives.

2.2.5.2 Barriers to Risk Management implementation

According to previous studies a number of barriers were identified to hinder implementation of risk management in different industries. These hindrances either precluded organizations from implementing risk management at all or forced them to implement same only partially. The Economist (2007) listed lack of time and resources, difficulty in identifying and assessing emerging risks, lines of responsibility for managing risk not sufficiently clear, threat from unknown, unforeseeable risks, lack of support from management, difficulty harmonising risk appetite across business units and geographies, regulatory complexity, lack of available data, lack of skills for effective risk management, difficulty obtaining buy-in from employees as the greatest factors to effective management of risks in organizations.

Zhao et al. (2014) have conducted a study aimed at identifying the critical hindrances to ERM implementation in Chinese Construction Firms and investigating the interrelationships among these

hindrances. A total of 36 hindrances identified in 27 previous studies by consultancies and academics were investigated. The results of the analysis implied that 20 out of the 36 hindrances identified from the literature review were critical hindrances. They are summarized as follows:

- Unavailability/inadequacy of data, not quality data,
- Lack of risk management tools and techniques, processes, ERM performance measurement metrics, lack of clear ERM implementation plan,
- Insufficiency of resources - financial, people, time,
- Lack of internal knowledge, skill, expertise in the organization, lack of qualified personnel to implement ERM,
- Lack of risk management information system,
- Unsupportive organizational structure,
- Unsupportive organizational culture,
- Lack of commitment of the board and senior management, risk management not perceived as a priority by senior management, lack of board and senior management leadership, unclear ownership and responsibility for ERM implementation,
- Perception that risk management adds to bureaucracy, administration and costs, interferes with business activities,
- Lack of risk awareness, lack of perceived value/benefits of ERM, inadequate training on ERM.

2.3 Summary of Literature Review

The literature review has shown that apart from the exposure to a multitude of risks that emanate from the general business environment in which the construction industry operates and shares with all other sectors, though the extent of the exposure differs by virtue of the nature of the sectors, the construction industry, in addition, is exposed to various risks and uncertainties due to a number of unique features that differentiate it from other sectors and industries.

Despite the very risky nature of construction, however, global experiences have witnessed that to date, risks are not well managed in the construction industry. Literature also shows that the construction industry had passed through bad experiences in its performance in terms of major corporate objectives as profitability, return on capital, customer satisfaction and positive image and reputation, affecting its success. Not only are contractors unable to complete important projects according to plan causing

immeasurable impact on respective stakeholders as well and substantial losses to the contractors, lack of proper management of risk has led many to liquidation and bankruptcy.

Hence, effective implementation of formal risk management in the construction industry was emphasized in the literature review. Particularly, the implementation of an integrated risk management system which takes the holistic view of risks on the overall business objectives of the construction organizations as opposed to risk management in its narrow definition and implementation at project level only has been underscored. Accordingly, effective risk management frameworks which were practically tested at global levels, particularly the ISO 31000:2009 framework was broadly considered as applicable to risk management activities at all levels of construction organizations, corporate, strategic business unit, department, project, and process level. The various principles for successful risk management implementation, all the necessary components of the risk management process including the importance of risk identification and the relevant techniques, the need for proper analysis and evaluation of risk and the related tools and techniques for the assessment and prioritization of risks, and the importance of regularly monitoring and reviewing risk and risk management system to ensure its adequacy, efficiency and effectiveness and various methods of monitoring have been reviewed in the literature. So were broadly considered various drivers as well as barriers to risk management implementation in organizations.

CHAPTER THREE

3 Research Methodology and Approach

Thus far, the problems to be studied have been clearly defined, the research objectives set, and justifications of the research were provided in the introductory chapter.

Moreover, previous research with regard to integrated risk management practice in general and risk management practice in the construction industry and specifically by construction contractors in particular was examined in the literature review section in the previous chapter. This review determined the context of the research and positioned this work relative to previous research. Journal publications, books, working papers and reports were used to develop the literature review.

In this chapter, the methodology for the research is discussed. Included in this section are questionnaire design, sampling, data collection procedures and validity and reliability of data.

3.1 Type of Research - Research Design

This research being an applied research, it takes on an exploratory and descriptive approach in assessing the subject of integrated risk management practices in the construction industry, specifically by general contractors. A descriptive research examines a situation as it is; it does not involve changing or modifying the situation under investigation, nor does it intend to detect cause-and-effect relationships (Leedy and Ormrod 2005). Such being the purpose of this research, therefore the reason for the selection of this method.

Again, while two types of research approaches can be used in research, quantitative and qualitative, in this study, the quantitative approach has been used to determine level of awareness to risk management, risk identification, risk analysis and risk response methods and the significant drivers and impediments for practicing risk management in the construction enterprises of Ethiopia.

3.2 Data type and source

Both primary as well as secondary data sources were used in this research. The primary data was obtained from questionnaires administered to a sample of general contractors in construction industry. The secondary data was obtained from published journals, books, conference papers, working papers, reports, theses, magazines and newspapers, and the internet.

3.3 Data Collection Method and Design

The survey is a very popular method of gathering information allowing inputs from various sources such as clients, key informants and target population, and it is useful in describing the characteristics of a large population. The survey strategy involves:

- Selecting a sample to represent a known population. The sample allows the researcher to generalize a study's result to a known population.
- Data are collected directly from respondents in a natural setting using a systematic technique (e.g. questionnaire or interviews).

The survey method is convenient for different types of research ranging from exploration to hypothesis testing (Neuman 2007).

Accordingly, the questionnaire survey was used as the main data collection method in the research. Closed-ended questions in which respondents select a single response that they felt were most appropriate from a selection of choices were used in the survey. Closed-ended questions were chosen in consideration of the fact that respondents are usually busy and this method enables the researcher to obtain responses promptly. Closed-ended questions are advantageous in that response choices can clarify the question text for the respondent as well as improve consistency of responses. Moreover, Likert scale of 1 – 5, in which 1 represented *'never used'* and 5 represented *'always used'* to measure frequency of usage, Likert scale of 1 – 5, in which 1 represented *'least important'* and 5 represented *'most important'* to assess the importance of a selected list of risks, and Likert scale of 1 – 5, in which 1 represented *'strongly disagree'* and 5 represented *'strongly agree'* to measure the extent to which contractors agree on the possible values and benefits of risk management implementation.

The questionnaire was designed to consist six parts. The 1st and 2nd sections consisted of questions of general background information regarding the respondents and their enterprises respectively. The third and fourth sections covered broad ranging questions relating to aspects of perception and awareness to risk management, the existence of a formal risk management framework which enables successful implementation of risk management in the subject enterprises, and the overall process of risk management including risk identification, assessment and risk response strategies adopted by respondents. Finally, section five and six comprise of questions on the benefits of risk management and the drivers and the barriers to the implementation of risk management in the construction industry. This is in line with what this study aims to achieve as stated in the objective in chapter one. The questionnaire is, in general, designed in line with the objectives of this study as stated in the first chapter.

3.4 Target Population and Sample Size

Whereas contractors are categorized as building contractors, general contractors and road contractors, in the Ethiopian context, the scope of the research is limited to general contractors who are licensed to be engaged in building as well as road construction projects. Risk management, while it should follow a structured process, should not be as such rigid. It should allow for flexibility in consideration of the specific situations of different business units in the organization. The activities of general contractors present different features and situations. They differ in the skill they require, the materials they consume, the equipment they use, the spatial area they cover, etc. and the management they require. As such, thus, they face different risks which the general contractors need to recognize and accordingly design tailored risk management tools and techniques. The focus on general contractors in this paper is therefore motivated by the interest to investigate the actual practice in this respect.

Furthermore, though risk management is important for all companies irrespective of their size or age, in fact more so for small and new companies, it also involves cost. Considering the effort that small and new companies exert to make the ends meet, it is highly likely that risk management would not be a priority agenda to claim the scarce resources. Thus, only general contractors of Grade one to Grade four were considered. These contractors are believed to have better organizational, human and financial capability than other lower level contractors allowing them to initiate structured risk management systems (Yimam 2011).

Accordingly, therefore, from the list of registered contractors for 2013/14 budget-year under the Ministry of Urban Development, Housing and Construction, a sample frame of general contractors of Grade one to Grade four was taken. The sample frame consisted of 139 members. The sample frame was then further edited for duplications and other irrelevant companies such as foreign companies licensed and operating in Ethiopia. Having done all the editing and corrections, the sample frame remained with only 93 members i.e. domestic general contractors of Grade one to Four. Out of these 11 are situated in the regions outside Addis Abeba posing accessibility problem for facilitating and collecting questionnaire responses. Thus, eliminating these as well, only 82 contractors remained as the target population.

The target population was distributed as follows:

1. Grade 1	45
2. Grade 2	13
3. Grade 3	20
4. Grade 4	<u>4</u>
Total	<u><u>82</u></u>

In order to determine a representative sample i.e. one that has all the important characteristics of the population from which it is drawn, from the given target population, the author has selected stratified sampling as an appropriate method. In this method, after having the target population for the study, the sample size was determined first and the determined sample size divided into the different categories, in our case the four grades of general contractors, in their relative proportion to the target population (Gay et al. 2011).

The determination of the appropriate sample size for a survey is generally not a straightforward decision. The question is one that usually has no one definitive answer (Gay et al. 2011). Nonetheless, different methods can be used to estimate the sample size. Gay et al. (2011) argue that while a sample as large as possible is helpful, it should not be too big, but also it should not be too small as the results of the study may not be generalizable to the population. Having emphasized that the minimum sample size depends on the type of research involved i.e. descriptive, correlational or experimental, they advise that one can apply some guidelines to determine whether a sample is big enough. In this respect, they state that for descriptive research the sample should be 10% of population. But if the population is small then 20% may be required. Another factor in the determination of the sample size according to Conroy (2006) is the variability of the thing being measured. The more something that varies from person to person the bigger your sample needs to be to achieve the same degree of certainty about your results. Hence, the need to decide on the degree of uncertainty one is prepared to tolerate in one's findings. For an exploratory study, for example, a margin of error of $\pm 10\%$ might be perfectly acceptable. If you have a finite population, the sample size you need can be significantly smaller.

Two of the conditions where small samples are justifiable as provided by Isaac and Michael (1995) are (a) in cases of small sample economy. That is when it is not economically feasible to collect a large sample and (b) in cases of exploratory research and pilot studies. Sample sizes of 10 to 30 are sufficient in these cases. Similarly, according to Roscoe (1975), in simple experimental research with tight controls (e.g. matched-pairs design) successful research may be conducted with samples as small as 10 to 20. As emphasized by Burns and Burns (2008), relatively small samples of the relevant populations, if carefully drawn using any of the random sampling techniques can produce high-quality results.

In view of the above, therefore 20% of the target population was taken as an adequate sample size:

$$\rightarrow 82 * 20\% = 16$$

This was rounded up and a sample of 20 contractors was taken for this research.

Then, in order to guarantee good representation of each category within the sample, proportional stratified sampling is used to divide the sample size of 82 general contractors determined as such among the different categories proportionately. Accordingly, their respective shares were determined as follows:

$$\text{Grade 1} = \frac{45 \times 20}{82} = 11$$

$$\text{Grade 2} = \frac{13 \times 20}{82} = 3$$

$$\text{Grade 3} = \frac{20 \times 20}{82} = 5$$

$$\text{Grade 4} = \frac{4 \times 20}{82} = 1$$

Thus, questionnaire was sent to 20 general contractors comprising of 11 Grade 1, 3 Grade 2, 5 Grade 3, and 1 Grade 4 contractors selected randomly from their respective target population. As risk management activities of an organization need to be led by the top management, the research intended to reach the senior officials of the contractors who have got the authority to make risk decisions. This was emphasized to respondents in the cover letter of the questionnaire.

3.5 Survey Administration

Questionnaires were hand-delivered or emailed to selected contractors. Respondents were provided ample time, a week, to complete and submit the questionnaire. Respondents thus had the chance to express their propositions in a stress-free condition and relatively relaxed timeframe which is expected to contribute in sourcing quality response. Responses were collected in a similar manner, either collected in person or emailed.

3.6 Reliability and Validity

Neuman (2007) emphasizes that reliability and validity are important in establishing the truthfulness, credibility, or believability of findings. Reliability refers to the extent to which the same answers can be obtained using the same instruments more than one time. ‘Reliability is a concern every time a single observer is the source of data, because we have no certain guard against the impact of that observer’s subjectivity, (Babbie 2009, p.189)’. Validity, on the other hand, refers to the extent to which an

empirical measure adequately reflects the real meaning of the concept under consideration. In Neuman's (2007) words, it refers to 'how well an idea about reality fits with actual reality'.

In an effort to avoid/minimize problems related to reliability and validity, previously designed questionnaires and successively used in surveys that directly and indirectly relate to risk management were carefully examined and adopted. In this regard, North Carolina State University (NC State 2015), KPMG (2013), Zhao, Hwang and Low (2015) and Deloitte and Touche (2014) are to be mentioned. Moreover, contents and structure of the questionnaire were discussed with practitioners in the construction industry prior to the finalisation and administration of the questionnaire in order to test the relevance of the sections outlined in the questionnaire. Apart from using a random sampling method to avoid biases, the survey was administered in such a way that respondents could not be pressured in any ways to select specific choices among the answer sets, contributing to the reliability and validity of the research.

3.7 Data Analysis Techniques

Data collected through questionnaires were analyzed using quantitative descriptive statistics with the help of IBM SPSS Statistics version 20 statistical computer software. The analysis enabled the researcher to rank risks prevailing in the construction industry of the Country as well as the risk identification, risk measurement, and risk response methods employed in the target construction companies in terms of their significance. The significant factors that determine and influence the practice of risk management in construction enterprises in Ethiopia were also be highlighted by the analysis.

CHAPTER FOUR

4 Results, Analysis and Discussion of Findings

This chapter of the study presents an in-depth analysis on the sample data gathered on the research topic, ‘A Study into the Risk Management Practice of General Contractors in Ethiopia’. 20 questionnaires were distributed out of which 14 of them were responded, representing a 70% response rate. All the questionnaires were completed by top management members, department managers, of the construction enterprises. Results and findings of the analysis are used as a basis for the conclusion and recommendation section of this study.

4.1 General Information on Respondents and Their Enterprises

Surprisingly, the respondents of the questionnaire were all men in what seems to testify the remark by Amaratunga et al. (2005) that the construction industry is typically a male dominated industry. Respondents come from all ages of working life and all of them have higher level education with 57% of them having a Bachelor’s degree and the rest having a post graduate degree. Respondents have a good deal of experience in the construction industry with 85.7% of them staying in the construction industry as well as in their respective enterprises for over five years to over 15 years. Moreover, 71.4% of respondents have formal risk management training indicating that they understand the subject matter which they are dealing with.

With regard to the enterprises involved in the survey, 78.6% of them were Grade One, 7.1% Grade Two, and 14.3% Grade Three contractors. The grade distribution has shown some variation with the target sample classification. Contractors upgrade their grades frequently and fast by increasing the number of equipment they own and the number of professionals they recruit, these being the major requirements for registering to a desired grade. As a result, most contractors in Grades Three and Two have upgraded to Grade One during the past year. 28.6% of the subject enterprises sole proprietorship and the remaining 71.4% are private limited companies. Accordingly, the number of shareholders is restricted to a maximum of 50 and share transfers are restricted (Commercial Code 1960) with most of such enterprise established through family ties or close personal relationships, with an important implication to raising additional capital for business growth and development.

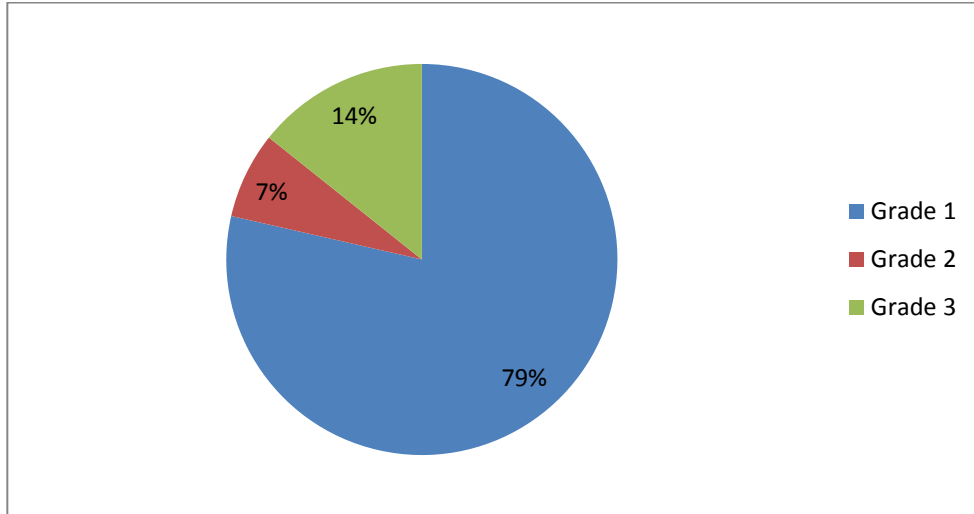


Figure 4: Profile of Survey respondents by license grade (survey result)

Out of the total number of respondents, 21.4% of them were ISO Certified and all these enterprises have a formal risk management implemented in their enterprises indicating the link between recognized quality certification standards and risk management as an embedded component of such standards. The respondent construction enterprises have a good deal of stay in the market with 85.7% of them being in operation for over 10 years. In terms of the permanent employees they employ, 42.9% of the enterprises have over 250 employees with 83.4% of them actively in operation for over 15 years signifying the relative growth in size of such enterprises over the years. Although general contractors are registered to be engaged in the construction of both buildings as well as infrastructure, a small proportion of the enterprises (less than 25%) work only in either of them. A similar situation is observed in relation to public and private sector engagement.

4.2 Integrated Risk Management Framework

It has been proclaimed by many authors in the literature that construction is a complex and dynamic industry facing risks and uncertainties at higher levels than other industries (Flanagan and Norman 1993, Ehsan et al. 2010). And yet, the industry is categorized as poor in managing such risks. In consistence with these findings, a vast majority of the respondent contractors, over 70%, have acknowledged that construction industry is complex, involving complex relationships, sensitive to the country's economic conditions and government policies and budgets. Moreover, 71.4% of respondents consider the construction industry as more risky than any other industry and 85.7% of respondents perceive that risks are not well managed in the construction industry. Similarly, over 79% of the general contractors covered in the survey acknowledge that current trends in the construction industry are characterized by thinning profit margins, increasing number of litigations/disputes, changing procurement methods, with

technology fast changing traditional construction methods, and increasing international competition. 92.9% of respondents also agree that most projects are not completed according to plan i.e. in terms of either time, cost, quality or a combination of them. Results of the survey thus vividly show that successfully and sustainably operating in the construction industry has grown to be very challenging with the risks facing the industry fast increasing tremendously that contractors must actively work to effectively manage the risks in the industry in order to be able to successfully cruise through the current tide. This demands the introduction and implementation of a formal risk management system which enables the proactive identification and assessment of risks and planning of effective ways of treating such risks as an integrated part of the strategic planning, performance and measurement activities of construction enterprises.

A principal component of the risk management framework is the mandate and commitment of the board and top management, both during the introduction of risk management system and in a long-term to ensure its ongoing effectiveness. The board and top management, among other things, are expected to provide a common and clear definition of what risk means to the enterprise. In this respect, a vast majority of the respondents (85.7%) accept risk as relating to a negative consequence. 78.6% of the respondents do not accept risk as relating to positive consequences as well. Though 50% of the respondents see risk as an opportunity, only 42.9% of them see risk as relating to positive consequences. Whereas these findings conform to the lack of universally accepted common definition of risk, organizations need to have respective common definition of risk to facilitate understanding and communication about risk among stakeholders and to enable aggregation of risks at all hierarchical levels of the organization. However, of all the respondent general contractors, only 42.9% have a common definition of risk across their enterprises out of which 50% happened to be those which have implemented a formal risk management system.

Considering the implementation of risk management, investigation into respondents' response has revealed that only 28.6% of the general contractors have a written risk management policy approved by the board and senior management and only these contractors develop a risk management plan tailored to their respective corporate objectives and organizational context. Only in these enterprises do the board and top management actively take part in risk management, continuously invest resources for improving the risk management process, tools and techniques and in enhancing personnel skills towards risk management, and have a dedicated senior executive, or a department, or a board level committee entrusted to take charge of risk oversight and centralizing risk management. At the same time these enterprises recognize the importance of involving stakeholders and taking their interests and concerns in the risk management system.

Contractors' response to a question if they practice formal risk management practice in their enterprises

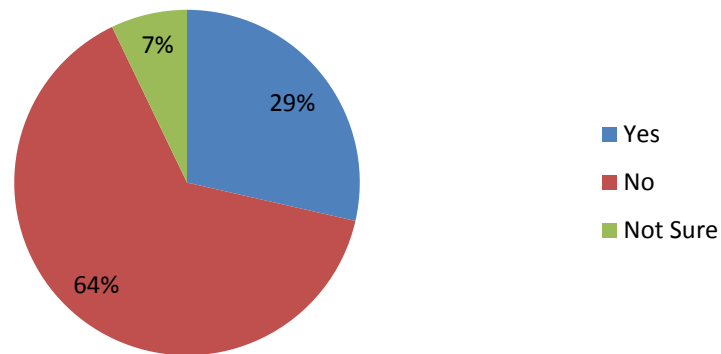


Figure 5: Contractors practicing formal risk management (survey result)

The definition of risk management as the range of activities that an organization intentionally takes to understand and influence the effect of uncertainty on the ability of an organization to achieve its objectives presupposes the existence of a formal strategic planning process and such objectives providing a context for risk management. In this regard, among the general contractors covered in the survey, only 50% of them have clearly defined mission and vision statements and strategic objectives, out of which 71.4% have their strategies and objectives defined at corporate, strategic business unit, and process levels, and 85.7% at functional, and project levels. These results are indicative that, overall, strategic planning as well as integrated risk management practice are not well implemented in the construction enterprises in Ethiopia.

As regards the extent to which risk management framework is embedded within the enterprises' overall strategic and operational policies and practices, results of the survey show that only in 50% of the general contractors is risk management fully integrated into other plans such as strategic, operational and tactical out of which 85.7% of them consistently consider risk information, risk tolerance and appetite, and risk treatment strategies in all decision making activities and in strategic decision making. At the same time, risk management is fully integrated into the daily management and business process in only 35.7% of such construction enterprises. However, in only 21.4% of the general contractors are practices for managing risks consistently applied across the enterprises and in only 21.4% of the construction enterprises is risk management a dynamic, iterative and on-going process implying the application of risk management in most enterprise on an ad-hoc basis.

As far as risk communication to stakeholders is concerned, the survey shows that in only 28.6% of the construction enterprises are the staff assigned the responsibility for managing risks with such responsibility included in their job descriptions. Risk communication between the functional departments and projects of construction enterprises also is not impressive as this happens in only 50% of the enterprises. An important element in the successful implementation of risk management is the involvement of external stakeholders as well. The industry appears to be reluctant in this respect as well as evidenced by the result of the survey which reveals that only 50% of contractors do communicate and involve stakeholders in their risk management programs.

4.3 Risk Management Process

Responses of survey respondents regarding the elements of the risk management process including risk identification, risk analysis and evaluation, risk treatment and monitoring and evaluation are discussed under this section.

4.3.1 Risk Identification

An organization should identify risk sources, areas of impact and their causes and potential consequences in an effort to generate a comprehensive list of risks that might influence the achievement of its objectives. Looking into the practice of the general contractors under survey, only 42.9% of them undertake such comprehensive identification of risks. 85.7% of the contractors who identified risk as relating to opportunities have responded as considering opportunities as well in the risk identification process.

From among the various methods available for risk identification 10 were selected based on the literature review and the prior discussions with practitioners. Respondents were then asked to indicate how frequently they use each method on a Likert scale of 1 – 5, in which 1 represented never used and 5 represented always used. The overall rankings of the risk identification methods based on their mean values are presented in Table2 on page 69.

The result of the ranking of the risk identification methods reveals that site visit, examination of contracts, brainstorming, interview of project personnel, and analysis of historical data in that order are the most frequently used five methods. These are methods which are mainly used in the identification of risks in construction projects in the construction industry. SWOT analysis, PESTLE analysis, examination of legislation and flowcharts which are usually used in the identification of risks at organization level are the least used by the general contractors. This appears to be a true reflection of the bias of the construction industry towards project management and project risk management as against the overall business management and risk management at the enterprise level.

Table 2: Ranking of use of risk identification methods (Survey result)

	N	Minimum	Maximum	Sum	Mean	Rank
Site visit is your enterprise risk identification techniques	14	2	5	52	3.71	1
Examination of contracts is your enterprise risk identification techniques	14	1	5	43	3.07	2
Brainstorming is your enterprise risk identification techniques	14	1	5	38	2.71	3
Interview project personnel is your enterprise risk identification techniques	14	1	5	33	2.36	4
Analysis of historical data is your enterprise risk identification techniques	14	1	3	31	2.21	5
Strength, Weakness, Opportunity, Threat (SWOT) analysis is your enterprise risk identification techniques	14	1	4	30	2.14	6
Examination at legislation is your enterprise risk identification techniques	14	1	3	26	1.86	7
Workshop with relevant stakeholders of a project is your enterprise risk identification techniques	14	1	4	26	1.86	8
Political, economic, social, technological, legal, and environmental (PESTLE) Analysis is your enterprise risk identification techniques	14	1	3	24	1.71	9
Flowcharts is your enterprise risk identification techniques	14	1	3	20	1.43	10

Respondents were further asked if they maintain risk registers at the various hierarchical levels of their enterprises. In response, only 57.1% of them stated that they maintain such registers at project level and at enterprise level. Most contractors don't maintain risk registers at process level (78.6%), at strategic business unit (71.4%) as well as at department levels (71.4%). With risks identified at each level of the enterprise successively integrated/rolled up to construct a comprehensive corporate risk profile in only 21.4% of the general contractors, it is highly likely that risk registers maintained at enterprise level are far from comprehensive and truly organizational. In the absence of regular updating of such risk registers at all levels of the enterprises, only 14.3% of the contractors do so, the usefulness of such registers for effective decision making is highly doubtful.

4.3.2 Risk Analysis and Evaluation

Once risks are identified, they have to be formally assessed with respect of the likelihood of their occurrence and the magnitude of their impact and accordingly prioritized. This is done in only 42.9% of the respondent construction enterprises. Risks can be assessed either quantitatively or qualitatively. Respondents were asked to identify the techniques they commonly use in a Likert scale of 1 – 5 ranging once again ranging from never used to always used respectively from a list of risk assessment techniques selected from the literature review. Responses show that quantitative methods are occasionally used by the general contractors with a mean of 2.36 at the highest for expected monetary value and subsequently ranked are scenario based analysis, probability analysis, sensitivity analysis, breakeven analysis, and decision trees in that order. Ranking results for the qualitative methods of risk assessment were almost similar to the quantitative ones indicating occasional use of risk urgency assessment and a checklist ranked first and second with a mean average of 2.43 and 2.14.

While in the topic of risk analysis and evaluation, respondents were asked to rank a selected list of risks in order of their importance from the point of view of the achievement of their enterprises' objectives on a Likert scale of 1 – 5, in which 1 represented Least Important and 5 represented Most Important. The overall ranking based on their means is as provided in Table 3 on page 71. Accordingly, the highest ranked 10 risks for the contractors were payment delay by customers, construction delays, unavailability of funds/financial failure, poor and incomplete design/scope, site conditions and unknown geological conditions, shortage in resources availability/materials, corruption, country economic condition, government rules and regulations, and inadequate managerial skills. A closer look into these 10 highly ranked risks reveals that the majority of them and the highest ranked ones are associated with project risks, once again reflecting contractors prejudice towards project level risk as opposed to enterprise level risks. This is evidenced by the ranking of the risks which could have significant influence on the success

of the construction enterprises and the range of projects which they undertake at the bottom of the 10 highly ranked risks.

Table 3: Ranking of importance of risk factors (Survey result)

	N	Minimum	Maximum	Sum	Mean	Rank
Payment delays by customer	14	2	5	59	4.21	1
Construction delays	14	3	5	57	4.07	2
Unavailability of funds, financial failure	14	2	5	57	4.07	3
Poor and incomplete design/scope	14	1	5	56	4.00	4
Site conditions and unknown geological conditions	14	2	5	56	4.00	5
Shortage in resources availability/materials	14	2	5	55	3.93	6
Corruption	14	1	5	54	3.86	7
Country economic condition	14	1	5	53	3.79	8
Government rules and regulations	14	1	5	52	3.71	9
Inadequate managerial skills	14	2	5	51	3.64	10
Market competition	14	2	5	51	3.64	11
Access problems to project area	14	2	5	50	3.57	12
Inflation and exchange rate fluctuations	14	1	5	48	3.43	13
Customer requirement changes and variations	14	1	5	47	3.36	14
Acts of God – natural disaster, weather and climatic conditions etc.	14	1	5	46	3.29	15

4.3.3 Risk Treatment

The selection of an appropriate risk treatment strategy is influenced by a number of considerations. Five such factors including the significance of risk, risk appetite and tolerance, availability of resources, cost/benefit comparisons, and enterprise objectives were selected from the literature review and respondents were asked to identify which factors they consider most in their selection of risk treatment strategies. Ranking of the responses have shown that enterprise objectives (mean=3.29), cost/benefit comparisons (mean=3.21), resource availability (mean=3.00), the significance of risk (mean=3.00), and risk appetite and tolerance (mean=2.79) in that order are the factors which contractors consider in their selection of risk treatment strategies.

Risk avoidance, risk mitigation/reduction, risk transfer/sharing, and risk retention are identified as the commonly used risk treatment strategies. From among the several strategies for treating risks and uncertainties which could be categorized under these options, 15 of them were selected from the literature and respondents asked to select the strategies which they most frequently use on a Likert scale of 1 – 5, in which 1 represented ‘never used’ and 5 represented ‘always used’. The result of the survey is summarized in Table 4 on page 73.

Examination into the table reveals that risk transfer strategies through insurance and various guarantee bonds are the most frequently used risk treatment methods with a mean value of 3.50 and 3.21 respectively. Further investigation into the results also suggests that avoidance is not the preferred strategy for risk treatment by contractors, with contractors not very much keen to discontinue/abandon or avoid/exclude an activity or a project. This is very likely given the unpredictability of securing business due to a number of unique features of the construction industry such as competition, bid-based procurement method, and sensitivity to economic conditions and government policies. A particular point worth mentioning is that joint ventures which could be used to pool capacity and resources by contractors to exploit an opportunity, such as undertaking huge projects involving new technology or expertise, as well as share risks are the least preferred strategies for treating risks, sitting at the bottom of the ranking.

Table 4: Ranking of preferred risk treatment strategies (survey result)

	N	Minimum	Maximum	Sum	Mean	Rank
Insurance	14	1	5	49	3.50	1
Guarantee bonds	14	1	5	45	3.21	2
Enhance controls	14	1	5	43	3.07	3
Claims	14	1	5	40	2.86	4
Use of subcontractors	14	1	5	40	2.86	5
Provide training and education	14	1	5	37	2.64	6
Contingency allowances as a percentage of project cost	14	1	4	36	2.57	7
Undertake business process improvement	14	1	5	36	2.57	8
Not bidding for a project in new geographic area or requiring new technology/expertise/materials	14	1	5	36	2.57	9
Vertical integration to control input or demand	14	1	5	35	2.50	10
Fixed price contracts	14	1	5	29	2.07	11
Contract exclusions and waivers	14	1	3	24	1.71	12
Avoiding/excluding activity	14	1	3	23	1.64	13
Discontinuing/abandoning activity/project	14	1	3	18	1.29	14
Joint ventures	14	1	2	17	1.21	15

4.3.4 Monitoring and Review

Though it is emphasized in the literature that the risk management process and risk management activities need to be regularly monitored to establish their efficiency and effectiveness given the dynamic nature of risks, only 57.1% of the general contractors covered in the survey undertake such monitoring and review.

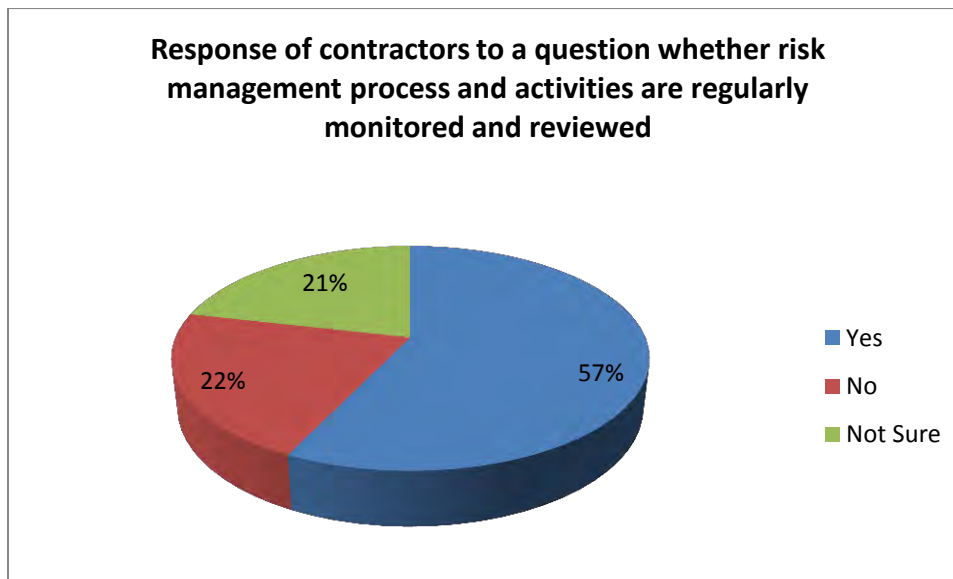


Figure 6: Monitoring and review of risk management process by contractors (survey result)

Respondents were also asked to identify the frequency of usage of four monitoring and review techniques selected from the literature on a scale of 1 – 5, in which 1 represents ‘never used’ and 5 represented ‘always used’. Periodic evaluations and issue logs were respectively ranked higher with mean values of 2.07 each in terms of frequency of usage. Periodic risk audits and periodic risk status reports and trends take the bottom of the ranking at mean values of 1.86 and 1.79.

4.4 Benefits of risk management implementation

In an effort to assess the business case for risk management in the perception of the general contractors, respondents were asked to state if implementation of risk management can result in a selection of values/benefits in their enterprises on a Likert scale of 1 – 5, in which 1 represented ‘strongly disagree’ and 5 represented ‘strongly agree’. The respondents expressed their agreement in more than average rates that risk management implementation can impact their enterprises in a multitude of facets. Results of the survey in this respect are presented in Table 5 on page 75.

Table 5: Ranking of Values/benefits of risk management implementation (survey result)

	N	Minimum	Maximum	Sum	Mean	Rank
Increase safety and reliability	14	1	5	60	4.29	1
Minimize cost	14	1	5	57	4.07	2
Reduce disagreement / legal disputes	14	1	5	57	4.07	3
Protect and enhance reputation	14	1	5	57	4.07	4
Enhance timely project completion	14	1	5	57	4.07	5
Increase client satisfaction	14	1	5	56	4.00	6
Increase profitability	14	1	5	56	4.00	7
Increase quality of projects	14	1	5	55	3.93	8
Uncover untapped opportunities	14	1	5	54	3.86	9
Improve decision making	14	1	5	54	3.86	10
Enhances organizational learning	14	1	5	53	3.79	11
Ensure regulatory compliance	14	1	5	53	3.79	12
Increase certainty in meeting strategic and operational objectives	14	1	5	53	3.79	13
Provide competitive advantage	14	1	5	51	3.64	14
Improve stakeholder relationships	14	1	5	50	3.57	15

4.5 Drivers and Barriers to risk management

Risk management drivers can be internal and external. Respondents were asked to identify the most important drivers of risk management in the construction industry from a list of eight such drivers on a

Likert scale of 1 – 5, in which 1 represents ‘least important’ and 5 represented ‘most important’. The result of contractors’ responses is given in Table 6 below.

The result reveals that while all the listed drivers are important, investors/owners were ranked first followed by board of directors and customers as most important in that order with mean values of 4.00, 3.86, and 3.71 respectively. The overall result also gives recognition to the important influence various stakeholders can have on the construction enterprises in terms of shaping their structures and processes in addition to influencing the achievement of their objectives. Stakeholders were identified as major sources of risk and uncertainty to the construction industry (Ward and Chapman 2008).

Table 6: Ranking of Risk management drivers (survey result)

	N	Minimum	Maximum	Sum	Mean	Rank
Investors/owners	14	3	5	56	4.00	1
Board of directors	14	1	5	54	3.86	2
Customers	14	2	5	52	3.71	3
Compliance to regulatory requirements	14	2	5	51	3.64	4
Banks/ creditors	14	3	4	49	3.50	5
Pressure from external auditors	14	2	5	44	3.14	6
Complexity of risks	14	1	5	44	3.14	7
Corporate governance	14	1	4	43	3.07	8

Regarding the various barriers to the implementation of risk management in the construction industry as well, respondents were asked to identify such possible barriers in terms of their importance on a Likert scale of 1 – 5, in which 1 represented ‘Least Important’ and 5 represented ‘Most Important’.

The result of the survey as presented in Table 7 on page 77 reveals lack of board and top management leadership in risk management as the most important barrier in the construction industry with mean value of 4.21. Lack of internal knowledge, skill and expertise in the organization to implement risk

management and lack of understanding and appreciation of values/benefits of risk management were ranked 2nd and 3rd at mean values of 4.14 and 3.86 respectively. Lack of time and resources and the perception that risk management increases bureaucracy were among the possible barriers ranked at the bottom in terms of their importance.

Table 7: Ranking of barriers to risk management implementation (survey result)

	N	Minimum	Maximum	Sum	Mean	Rank
Lack of board or senior executive risk management leadership	14	3	5	59	4.21	1
Lack of internal knowledge, skill, expertise in the organization to implement risk management	14	3	5	58	4.14	2
Lack of understanding and appreciation of values/benefits of risk management	14	2	5	54	3.86	3
Competing priorities	14	3	5	50	3.57	4
Lack of time and adequate resources	14	1	5	45	3.21	5
Resistance from the staff	14	2	5	45	3.21	6
Risk management is about predicting the future and it is difficult	14	1	5	44	3.14	7
Risk management adds bureaucracy	14	1	5	33	2.36	8

Finally respondents were asked to rate possible factors that can help promote implementation of risk management in the construction industry in terms of their importance on a Likert scale of 1 – 5, in which 1 represented ‘Least Important’ and 5 represented ‘Most Important’. The results show that providing training and seminars on risk management (Mean=4.64), introduction of risk management standard by government or other agencies (mean=4.43), introducing risk management courses and programs in colleges (mean=4.36), designing a dedicated risk management unit (mean=4.21), and enforcing a statutory requirement (mean=3.93) were ranked from 1st to 5th in that order. The ranking of ‘enforcing a

statutory requirement' at the bottom in terms of its importance appears to support one of the ISO 31000:2009 principles for risk management implementation stipulating that risk management is implemented to create and protect value

4.6 Awareness and Perception to Risk and Risk Management

In investigating awareness and perception of contractors to risk management, a number of survey questions relating to risk management training, the definition contractors attach to risk, risk identification and treatment as well as the values and benefits of risk management implementation were considered.

Accordingly, although 71.4% of the respondents said they have formal risk management training, their understanding to risk, however, differs substantially.

While more than 75% of the respondents perceive risk as a threat and with negative consequences, only 50% see risk as relating to opportunity and a mere 21.4% regard risk as resulting in positive consequences. This perception of contractors not recognizing risk as an opportunity and resulting in positive consequences seems to have limited their efforts to identify for opportunities in their risk identification efforts considering that only 57.1% of the respondents do look for opportunities as well in their risk identification activities. On the other hand, a vast majority of them recognize their industry as risky and only 14.3% of respondents consider that the construction industry well manages its risks. While differences remain, most contractors appear to match in their perceptions as to the most important risks to their enterprises agreeing on at least five risk sources as very important with mean values of 4.00 and above (Table 3). Respondents have shown wide variations in their risk treatment preferences with mean values between 1.21 to 3.50, insurance and guarantee bonds, the 1st and 2nd ranked risk treatment strategies (Table 4), being the frequently used strategies by 65% of the respondents.

Respondents have also exhibited more or less similar perceptions as to the possible benefits of the risk management implementation in their enterprises with mean values of 3.57 to 4.29 (Table 5). Referring to the respective tables in the respective sections above, similar observations can be made with regard to contractors' perception as to what drives risk management in the construction industry and the most important barriers to risk management implementation in the industry. Particularly close responses could also be observed in their response as to what needs to be done and by whom in order to promote risk management implementation in in the construction industry with mean values of 3.93 to 4.64.

CHAPTER FIVE

5 Conclusion and Recommendation

5.1 Introduction

The research set out with the object of assessing the practice of integrated risk management by construction enterprises, particularly general contractors, in Ethiopia with the specific objectives of:

1. Investigating the level of awareness and perception to risk management/integrated risk management,
2. Identifying the risk management process, tools and mechanisms employed in the management of risk,
3. Identifying the major drivers and impediments for integrated risk management implementation,
4. Providing recommendations to enhance integrated risk management implementation and practice based on the findings of the research.

In an effort to achieve these objectives a modest examination into the literature has been made. The complex and risky nature of construction was established and the value and significance of integrated risk management implementation for construction organizations in the effort to achieve their objectives.

An empirical survey was conducted by the researcher in an effort to examine the experience of the construction industry of Ethiopia with respect to the management of risk and the implementation of integrated risk management. Primary data collected through questionnaire survey was analyzed to understand the state of risk management practice in construction enterprises in Ethiopia results of which were presented in the previous chapter. This section will present the conclusions and recommendation of the study.

5.2 Conclusions

Results of the survey have vividly shown that the Ethiopian construction industry faces many challenges and uncertainties which are similarly shared by the construction industry at global level. The trends are that as the business environment grows more complex and dynamic, the risks and uncertainties which construction organizations face also get complex and significant. On the other hand, however, the findings indicate that risk management is not implemented and practiced in the construction industry in

Ethiopia. An incidental and twin finding of the research is that strategic planning as well is not well practiced in the construction industry.

Risk management can be effective only with the commitment and leadership by the board and senior management of construction enterprises. The results of the survey have revealed that this is deficient in the industry identifying the lack of board or senior executive risk management leadership as the number one barrier to risk management implementation in the construction industry. At the same time, owners and the board of construction enterprises have been identified as the most important drivers for risk management implementation in construction enterprises.

A risk management framework is an indispensable requirement for effective risk management implementation. While a number of such frameworks are available, some of them examined in this research, the ISO 31000:2009 Risk Management Framework has gained international acceptance by a number of countries. Findings of the survey, however, are that there is no established risk management framework in the construction industry of Ethiopia.

Risk and risk management awareness and risk management expertise have also been emphasized by contractors in their response to the survey questions. Not only the top management and decision makers but all staff of construction enterprises must take risk management as their core responsibility for the success of risk management practice. This requires the development of the awareness of all staff on the risks and the objectives of risk management in the enterprise. Respondents have also emphasized the importance of such elements by identifying training and development of expertise as important promoters of risk management implementation.

The role of the various stakeholders of the construction industry in influencing the success or otherwise of construction enterprises have been emphasized in the literature and was recognized by respondents of the survey as well. However, stakeholders of the construction industry in Ethiopia do not seem to utilize their power to shape the business organization of construction enterprises. Apart from the government with all its powers as source of all legislation and the major source of the business of construction enterprises, other close stakeholders such as customers, banks, and insurance companies can play significant roles in their respective own ways in influencing the behavior of construction enterprises in the country towards risk and risk management.

5.3 Recommendations

Based on the findings of the research, the following recommendations are forwarded. The implementation of the recommendations is believed to take the construction industry a step forward in respect of risk management implementation.

- Construction enterprises in Ethiopia need to introduce and sustainably implement integrated risk management, as distinct from project risk management which in fact forms a necessary component of integrated risk management, in their organizations in order to be able to emerge as productive and competitive enterprises and achieve their organizational objectives successfully.
- Thus, owners of construction enterprises, their board and the top management of the construction enterprises have to be able to discharge their leadership role in implementing integrated risk management in their enterprises for the success and growth of the construction industry.
- It's recommended that Ethiopian construction enterprises adopt the ISO 31000:2009 risk management framework in the management of their risks. The framework provides comprehensive tools and techniques required at each stage of the risk management process and a common vocabulary. In fact, one very important aspect of this framework is its versatility in terms of its applicability to all industries, all organizations and at all levels of the organization to the level of a process and activity. Thus, it is the author's recommendation that policy makers also recognize and adopt the ISO 31000:2009 framework as a national framework applicable to all sectors.
- It is recommended that universities and colleges need to introduce risk management at least at a course level in their undergraduate programs in order to be able to reach a large number of construction professionals.
- Construction enterprise need to invest adequate resources to build risk management capability and necessary risk management structures in their enterprises including the designation of a dedicated high level unit, enhancing risk awareness across their enterprises through continuous training to their staff and core personnel, and utilizing outsourced skills to help them successfully implement risk management in their enterprises.

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- Stakeholders of the construction industry, particularly the primary ones including customers, banks and insurance companies, must play their important role in influencing the introduction and implementation of risk management practice by construction enterprises. In this regard,
 - Customers, of which the Government is the major one, should introduce risk management practice and risk management plan as major criteria for selecting and awarding projects to contractors. This is also due upon the Government as a rule making body to protect public interest as well as ensure healthy growth and competitiveness of the industry.
 - Banks and insurance companies should be able to influence risk management implementation and practice by the construction enterprises through prudent underwriting of contractors with respect to risk management in providing financing and insurance coverage and guarantee bonds.
 - Professional and trade associations need to be actively engaged in raising the awareness of their members on the values of risk management by undertaking related trainings and developing standards which encourage risk management implementation.

5.4 Limitation of the Research and Future Research Work

The study was conducted with a focus of solely on construction enterprises. Thus, it shows only a snapshot of the risks and risk management practice of the construction industry of Ethiopia. The definition of the construction industry, however, is broad to include a number of stakeholders that one way or another influence the risks to which contractors are exposed and eventually the achievement of their overall business objectives. At the same time, these stakeholders are affected by the risks and risk management practices in the industry.

A comprehensive understanding of risk management practice in the construction industry, therefore, requires a detailed study of the perspectives of at least the very close stakeholders of the industry i.e. the employers, architects, and the regulatory body with respect to risk and risk management. An in-depth study of the risks and perceptions of such stakeholders is also needed in order to develop a tailored risk management framework for Ethiopia. The recommendation by the author for the adoption of the ISO 31000:2009 risk management framework was based only on experiences of some other countries which have adopted the framework as it is, e.g. India and Australia.

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**Addis Ababa University
College of Economics and Management
Management Department
Executive MBA Program**

Questionnaire on Risk Management Practice of General Contractors

Company Sent to: _____

Dear CEO,

The aim of this questionnaire is to study current practices of integrated risk management in the construction industry, particularly by general contractors. It is an important element in my post graduate research. Risk management activities of an organization need to be led by the top management. Thus, it is very important that the questionnaire be completed by Your Excellency, the Chief Executive Officer, or if not possible, by a most senior executive officer. Each statement/question has a number of choices provided in the respective columns. Possible answers to the questions are provided in the columns in bold. You are expected to answer by ticking at the appropriate box corresponding your answer from those provided against each statement/question.

This survey is purely for research purposes, and the information you provide will be treated strictly confidential and no reference will be made to enterprises or persons. However, the outcome of the research can be made available to you if you so desire.

I thank you in advance for taking the time to complete the questionnaire. I would also be extremely grateful if the completed questionnaire could be returned to me by May 18, 2016.

Yours sincerely,

I GENERAL INFORMATION ABOUT THE RESPONDENT						
1	Gender	Male <input type="checkbox"/>	Female <input type="checkbox"/>			
2	Age	25 - 35 Yrs <input type="checkbox"/>	36 – 40 yrs <input type="checkbox"/>	41 – 50 yrs <input type="checkbox"/>	51 - 55 yrs <input type="checkbox"/>	Over 55 yrs <input type="checkbox"/>
3	Position in the Enterprise					
4	Educational background (1= High school complete; 2= Bachelor's Degree; 3= Post-graduate Degree; 4= PHD Doctoral Degree; 5= Other, Please specify)	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
5	Experience in the construction industry	Less than three years <input type="checkbox"/>	3-5 years <input type="checkbox"/>	5-10 years <input type="checkbox"/>	10-15 years <input type="checkbox"/>	Over 15 years <input type="checkbox"/>
6	Years you spent in your present enterprise	Less than three years <input type="checkbox"/>	3-5 years <input type="checkbox"/>	5-10 years <input type="checkbox"/>	10-15 years <input type="checkbox"/>	Over 15 years <input type="checkbox"/>
7	Do you have formal risk management training	Yes <input type="checkbox"/>	No <input type="checkbox"/>			
II GENERAL INFORMATION ABOUT THE ENTERPRISE						
8	Grade	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	
9	Legal form of organization (1= Sole proprietorship; 2= Partnership; 3= Private Limited Company; 4= Share Company; 5= Other, Please specify)	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
10	Net worth/capital as per last year's balance sheet					
11	Which of the following represents the Organization structure of your company? (1= Functional; 2= Matrix; 3= By Strategic Business Unit, E.g. Buildings, Infrastructure, etc.; 4= Project-based; 5= Other, Please specify)	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
12	Any accreditation to any certification standard such as ISO	Yes <input type="checkbox"/>	No <input type="checkbox"/>			

	○ Type of accreditation earned: _____					
	○ Accrediting Institute: _____					
13	Years in operation	Less than five years <input type="checkbox"/>	5-10 years <input type="checkbox"/>	11-15 years <input type="checkbox"/>	15-20 years <input type="checkbox"/>	Over 20 years <input type="checkbox"/>
14	Number of Employees (Permanent employees)	Less than 25 <input type="checkbox"/>	26-75 <input type="checkbox"/>	76-150 <input type="checkbox"/>	151-250 <input type="checkbox"/>	Over 250 <input type="checkbox"/>
15	Sector of project involvement	Yes	No			
	○ Public sector projects	<input type="checkbox"/>	<input type="checkbox"/>			
	○ Private sector projects	<input type="checkbox"/>	<input type="checkbox"/>			
16	Type of construction projects	Yes	No			
	○ Residential	<input type="checkbox"/>	<input type="checkbox"/>			
	○ Industrial and Commercial Construction	<input type="checkbox"/>	<input type="checkbox"/>			
	○ Infrastructures (Road, Bridge, Airport, etc)	<input type="checkbox"/>	<input type="checkbox"/>			
	○ Others	<input type="checkbox"/>	<input type="checkbox"/>			
17	Project Duration (Longest Duration Project Undertaken)	Less than six months <input type="checkbox"/>	Six months to one year <input type="checkbox"/>	1 – 2 years <input type="checkbox"/>	2 - 3 years <input type="checkbox"/>	Over three years <input type="checkbox"/>
III	INTEGRATED RISK MANAGEMENT FRAMEWORK					
		Yes	No	Not Sure		
18	Mission and vision statements and strategic objectives of your enterprise are clearly defined and they are well communicated and understood at all levels	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
19	Objectives, strategies, and scope of the activities of each of the levels of the enterprise are well defined	Yes	No	Not Sure		
	○ Corporate level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	○ Strategic business Unit level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	○ Functional level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	○ Project level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	○ Process level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
20	Deviations from plans or expectations are assessed against the	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

objectives at all levels						
21	Each of the following statements characterize the nature of the construction industry	Agree	Disagree	Not Sure		
	o Construction is a complex process	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	o Construction involves complex relationships	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	o The construction industry is highly competitive	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	o Construction is highly sensitive to economic growth	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	o Construction is highly sensitive to government activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	o Construction is more risky than any other sectors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	o Risks are well managed in the construction industry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
22	The following describe the current trends in the construction industry	Agree	Disagree	Not Sure		
	o Profit margins are thinning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	o Litigation/disputes are increasing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	o construction procurement methods are changing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	o Technology is changing traditional construction methods	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	o International construction companies highly involved in the market	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	o Most projects not completed according to plan (time, cost, quality)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
23	A common definition of risk is used across the enterprise	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
24	For your enterprise, risk relates to:	Yes	No	Not Sure		
	o Negative consequences	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	o Positive consequences	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	o A threat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	o An opportunity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
25	A written risk management policy stating the overall intentions and direction of the enterprise related to risk management is approved by the board and senior management and is made known to all the staff	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
26	A risk management plan is developed and tailored to the corporate objectives and context (procedures, practices, assignment of responsibilities, sequence and timing of activities)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
27	The board and senior management actively take part in risk management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

28	Resources are continuously invested in improving the risk management process, tools, techniques, personnel skills, etc.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
29	Risk appetite (the amount of risk the enterprise is willing to accept) is formally and clearly defined according to the corporate strategy and is made known to all the staff in the enterprise	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
30	Risk management system involves important stakeholders and takes into account their interests and concerns	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
31	A dedicated senior executive, or a stand-alone department, or a board-level committee takes charge of risk oversight and centralizes risk management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
32	All staff in the enterprise have a responsibility in managing risks and such responsibility is included in their job descriptions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
33	Risks including suspected improprieties are escalated to the appropriate level in the enterprise	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
34	Management across the enterprise consistently considers risk information, risk tolerance and appetite, and risk treatment strategies in all decision-making activities, especially in strategic decision-making	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
35	Risk management is fully integrated into all daily management and business processes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
36	Risk management plan is linked or integrated into other plans (Strategic plan, operational plans, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
37	Practices for managing risks are consistently applied throughout the enterprise	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
38	Strategic combination of risk management techniques are used to manage the aggregate of risks faced by the enterprise	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
39	Risk information is consistently communicated and shared across projects and departments within the enterprise	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
40	Risk management in the enterprise is a dynamic, iterative and ongoing process	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
IV	RISK MANAGEMENT PROCESS					

A	RISK IDENTIFICATION	Yes	No	Not Sure		
41	Your enterprise comprehensively identifies sources of risk, areas of impacts, and their causes and potential impacts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
42	Opportunities as well are considered in the risk identification process	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
43	The enterprise uses the following risk identification techniques	Never	Occasionally	Frequently	Very frequently	Always
	1. Brainstorming	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2. Interview project personnel	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	3. Analysis of historical data	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	4. Workshop with relevant stakeholders of a project	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	5. Site visit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	6. Examination at legislation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	7. Examination of contracts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	8. Strength, Weakness, Opportunity, Threat (SWOT) analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	9. Political, economic, social, technological, legal, and environmental (PESTLE) Analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	10. Flowcharts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
44	Risk register identifying risk sources and consequences are maintained at	Yes	No	Not Sure		
	o Process level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	o Project level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	o Department level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	o Strategic business unit level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	o Enterprise level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
45	Risks identified at each level of the enterprise are successively integrated/rolled up to construct a comprehensive corporate risk profile	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
46	Risk registers at all levels of the enterprise are regularly updated	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
B	RISK ANALYSIS AND EVALUATION	Yes	No	Not Sure		
47	Risks are formally assessed with respect to their likelihood of occurrence and impact magnitude	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

48	Interdependencies between risks of the enterprise (as one risk triggering another or risks occurring concurrently) are analyzed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
49	Risks are ranked and prioritized based on their likelihood and impact for management action	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
50	The enterprise uses the following quantitative risk assessment techniques	Never	Occasionally	Frequently	Very frequently	Always
	1. Expected monetary value	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2. Decision tree	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	3. Breakeven analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	4. Scenario based analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	5. Probability analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	6. Sensitivity analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
51	The enterprise uses the following quantitative risk assessment techniques	Never	Occasionally	Frequently	Very frequently	Always
	1. Risk Probability and Impact Assessment (as very high, high, moderate, low, very low etc.), both dimensions of risk applied to specific risks and risks ranked and prioritized according to each dimension separately	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2. Probability – Impact Risk Rating Matrix constructed based on combining probability and impact and risks ranked as low, moderate, high extreme etc. based on combined result	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	3. Risk Urgency Assessment (risks ranked and prioritized according to how urgent response is needed)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	4. Checklist	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
52	Please rank the following types of risks in order of importance from the point of view of achievement of your enterprise's objectives	Least important	Slightly important	Important	Very important	Most important
	1. Customer requirement changes and variations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2. Inflation and exchange rate fluctuations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	3. Site conditions and unknown geological conditions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	4. Unavailability of funds, financial failure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	5. Inadequate managerial skills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	6. Shortage in resources availability/materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	7. Acts of God – natural disaster, weather and climatic conditions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	etc.					
	8. Construction delays	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	9. Country economic condition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	10. Market competition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	11. Corruption	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	12. Government rules and regulations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	13. Payment delays by customer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	14. Access problems to project area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	15. Poor and incomplete design/scope	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C	RISK TREATMENT					
53	The enterprise considers the following in identifying and selecting an appropriate risk treatment (response)strategy	Never	Occasionally	Frequently	Very frequently	Always
	○ the risk significance,	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	○ risk appetite and tolerance,	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	○ resource availability,	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	○ cost versus benefit comparisons,	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	○ the enterprise objectives	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
54	The enterprise uses the following risk treatment alternative tools and mechanisms	Never	Occasionally	Frequently	Very frequently	Always
	▪ Discontinuing/abandoning activity/project	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	▪ Avoiding/excluding activity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	▪ Not bidding for a project in new geographic area or requiring new technology/expertise/materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	▪ Enhance controls	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	▪ Undertake business process improvement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	▪ Provide training and education	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	▪ Vertical integration to control input or demand	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	▪ Insurance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	▪ Guarantee bonds	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	▪ Contract exclusions and waivers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	▪ Fixed price contracts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	▪ Joint ventures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	▪ Use of subcontractors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	<ul style="list-style-type: none"> ▪ Contingency allowances as a percentage of project cost 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<ul style="list-style-type: none"> ▪ Claims 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
D	MONITORING AND REVIEW	Yes	No	Not Sure		
55	Risk management process and activities are regularly monitored to determine their efficiency and effectiveness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
56	Enterprise uses the following tools to monitor and review risk management effectiveness	Never	Occasionally	Frequently	Very frequently	Always
	<ul style="list-style-type: none"> ○ Periodic risk status reports and trends 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<ul style="list-style-type: none"> ○ Issue logs 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<ul style="list-style-type: none"> ○ Periodic evaluations 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<ul style="list-style-type: none"> ○ Periodic risk audits 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
V	BENEFITS OF RISK MANAGEMENT					
57	Risk management implementation can have the following impacts in your enterprise	Strongly disagree	Disagree	Not Sure	Agree	Strongly agree
	<ul style="list-style-type: none"> ○ Improve decision making 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<ul style="list-style-type: none"> ○ Increase profitability 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<ul style="list-style-type: none"> ○ Enhance timely project completion 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<ul style="list-style-type: none"> ○ Increase quality of projects 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<ul style="list-style-type: none"> ○ Protect and enhance reputation 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<ul style="list-style-type: none"> ○ Provide competitive advantage 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<ul style="list-style-type: none"> ○ Reduce disagreement / legal disputes 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<ul style="list-style-type: none"> ○ Minimize cost 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<ul style="list-style-type: none"> ○ Increase client satisfaction 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<ul style="list-style-type: none"> ○ Increase safety and reliability 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<ul style="list-style-type: none"> ○ Uncover untapped opportunities 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<ul style="list-style-type: none"> ○ Increase certainty in meeting strategic and operational objectives 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<ul style="list-style-type: none"> ○ Ensure regulatory compliance 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<ul style="list-style-type: none"> ○ Improve stakeholder relationships 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<ul style="list-style-type: none"> ○ Enhances organizational learning 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
VI	DRIVERS AND BARRIERS TOR RISK MANAGEMENT IMPLEMENTATION					
58	The following can be the major drivers for risk management in the	Least	Slightly	Important	Very	Most

	construction industry	important	important		important	important
	○ Board of directors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	○ Banks/ creditors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	○ Compliance to regulatory requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	○ Pressure from external auditors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	○ Investors/owners	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	○ Customers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	○ Corporate governance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	○ Complexity of risks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
59	The following can serve as barriers to implementation of risk management in the construction industry	Least important	Slightly important	Important	Very important	Most important
	○ Lack of internal knowledge, skill, expertise in the organization to implement risk management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	○ Lack of board or senior executive risk management leadership	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	○ Resistance from the staff	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	○ Lack of time and adequate resources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	○ Risk management is about predicting the future and it is difficult	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	○ Competing priorities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	○ Risk management adds bureaucracy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	○ Lack of understanding and appreciation of values/benefits of risk management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
60	The following can help promote risk management practice in the construction industry	Least important	Slightly important	Important	Very important	Most important
	○ Providing training and seminars on risk management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	○ Introducing risk management courses and programs in colleges	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	○ Introduction of risk management standard by government or other agencies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	○ Designating a dedicated risk management unit/department	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	○ Enforce a statutory requirement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>