UNIVERSITY OF LUSAKA

# School of Postgraduate Studies

## RISK MANAGEMENT PRACTICES IN THE TENDERING PROCESS OF BUILDING PROJECTS IN THE ZAMBIAN CONSTRUCTION INDUSTRY: CASE OF LOCAL CONTRACTORS IN LUSAKA

**A very interesting topic and very relevant to the students programme of study**


**BY**

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Submitted to the school of postgraduate studies in partial fulfillment of the requirements for the award of the Degree of Master of Science in Project Management

**DECLARATION**

I, **BRIAN KAOMA** declare that this dissertation is my own original work towards the **MSc Project Management** and that the works of other persons utilised in this dissertation have been duly acknowledged. This work has never been submitted for the award of a Master's Degree in any University / Institution in and outside Zambia.

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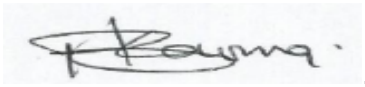
Signature……  …….

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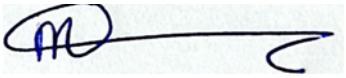
Signature: 

Date: 09/04/2024

**DEDICATION**

I dedicate this work to my wife, Inonge Mubuyaeta Kaoma and my children, Wise, Thabo, Natasha and Limpo for their understanding when I had very little time to spend with them as I was busy preparing this dissertation. I say to them, thank you for being patient with me. Greatly I thank God for his grace upon my life because all was made possible because of him.

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I would like to extend my sincere gratitude and appreciation to the people who made contributions to make this research possible. This work would not have been possible had it not been for the support and contribution of many individuals.

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**ACRONYMS**

EIZ – Engineering Institute of Zambia

NCC – National Council for Construction

QSIZ – Quantity Surveyors Institute of Zambia

RMP – Risk Management Practice

RMF – Risk Management Framework

ZPPA - Zambia Public Procurement Authority

ZIA – Zambia Institute of Architects

ZIQS – Zambia Institute of Quantity Surveyors

## ABSTRACT

This study aimed at exploring the risks associated with building projects during the tendering process. The research determined the probability and impact of the explored risks on building projects if not managed during the tendering process. Furthermore, the research aimed at proposing a risk management framework using both internal and external technical input risk factors. Ultimately the research sought to find out the maturity levels of organizations in managing risks. The Methodology of the study followed a mixed method technique in which the questionnaire survey and interviews were used as data collection instrument. The study sample size was 87 out of target population of 109; the research had 80% response rate comprising technical personnel in the companies. Descriptive statistics were used to analyse the research findings.

The research findings revealed that at tendering stage, building projects are exposed to more risks and these risks include the level of competition, Weather and Environmental Conditions, Clarity of bidding documents, Resource availability (Finance, material, labour), Project site location, Perception and experience of the estimator, Actual direct cost, Payment system, Time delivery, Fluctuations in exchange rates and project scope. The study findings revealed that these risks have a likely chance of occurring during the tendering process through the composite mean of (1.69 ~ 2) and that all the risks have the capability to impact building projects through the composite mean of (1.74 ~ 2). Lastly most contractors that participated in the study describe the maturity of the organisation risk management as aware (43.7%) denoting that they use scattered approach to risk management. Therefore it was recommended that contractors should involve professionals during tendering to price the works and government professional bodies should be proactive during the tendering process of building projects. And finally the researcher developed a Risk management framework that should be adopted in Zambia for Building projects at the tendering stage.



**Key Terms: Tendering process, Risk Management, Risk maturity, Building projects**.

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# CHAPTER ONE

# INTRODUCTION AND BACKGROUND

## 1.1 Introduction

Globally the construction industry is one of the fastest growing industries in the world. Simwambwa ( 2020), states that the construction industry is a significant industry in the economy of any underdeveloped, developing or developed country. Simwambwa (2020) further indicated that the industry contributes to the development of the country in various ways such as; the Gross Domestic Product (GDP) of a country, provides outputs for other industries and uses outputs from other industries, creates employment and can also be used as a tool for achieving sustainable development. Also Edison & Singla( 2020), acknowledges that the construction industry plays an important role in the economic growth and development of any country. However, the industry is an extremely risk seeking industry that lack a good reputation when it comes to handling of risks (Nawaz *et al.*, 2019).

Wood et al. (2002) described the industry as highly dynamic, risky and challenging in nature which leads to its rather poor reputation as compared to other industries. Nawaz *et al.* ( 2019), considered risk management in the construction industry to be a new field that does not have core risk management system especially in developing countries. Singn & Hong, (2020) confirms that risk management practices conducted by most construction organizations in Oman rely on practical experience, subjective judgment and intuition in assessing risks on projects. Also Khatleli and Tembo (2020) highlights that in Zambia most construction professionals relies on contract provisions such as insurance, bonds, and guarantees to manage risks. Hence this research strives to develop risk management framework with the ability to enhance the risk management systems and culture in developing countries like Zambia.

## 1.2 Background of the Study

In the European Union (EU), the construction industry contributes 10% of the Gross domestic product (DGP) and employs about 7% of the work force, it is also one of the leading industries with regard to boost competitiveness and promote sustainable

solutions (Braulio (2020). In Malaysia, according to the Construction Industry development board (CIDB), the construction industry attained RM170Billion and RM180 billion value of projects in the year 2017 and 2018 respectively. In the United African Emirates, the construction industry constitutes about 14% of the gross domestic product (Motaleb & Kishk, 2010). And in Ghana, the construction industry contributes about 12% on average to the overall GDP between 2010 and 2017 (Ghana Statistical Service, 2018). As recorded in the recent past, the Zambian construction industry contributed about 10.6% of the Zambian GDP and 2016 and 9.9% in 2014, indicating that there is growth in the development of infrastructure in the country (KPMG, 2017).

Therefore, Olanrewaju & Abdul-Aziz (2015) stated that it is very difficult for any country to have any form of meaningful development if the construction industry is inefficient. However, the industry is an extremely risk seeking industry that lack a good reputation when it comes to handling of risks (Nawaz *et al.*, 2019). Wood et al. (2002) described the industry as highly dynamic, risky and challenging in nature which leads to its rather poor reputation as compared to other industries. Sharma (2006) indicates that infrastructure development of any size is usually affected by risks. And when risks are not well managed, they result in claims, cost overruns, schedule delays, disputes and quality shortfalls (Alsalm & Sillars, 2013).

According to Gonzalez et al. (2020), project performance is highly hindered by delays. Assaf and Al-Hejji ( 2006) defined delay in the project as the time overrun beyond completion date specified in a contract or beyond the agreed project time delivery between parties. Delays in construction project is considered to be a universal occurrence that cuts across large and small projects and its impact is felt both by developed and developing nations (Mahamid, Bruland & Dmaidi (2012), According to Edison & Singla( 2020), any form of delays leads to excess cost of contractors overheads and loss of revenue for clients. A lot of studies globally have looked at the issue of project delay and have concluded that delays are tied to the country, region, project type, procurement methods, and perspectives of various stakeholders (Lessing et al., 2017; Hampton et al., 2012; Oyegoke and Al Kiyumi, 2017; Yang et al., 2010).

This study specifically focuses its attention on the procurement methods as a major source of project delay in the construction industry. This is justified by Smith et al. (2008) and Alsaadi & Norhayatizakuan (2021), who highlighted that risks levels increases in the beginning of the project and reaches its highest levels during the tendering process where the project uncertainty is at its peak and hence limits decision making.

Tendering is one of the most important pre-construction stages that the client should pass through for any construction project to be initiated (Kang *et al.,* 2018). According to Borasi & Nagaich (2018), tendering has been considered to be part of the traditional contractual procurement process for many years which works on the separation of the design and the construction phases. Tendering is defined by Kang *et al*. (2018) as the selection of the most suitable contractor by the client form a group of contractors invited either directly or publicly depending on the tendering method. Tendering is also defined by Hemanth & Manoj Kumar (2017) as the 'the process of preparing and submitting for acceptance conforming offer to carry out work for price by converting the estimate to bid'. According to Urquhart and Whyte (2018), the subject of tendering procedures has a limited research because the subject matter is commercially sensitive and confidential in nature.

Tendering in the construction industry around the globe has become an international procurement practice. Competitive and negotiation tendering are the two mainly used tendering processes for the selection of contractors (Kang *et al.,* 2018). However, competitive tendering is widely and internationally recognized by international organizations like European Union (EU), World Bank (WB), African Development Bank (AfBD) and the Organization for Economical Co-operation and Development (OECD) (Douh, 2015). Competitive Tendering is defined as a procurement method where contractors are invited to make the firm unequivocal offer of the price and terms which on acceptance shall be the basis of the subsequent contract (Oladapo, 2000). And Negotiated tendering is defined as a specialized form of selective tendering which encourages one name list of a tenderer (Setic, 2020).

The World Bank framework (2015), promotes tailored procurement systems that are adaptable to the countries context to ensure choice, quality and value for public spending. The African development Bank, rules and procedures of goods and works, adopts competitive bidding as a prime procurement method and considers critical factors such as procurement planning, two stage tendering, prequalification of bidders, validity of bids and bid security, standards, pricing, currency, insurance, performance security etc in order to come up with the best evaluated bid. Equally the European procurement, policies and rules (2014), advocates for competitive tendering as a principle procurement method for goods and services, also highlighting important factors such as procurement planning, notification, open tendering, prequalification of tenders, two stage tendering, evaluation criteria, tender prices, standards and specifications, currency, payments, time limits etc

According to Douh (2015), most developing countries have adopted competitive tendering as a prime method of public procurement because of its many benefits. Some of the benefits include competition promotion and corruption reduction (Steven &Patrick, 2006), 20% broadly cost reduction (Simon et al., 2005) and provision of good environment for effective utilization of scarce resources in the economy (Dikko, 2000). According to 'An Overview of China's Construction Project Tendering International Journal of Construction Management_ Vol 7, No 2', (no date), China has adopted the competitive tendering practice as part of its economical reform in order to improve the effectiveness of construction investments. In Chad, the construction industry prefers competitive tendering as prescribed by the Public procurement Act (PPA) 503 (2003). Likewise the Zambia Public Procurement Act (ZPPA) highlights open bidding as the recommended procurement method to procure works because of its ability to promote public confidence in the procurement process.

However, the author noted that despite the predominance use of competitive tendering by the developing nations and many organizations such as European Union, World Bank, African Development Bank and Organization for Economical Co-operation and Development, many countries and organizations still face challenges with regard to its implementation. The CCSRP (2009), states that many prevailing contracts have failed

to meet the expectations of the government by having abandoned sites or doubtful quality of workmanship due to the poor performance of the tendering process. According to the revelations of the survey conducted by Douh (2015) in Chad, it is indicated that despite the reforms in the Public procurement act (PPA) 503 (2003), the lack of comprehensive study of the tendering process at pre-contract stage is one of the causes of very poor performance of public procurement. Hence, good public procurement practices helps in ensuring that the right bidders are selected to provide cost effective services for the project (Mukumbwa, 2008).

According to Liou, Chiang & Perng (2018), the tendering processes traditionally for contracted work are normally done separately from design and construction in which different units handle design and construction. For this reason design concepts are mostly not well communicated, hence creating a gap between design and construction. The author indicates that having a design and build tendering process will improve the project delays, because the process closes the gap of the two stage tendering by combining preparation of tendering documents and designs with construction, thereby reducing the chances of design changes. Traditionally, Time, cost and quality are considered to be the performance parameters that determines the success or failure of the construction project because they affect the clients, operators, contractors and other project participants (Edison & Singla, 2020). In the United Kingdom, the rate of projects in the construction industry that are challenged and cancelled is among the highest of all industries (Rounds & Segner, 2011). In India, according to the report from the Ministry of statistics and programme implementation, out 1453 projects on April 2019, only 22 projects were are head of schedule, 294 were on schedule and 388 were delayed (Edison & Singla, 2020). Maceda (2016) also reported in his research that 70% of projects in Dubai are subjected to time overrun.

Project delay is also a challenge in the Zambian construction industry. This is demonstrated by Kamboyi (2019) who conducted a survey and published a list of delayed Public sector building projects in Luanshya district. Table 1 below shows a list of delays projects in Luanshya district.

**Table 1.1: Delayed projects in Luanshya**

| Project | Start | Project schedul | Completion dat | Delay period |
|---|---|---|---|---|
| Expansion of Section 25 health post | January 2015 | 10 months | November 2017 | 2 years |
| Construction of Section 3 health post | November 201 | 6 months | December 2018 | 2 years 6 months |
| Expansion of Section 9 health post | 2012 | 6 months | November 2017 | About 3 years |
| Construction of Roan Skills Training Center | April 2012 | 12 months | Stalled at roof level | More than 8 years |
| Construction of Mikomfwa and Maposa market shelters | 2015 | 6 months | On-going | More 4 years |
| Construction of Roan community police post | 2013 | 6 months | Stalled at window lev | More than 6 years |
| Conionstruction Ndeke police post | 2014 | 9 months | September 2018 | About 4 years |
| Construction of Franco health post | 2014 | 6 months | August 2016 | About 2 years |
| Construction of Mama Rosa health post | 2014 | 6 months | September 2016 | About 2 years |
| Construction of Fisenge Day Secondary School | 2011 | 2 years | 2018 | About 5 years |
| Construction of a student hostel at Luanshya technical & Business College | October 2017 | 1 year | Stalled at lintel level | More than 9 months |

**Source:** (Kamboyi, 2019)

The Zambian construction industry suffers complex issues in performance due to drawing and design amendments (Chilongo & Mbetwa, 2017). Many authors have highlighted that in order for the project to attain its objectives in terms of time, cost and quality, risk management processes have to be implemented by organisations (Perry & Hayes ,1985; (Flanagan & Norman,1993;Turner, 1999) and (Zou et al., 2006). In countries like the United Kingdom construction industry, professional bodies such as British Standard 31100, (2008) have designed risk management as one of the main areas of business management process and also introduced structured principles that fit risk management within organizations.

According to Shirodkar et al. (2017) and Abulhakim et al. (2019), risk management is an indispensable contributor to business and project achievement since its attention is to effectively addressing uncertainties, minimize pressures, maximize chances, and optimize the performance of objectives. Risk management is a subject of concern in various industries such as: finance, engineering, cybersecurity, supply chain and forestry (Le-vy, 2021). According to Le-vy (2021), risk analysts should be able to

distinguish the difference between opportunity, risk and uncertainties. Browning (2019) defines uncertainties as events that might or might not happen in the project life but could affect the project outcome negatively or positively. In comparison, risk and opportunity are defined as two types of uncertainties (Voose, 2008).

The author indicates that in the Zambian construction industry, most local contractors experience challenges during construction because they lack a risk management framework that can help them identify and manage risks from the initial stages of the project. Taofeeq & Adeleke, (2019), states that expert knowledge is required to study, identify, analyse and manage risks during the initial stages of the project. This makes risk management to be one of the most important knowledge areas in project management, because parties such as engineers, quantity surveyors, architects, project managers, contractors, designers, subcontractors and clients monitor risks during the project cycle (Adeleke et al., 2016).

Smith et al. (2008), reveals that risks on the project increases in the beginning and reaches its highest levels during the tendering process where the project uncertainty is at its peak. And this makes tendering to be one of the most critical stages in the project cycle which requires attention. This author has noted that, most performance issues such as project delays, cost overruns and perpetual quality compromised projects exhibited by our local contractors is mainly caused by the failure to identify and manage risks during the tendering stage of the project. Delays in the construction process may be avoided or minimized when the likely causes are clearly identified (Muneeswaran *et al.*, 2019). Hence this research study evaluates the risk management processes conducted by local contractors during the initial stages of the project and explores the risks that are involved during the tendering stage in order to formulate an effective risk management framework that will help and guide our local contractors to manage risks during the initial stages of the projects.

## 1.3 Statement of the problem

According Kamboyi (2019), construction projects world-over, faces delay as one of the major problems and is more severe in a developing nation like Zambia. Kamboyi (2019) recorded a number of delayed projects in Luanshya district which includes; construction of health posts, schools, training centres, police posts, markets etc. Insufficient preparation of tender documents and design is also considered to be part of the causes of project delay in Lusaka (Aigbavboa, Thwala & Mukuka, 2014). The author has noted that project delays are more prevalent in countries that have adopted competitive tendering as a prime method of procurement for construction works. Countries like England, United states, Singapore and Japan uses a different tendering strategy called design and build to address the current issues experiencing by developing nations (Liou, Chiang & Perng, 2018).

Shimwambwa (2020), indicates that project delays and abandonment in the Zambian construction industry is still a challenge, mostly because of poor risk management from the inception of the projects. Project delay is still eminent in the Zambia construction industry despite all the guidelines and regulations provided by World Bank, African development Bank, European banks, and the Zambia public procurement regarding the tendering strategies.

Hence this research study strives to formulate a useful risk management framework in the Zambia construction industry with the ability to minimise the risks at the tendering stage of the project.

## 1.4 Research Objectives

### 1.4.1 Main Objective

The main research objective of this assignment is to evaluate the risk management practices used during the tendering process by our local building contractors in the Zambian construction industry.

### 1.4.2 Research Objectives

Specific objectives include the following;

1. To explore the risks in tendering system in building sector in Lusaka
2. To analyze the probability of risk occurrence and effect on the local contractors in Lusaka.
3. To develop a risk management framework for local building contractors in Lusaka

### 1.4.3 Research Questions

1. What type of risks is associated with building projects at the tendering stage in Lusaka?
2. What is the probability and impact of risk on building projects at the tendering stage in Lusaka?
3. What technical inputs are required in establishing an effective risk management framework for building projects at tendering stage in Lusaka?

## 1.5 STUDY SIGNIFICANCE

The findings of this research will be of great importance and use to the following stake holders;

**Contractors:** The research findings are intended to help the local contractors on which risks to look out for during the tendering process of the building projects. This will help them to decide whether to bid for the project or not depending with their risk appetite that they for the project. Additionally it will help contractors to understand the importance of risk management during the tendering process

**Clients:** Clients may include NGO's, communities, individuals, government and other private organizations. The findings of the study may help the clients to easily identify the gaps that that the tendering documents may have such drawing, bills of quantities and also the type of stakeholder that are involved in the project during the tendering process.

**Government**: this finding will be helpful to the government because the government can be a client and contractor and hence the role of risk management in the building sector at tendering stage is of paramount importance

## 1.6 SCOPE STUDY

This research was limited to the local contractors in the building category within Lusaka district considering the time involved and the resources available. The research study only considered the tendering stage of the building projects and did not cover the implementation stage. The basis for establishing risk management practices will be limited to the tendering process and will cover various stake holders such local contractors, government ministries, National council for construction, Consultant engineers, Quantity surveyors, These are very key stake holders in the building sector.

## 1.7 DISSERTATION OUTLINE

**Chapter one** – this chapter provides the introduction and the background by giving a comprehensive angle of the research by defining the problem, research objectives, scope and the importance the conducting the research.

**Chapter two** – this chapter provides a detailed review of literature linked to risk management, tendering process and the related strategies to manage risks during the tendering process of building projects, citing various experiences around the globe then trickle down to Zambia. The chapter will also look at the previously published literature related to the research topic.

**Chapter three** – this chapter will look at the theoretical and conceptual framework at the bottom of the research.

**Chapter four** – explains the research methodology methods to be explored in the study investigate the research problem. The chapter will further explain more on the research philosophy, methods, designs and the methods that will be used to collect data. Data analysis techniques, ethical considerations and the research limitations will be outlined in this chapter.

**Chapter five** – discusses the findings and interprets the data collected from the respondents through questionnaires and interviews by outlining comprehensively the results of the research study.

**Chapter six** – this chapter details the discussion of the important findings from the data collected considering the research objectives

**Chapter seven** – outlines the conclusions and recommendations on the key findings from the entire analysis and comprehensive study of the research problem.

### 1.8 Chapter Summary

This chapter highlights the general introduction and background of the research topic and provides guidance and direction to the research; this will be in line with the identified problem of the research using the objectives, scope and significance. The chapter will do further to provide the full outline of the entire dissertation.

# CHAPTER TWO

# LITERATURE REVIEW

## 2.1 Introduction

This chapter focuses its attention on reviewing related literature with regard to tendering as a procurement method and Risk management in the construction industry. Firstly it looks at the general overview of the tendering process and the risks involved. It further goes on to look at the probability of risk occurrence on and their effects on building projects. Additionally the chapter reviews the proposed risk management frameworks for constructions projects by other researchers. Finally literature identified the knowledge gaps with a chapter summary at the end. The review dwells much on the tendering process and risk management in construction project(s). The tendering process examines the contractors tendering and potential risks involved during the tendering process while the risk management part provides a reader with an understanding of the risk management process giving more details on how risk can be identified and managed systematically using different tools and techniques.

## 2.2 Overview of the Literature

World over, tendering is the most common method of buying implementation services in the construction industry, especially where the government or public sector is the major client (Soltaninejad *et al.,* 2021; Faraji *et al.,* 2021). It is considered to be a process of selecting the most suitable contractor from a list of contractors invited either directly or publicly by the employer to carry out the construction works (Yan, 2021). For many years, tendering has been considered traditionally as part of the contractual procurement process in the construction industry that works on the separation of the design and construction phases (Borasi & Nagaich, 2018).

In the construction industry, the term tendering and bidding are used interchangeably. However, the difference between the two terms according to the code of estimating and tendering practice (2018), is that ‘bidding’ is mainly used by contractors (suppliers), while the term ‘tendering’ is used on the procurement side (buyer). Therefore, a bid is a process involving the preparation of the price for the work and the tender is the formal offer. In many countries around the globe, the public sector is mainly considered to be a

lager client because it engages in mega project (Khoso *et al.*, 2021). Therefore, public tendering was considered very critical in this study.

In the public sector, appropriate contractor selection is very important and cannot be overemphasized because the successful delivery of the project depends on the contractors (Khoso & Yusof, 2020). Kog *et al.* (2014), confirms that one of the most believed challenging decisions in the tendering process is the choice of a capable contractor. In public projects, a typical tendering process for executing infrastructure projects is normally very extensive to ensure that the right team is engaged at the right place and time (Khoso *et al.*, 2021).

According to Adedokun (2020), the three basic major tendering methods available to chose a contractor to carry out construction projects include open, selective and negotiated tendering. These tendering methods are considered to be effective and provides value for money (Muhammed *et al.*, 2022). However, factors such as; design, construction, nature of the client, size of the project, cost, duration and the details of the project influences the type of method to be selected (Bina, 2010; faruk, 2020). A contractor may negotiate with the client or participate in a competitive bidding or tendering with other contractors (Shash, 1993).

Competitive tendering which is also known as open tendering has been considered to be the best practical strategy when it comes to the selection of the best tender in the tendering process of construction projects (Bohari et al., 2021; Obodo *et al.*, 2021). On the other hand what determines the sequence is the type of procurement strategy selected. Procurement is defined by the Royal institute of chartered surveyors (2014), generally as the “act of obtaining goods and services from external sources such as a building contractor”. According Smith (2017), procurement and tendering in the construction industry always enter into some form of competition. This is mainly because the choice of the method selected determines the level of risks in the construction project (Potts, 2008).

Procurement strategies in the construction industry especially in the building sector has evolved with time, from the traditional method of Design, bid and build which was

developed around 1900s to the design and build model which also came around 1980s (Ahamed et al., 2020; Viana *et al.,* 2020; Davison *et al.,* 2020). Many researchers have highlighted that most countries still prefer the traditional procurement strategy to the currently developed design and build model especially in the public sector and other international organizations. However, some other countries around the globe such as Sweden, United Kingdom, United States, England, Japan, Singapore and other few African countries have adopted both models of procurement system (Osipova & Eriksson, 2011; Naoum & Egbu 2016; DBIA, 2000 and FIDIC, 1999).

Design-bid and build (DBB) is a procurement process where the owner engages two separate units to do design and construction (Hale *et al.,* 2009; Ling *et al.,* 2004). This procurement method was developed in the early 1900s and it is popularly referred to as the traditional method of procurement (Ellis *et al.*, 2021). This method operates in such a way that when the first unit completes the design, the design becomes part of the tendering documents which in turn is used to solicit the contractor to do the construction (Hughes *et al*., 2015). This method is used globally by many institutions and countries such as the European Union (EU), World Bank (WB), African Development Bank (AfBD), Vietnam, Taiwan, Indonesia and many African countries such as Zimbabwe, south Africa, Tanzania and Zambia because of its ability to offer a fair, transparent, integrity and open competition in the construction sector (Douh, 2015; World Bank framework, 2015; Liou, *et al*., 2018; ZPPA, 2020).

This procurement model seems to create opportunities for both contractors and consultants to participate on the project because of the involvement of two different entities to do the design and construction. The other merit of this strategy is that contracts involving DBB contracts provide a clear view of the project cost before construction is commenced (Potts, 2008). Other researchers such as Murdoch and Hughes (2007) claims DBB contracts are even more appropriate with projects that have complex designs. However, Liou (2018) argues that, the separation of the design and construction in DBB contracts create a communication gap that leads to poor budgeting and project delays. Huynh *et al*. (2019) also elaborates that the project duration

normally increases in DBB contracts because a contractor is only deployed to site once surveys, designs, cost estimates and other legal procedures are concluded.

Thanh *et al.* (2019) further states that, DBB contracts does not seem to promote creativity, innovation and flexibility, because the contractors only depend on the consultant for guidance while contractors spend more time in trying to understand the construction drawings and tabling all arising issues on site with the client and the consultant. Figure 2 below describes the sequence of the design, bid and build model.

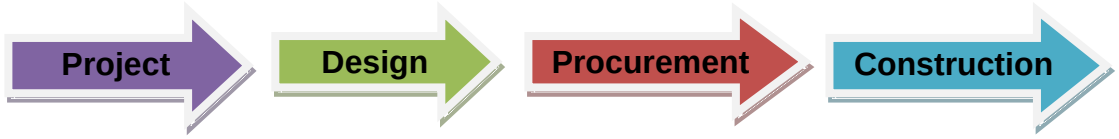


**Figure 2.1** Sequence of Design Bid Build Model (DBB)
**Source:** (Osipova, 2008)

Design and Build (DB) model is as a procurement technique where both design and construction activities are carried out by a single entity contracted by the owner (Murdoch & Hughes, 2007; Park *et al.*, 2017). In DB contracts, contractors have a bigger role to play because of its extra responsibility of designing. Countries like Indonesia, Sweden, United Kingdom, United States, England, Japan, Singapore and other few African countries have adopted this delivery system in the quest to encourage innovation, improve cost performance and project scheduling (Rostiyanti *et al*., 2019).

Design and Build contracts are known to pose certain advantages to project owners such as; quick project completion and risk reduction (Murdoch & Hughes, 2007; Levy, 2010). According to the research conducted by Rostiyanti *et al*. (2019), the design and build (DB) model proved to be 12% faster than the Design–bid-build (DBB) in terms of jobs per square meter and also 33% faster with regard to the design speed during the implementation stage. Nevertheless, the same study revealed that DB projects are 6% more costly than the DBB projects per square meter of jobs.

According to Potts (2008), DB contracts posses an advantage of clients getting only into one agreement with a single entity responsible for both the design and construction.

However, Rostiyanti *et al.* (2019), argues that the engagement of a single entity to doth both design and build increases risks to the contractor because of the increased scope. Ling *et al*. (2004), commends DB contracts to be more successful when it comes to construction and delivery speed and meeting time, budget and quality standards required because of its ability to commence construction before the design stage is fully concluded. The other merit of DB contract is that it is easy for the contractor to make adjustments on the project (Sullivan, *et al*., 2017). Figure 3 describes the sequence of the design and build model.

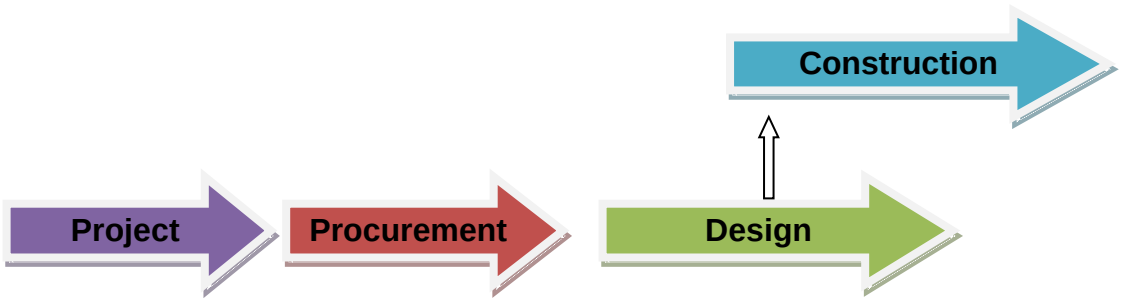


**Figure 2.2** Sequence of Design Build Model (DB)
**Source:** (Osipova, 2008)

### 2.3 Exploring risks in the tendering system of the building sector

The dynamic and complexity of construction projects have created so much risks and uncertainty (Mhetre *et al*., 2016). The construction industry is more exposed to more risks and uncertainties than any other industry (Flanagan & Norman, 1993; Ehsan *et al*., 2010). According to Hopkinson (2017) and Qureshi *et al*. (2020) the terms uncertainty and risk are the most used terms in the field of project management whenever the subject of risk management is addressed. In construction industry, researchers like Hillebrandt (1985) used the two terms 'risk 'and 'uncertainty' interchangeably, but Lachapelle & Hundozi (2018) argues that these two terms are closely related but they do not mean the same. Nevertheless, Samson *et al.* (2008) argued that the definition of either risk or uncertainty is subjective because there is no general definition that is accepted. Hence the definition is subject to the person defining them (Dorfman, 2007).

Globally, there has been an argument between strategic managers and finance academics for a long time with regard to the terminological difference between risk and uncertainty (Alessandri et al., 2004). However, there are two general approaches to the definition of risk and uncertainty as illustrated in figure 4 below.

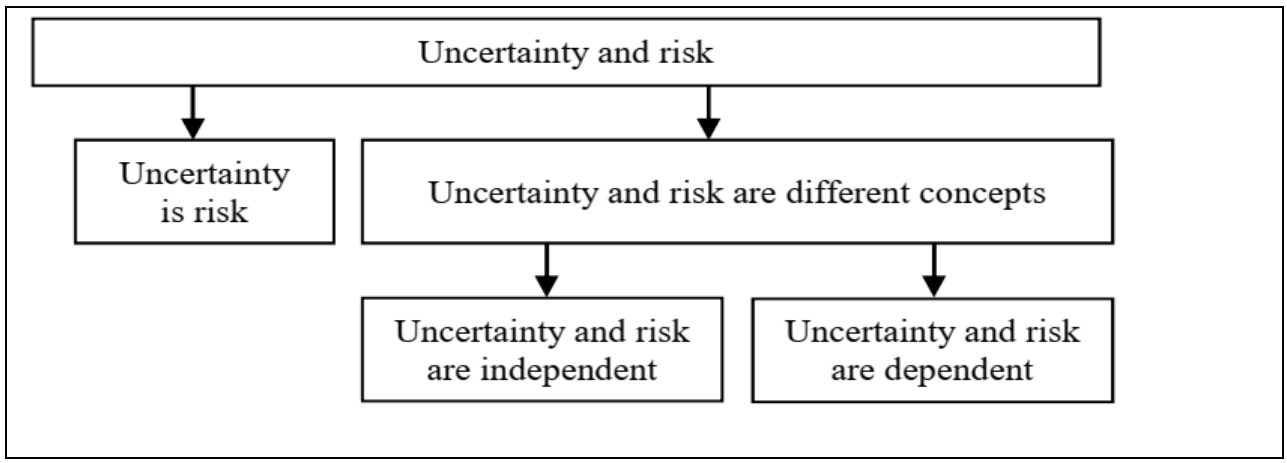


**Figure 2.3** Comparison of risk and uncertainty
**Source:** (Agren, 2012)

In figure 2.3 above, the first opinion claims that risk and uncertainty are the same but on the contrary the second opinion indicates that the two terms are different concepts. However, even if risks and uncertainties are considered to be different concepts in the second opinion, others still think they are independent to each while another group claims they are dependent on each other. Nevertheless, despite the many opinions regarding these terminologies, it is has been concluded by majority that both risks and uncertainty do exist on projects and there is need for an effective management system that can adequately handle both of them at the same time (Samson et al., 2008).

According to Wang *et al*. (2004), the term risk is defined in so many dimensions. The construction industry generally perceives risk is as the likelihood of occurrence of a definite event or factor or combination of both during the construction process that can adversely affect the project objectives in terms of time, cost, scope and quality (Ehsan, et al., 2010). In the construction industry, risk could have monetary, physical, social and cultural dimensions (Choudhry & Iqbal, 2013). Generally risk is defined as any uncertain

event or circumstance, which if occurs during any project stage may have a positive (opportunities) or negative (threats) impact on the goal of the project (Keshk *et al*., 2018).

In most risk management literature, risk is simplified as an event with a probability of occurrence with a consequence if occurs (Tembo *et al.*, 2015). In this regard, risk is measured arithmetically as shown in the equation 2.1 below:

Equation 1

**R = P X I**

Where: **R** = Level of Risk, **P** = probability of risk occurrence and **I** = Impact or consequence of perceived risk

Source: (based on McNeil *et al.,* 2005).

Uncertainty is normally referred to as a random event of an event where the probability of occurrence is actually unknown though it can happen (Bazin, 2017). According to Wanyona (2021), uncertainty occurs only when the probability of occurrence of an event cannot be predicted and its impact cannot be determined.

### 2.3.1 Risks in the tendering system of contractors

Generally, the contractors tendering process in the building sector mainly involves three major stages. These stages include the decision to bid, cost estimation and the bid price determination (expected costs and mark-up decision) (Drozdov & Marovi, 2021). In the tendering process, the most risky assignment that contractors face globally is making a decision to bid and provide a bid price that is reasonable enough to create a decent profit but still low enough to win a bid (Asgari *et al.,* 2016). According to Drozdov & Marovi (2021), many contractors face a price determination risk because majority of construction tenders are awarded based on the lowest bid price especially in public procurements. To explore risks in the contractors tendering process, the three stages were looked at in detail.

**Stage 1 – Decision to Bid**

The decision to bid for a specific project is one of the most important decisions that contractors should consider regularly (El-Mashaleh, 2010). It is very important for contractors to make bid decisions because it is the main mechanism of allocating projects to contractors in the construction setup (Su *et al*., 2020). Contractors should look out for projects in which they can submit a bid to stay on the market (Drozdov and Marovi, 2021). Otherwise failure by contractors to look for projects and submit bids means losing an opportunity for potential profits, as well as a position to be known and establish a working relationship with potential clients in the industry (Bagies & Fortune, 2006). And if a bidding decision is made, substantial time and resources is needed in the process to prepare the bid document (Ravanshadnia *et al.,* 2010). According to Drozdov & Marovi (2021), it is not necessary for contractors to bid on all available projects but only those that are suitable for the company.

In the Unites States, a study was conducted by Ahmad & Minkarah (1988) on the risk factors that affect contractors bidding decisions. The study revealed 31 risk factors in which the type of job, size of job, owner, location, historic profit, degree of hazard and need for work emerged as the top risk factors to consider before making a decision to bid or not.

In Canada, 118 risk factors were identified by Fayek et al. (1999) to affect the bidding decision. The study concluded that type of the project, expected profit, familiarity with market, size of the project and experience on similar projects were the most critical factors to consider when making a decision to bid.

In the United Kingdom a study was conducted by Sash (1993) on the risk factors affecting the bidding decision of contractors. About 55 risk factors were identified, however, the study considered only three major factors such as number of tendering competitors, the need for work and level of experience on related projects.

With regard to the 11 statements on the risk factors the findings revealed that all the risk factors are rated as important (2) in the tendering process considering that all the mean values in table 5.4 ranges from 1.589 to 1.696 which when rounded off is 2 denoting the

rating important. This implies that all these factors namely level of competition, are to be considered and examined during the tendering process. Additionally the researcher conducted interviews with selected key stakeholders with regard to potential risk factors in the tendering process.

In Qatar, a study conducted by Jarkas et al. (2013) concluded that previous experience with the employer, the need for work, past experience in similar projects, size of the project, current workload, reputation and employer identity in the industry, availability of other projects, financial stability of the employer, quality of tender documentation and quickness in the payment process by the employer were the top ten risk factors to consider before making a decision to tender.

In Australia, Shokri-Ghasabeh & Chileshe (2016) highlighted the major risk factors in bidding decision to be the project future benefits, client financial muscle, number of bidders/competitors, project duration and contractors' material availability.

In Palestine, about 78 risk factors were identified by a study that was conducted by Enshassi et al. (2010) on the factors affecting the decision to bid or not. This study concluded that Owners financial capability, contractor's financial capability, project value, stability of the construction industry, payment due dates and availability of materials on the local markets were considered to be the critical factors.

In Saudi Arabia, the most important risk factors that influence the decision to tender according to Bageis & Fortune (2009) were client financial capacity, payment system of the project, cash flow of the project and quick payment system of the client.

In Nigeria, according to conclusion of the study that was conducted by Oyeyipo et al. (2016), the most critical factors affecting the decision to bid were availability of capital, availability of material and clients financial capability.

Scholars such as Laryea & Huges, (2011) and Duzkhale & Lucko, (2016a) pointed out that before making a decision to bid, it is very cardinal to ensure that an accurate incorporation of risks is considered into the decision making process. However, this consideration is normally overlooked in most current bid practices (Owusu *et al.,* 2020).

Many recent studies have revealed many risk factors that influence a decision to bid or not. According to Alsaedi *et al.* (2019), the type of the job, size of the job, company capability, design quality, rate of return and project cash flow were considered to be the six top factors that influences a decision to bid or not. Wang (2020) highlights external macro economical factors such as the interaction between demand/ supply such as economic prosperity and decline to have influence on the decision to bid or not. Other risk factors include availability of other projects at the time of tendering, previous relationship with the potential client, project requirement, technological requirements and requirement for prequalification (Olatunji *et al.,* 2017). Also Aje *et al.* (2016) opines availability of materials, labour productivity and profit levels to be critical factors.

Other researchers highlights project size, procurement method types, condition of site, project location, project special requirements, company's reputation, materials availability, organizational expertise, relationship with the previous project and business continuity as critical factors to contractor's success (Bagies & Fortune, 2006; Olatunji *et al.* 2017; and Biruk *et al.,* 2017). And other factors such as tender submission time, price of the document, previous experience with similar projects, other tenderers strength, prequalification and completeness of the document are considered to be very important to the contracts project award (Flynn & Davies, 2017).

**Stage 2 – Cost estimation**

Cost estimation is one of the most important functions of construction management (Abdal-Hadi, 2010). It is defined as a process in which contractors examine the tender documents in form of project drawings, bills of quantities and any other project specifications related to the project and request for quotations from suppliers and subcontractors of products and services to come up with the tender price (Laryea, 2011). It is summarized by Agren (2012) as a process of calculating the tender price.

When a contractor decides to bid on a contract, it is very important to come up with a bidding strategy and estimate of prices (Urquhart *et al.,* 2017). It is very critical for a contractor to study tender documents with awareness before preparing a bid (Drozdov

& Marovi, 2021). Moreover, sufficient project documentation should be provided to contractors for them to come up with accurate cost estimation.

According to Ibrahim & Elshwadfy (2021), cost estimation gives a direction on whether the company is ready to bid on a construction tender and win the tender. Fry *et al.* (2016) states that when a company produces an accurate cost estimate, the bid price is likely to be lower and hence the chances of winning the contract becomes very high. Projects have a chance of being delivered within budget if the accurate cost estimates and evaluation of factors that can make the project cost to increase is performed (Hatamleh et al., 2018). Cost estimation accuracy is affected by a number of risk factors in the construction sector.

In Australia, a study on the pretended cost estimate was conducted by Aibinu & Pasco (2008) on 56 projects and the conclusion was that, the estimate was affected by the size of the project.

In Malasya, Azman (2012) conducted the preliminary cost estimate accuracy on 83 projects and the study revealed that the most important risk factors that affect the accuracy of cost estimates include number of competitors/bidders, project size, project location and the project type.

In Saudi Arabia, the study that was conducted by Alghonamy (2015) revealed that lowest bid award, improper planning, design changes, delay in payment and delay between design and implementation were considered to the most important risks factors that affects accuracy of cost estimates.

In Gaza strip, five essential risk factors were identified in the study conducted by Enshassi et al. (2013) to affect the accuracy of cost estimates. These factors are protect team experience in the type of construction, skill and experience level of consultants, clarity of drawings and specification, blockage and closure of boarders and materials (quality, supply, availability and prices).

In New Zealand, Ji et al. (2014) conducted a study on the factors that affects the final contract price and the results showed 37 factors affect the contract price. However, the

three most critical ones were incompleteness of project information, poor tender documentation and complexity of design construction.

In Nigeria, a study was done by Alumbugu et al. (2014) on the risk factors affecting estimate costs. The results reveals that contractors, consultants and clients all agree that the most important factors that affects the accuracy of cost estimates are experience and skill level of consultant, the experience of the project team on the construction type and the level of details on drawings and specifications.

In Ghana, Akinradewo *et al.* (2020) conducted some studies on what affects the accuracy of cost estimates on road projects. His study revealed that insufficient site investigation, outdated use of market prices, lack of proper planning, use short cuts and incorrect equipment were the major factors. Akinradewo et al. (2020) advises in his study that, estimators should pay particular attention to factors such as clear scope definition, sufficient design availability, formal feedback between designers and estimators and proper information management to arrive at an accurate cost estimate

In Egypt, Ibrahim & Elshwadfy (2021) conducted a study on factors affecting estimation cost on constructions using a questionnaire survey on 106 contractors and consultants. The results show Clarity of details (drawings, specifications and project documentation), level of experience of the estimator, Completeness of information (cost, quality and cost data), Materials (prices, availability, quality, imports), Similar projects experience, accuracy of Bills of quantities were the top six risk factor that affects the accuracy of the cost estimates.

Bakr (2019) revealed in his study that experience level by the estimation team, financial capability of the client and project team experience were considered to be the most three important factors that affects cost estimation accuracy at the tendering phase.

**Stage 3 – Tender Pricing**

Tender pricing is defined as the distribution of money among the items in the bill of quantities that have been reviewed (Tehin, 2009). Price is also defined by smith (2017) as the charge for finishing an element of work. The tendering price is mainly known to

be made of three major components, the direct costs, indirect cost and, profits and risks (Omran & Boon Hooi, 2018). Direct cost includes material cost, labour or wages, and subcontractors. Indirect costs include management costs such as site maintenance, project management, equipment, insurance, bank guarantees etc. Profit is considered to be the markup decided by the company while risks include positive and negative risks.

According Laryea & Hughes (2009), the five elements that make up the bid price include labour, plant and equipment, materials, overheads and profits. Most contractors according to many studies are not willing to take the full account of risks in their bidding price because they fear inflating their bid price and become uncompetitive (Bohn, 1999; Mochtar & Arditi, 2001). However, Laryea and Hughes (2011) argued that the major factor that makes the risks to go high is disregarding risk cost to avoid becoming uncompetitive.

The major risk factors that affects the success of the tender price are the actual direct cost, level of competition, time delivery of the project, payment system, perception and experience of the estimator and clarity of the bidding documents (Laryea & Hughes, 2009). According to Kim et al. (2005), the tender price must be good enough to make profits and handle eventual risks, but it should also be low enough to be competitive.

In Ghana, a study was conducted by Laryea & Hughes (2009) on how contractor accounts for risks in their bidding prices. The results reveals that the main method used to incorporate risks in their bid prices are lump sums and a single fixed percentage of the cost estimated in the bill item. According to the study the risk allowance is mainly determined by the level of experience and intuition of the estimator and the managing director.

Two ways of calculating a tender price is shown below;

(i) Direct costs + Indirect costs + Profits and Risks = **TENDER PRICE** (Nemuth, 2008)

(ii) Estimated costs + Profit + Risk (Contingencies) + Risk (Uncertainties) = **TENDER PRICE** (Olsson et al., 2006)

In the construction set up, apparently clients with their consultants spend a long time planning and preparing the project documents and yet they expect the tenderers to respond to the same project within a limited set time frame (Obodo *et al.*, 2021). Hence, Binnington, (2004) considers tendering time to be one of the major risk factors in the tendering process that contributes to project failure, because contractors barely have time to analyze work and end up submitting tenders that are not accurate. It is also important to understand that the daily and long term performance of a contractor largely depends on the bidding decision (Ahmad, 1990), because it determines the survival and prosperity of the contractor (Yan *et al.,* 2018).

The set limited time makes it practically impossible for contractors to consider all necessary factors (Deng, 1994). Hence Obodo *et al.*, (2021), emphasizes that tenderers should be accorded ample time to study the project in order to come up with accurate tender document.

An investigation conducted by Faraji *et al.* (2022) reveals that the bid or no bid decision lacks support with regard to the application of project comprehensive assessment which in turn affects the determination of mark up percentage considering the limited time given hence causing financial risks such as under pricing. Therefore the tendering stage is a very critical stage that should be considered highly in the field of risk management not only for contractors but also for consultants, clients and all construction professionals in order to reduce risks during the construction phase and ultimately improve project delivery.

### 2.4 Probability of risk occurrence and effects of risks on building contractors

According Hwang et al. (2014), building projects in the construction industry varies in size ranging from small, medium and large and hence their level of impact varies depending on the size. However, regardless of the size of the project if the risk is not satisfactorily dealt with poor performance is inevitable (Iqbal et al. 2015). Grimsey

(2002) highlighted in his study that Uncertainties and risks causes many projects to experience cost overruns, delay in terms of schedule and poor quality performance.

The performance of any building project is measured by time, cost and quality (Kamal *et al.*, 2022). And whatever affects any of the three factors affects the performance of the project. For this reason Hughes & Williams (1991) argues that any effect on any of the three factors has a detriment effect on the other two. It should be known that the performance of any contractor is measured by his ability to complete the project within schedule, cost and quality performance (meeting the required specification). If the contractor makes a decision to bid without considering inherent risk factors of the project, the probability of the contractor getting the wrong project estimation and price is very high. These risk factors are discussed below with their effects on construction projects

**Time risk factors**: Time risk factors are also popularly known as delay factors that slow down the activities of the project. These factors cause the project delivery schedule to go beyond the agreed period between parties or contract due (Lo et al. 2006; Howick et al. 2009; Shahsavand et al. 2018). According to Mpofu et al. (2017), schedule delays on a project frequently causes cash- flow challenges, arbitration, adversarial relationships and mistrust. A study by Pourrostam & Ismail (2012) also showed that cost overruns, time overruns, litigations, project abandonment and disputes between key stakeholders are the major effects project delays.

In Australia, Zou & Zhang (2009) conducted a study on time related risks that affects project delivery. The study highlighted changes in design, tight project schedule, unnecessary approval processes, bureaucracy and client changes as critical factors that affects project delivery.

In Cambodia, a study was conducted on the causes of delays in residential building projects by Durdyev et al. (2017) using the relative importance index (RII) of contractors and consultants and the analysis feedback showed that poor project scheduling, materials shortage on site, skilled labour shortage, late delivery of material, project complexity, late payment for the completed work by owner, absenteeism of labour,

subcontractor delay, poor site management, poor site safety which cause accidents were ranked to cause project delays.

In Morocco, an empirical study was conducted by Bajjou & Chafi (2020) and the survey revealed the top ten delay causes such as payment progress delay, lack of training for employees, lack of strategy for waste management, unrealistic contract duration, rework due to construction errors, excessive subcontracting, permit delays from government, ineffective planning and scheduling, unskilled workforce and lack of collective planning.

**Cost risk factors:** Many building projects are mega in size and costs huge budgets, but because of various risks that are linked to these projects huge monetary losses are encountered (Deviparasath 2007). According to Shrivastava *et al.* (2019), cost overruns on infrastructure projects results in huge losses on national treasury because it uses tax payers money.

In the United States, an investigation was conducted by Chen *et al.* (2016), using 418 design and build projects from design Institute of America and it was found that more than 50% of the projects experienced budget overruns.

In Pakistan, Sohu *et al.* (2017) did a survey on the contractor's perspective for critical factors of cost overrun in highway projects and the results showed that Change in scope, payment delay, contractor inexperience, interference by owner and delay in decision making were the top risk factors.

In Qatar, Senouci *et al.* (2016) examined the issue of budget overruns in 122 public projects constructed between 2000 and 2013 and the results revealed that 54% of the projects were over budget.

In Ghana, Asiedu & Alfen (2014) conducted a study on factors Engendering Cost Misrepresentation of Public Sector Projects and the findings indicated Material price variation, contract document error, poor communication, lack of monitoring and inaccurate cost estimates as the major factors.

Various tudies conducted in Thailand by Meeampol & Ogunlan (2006), South Korea by Lee (2008) and in Pakistan by Sohu *et al.* (2017) equally reveals that construction

projects are constantly having the challenge of budget overruns and building projects are not spared.

**Quality risk factors:** Quality according to Kamal *et al.* (2022) is a key function factor where improvement of cost and time is concerned. Love & Li (2000) considered it to be one fundamental factor in any construction project. Kamal *et al.* (2022), highlights three types of costs related with costs such as appraisal cost which is the cost of testing or inspection, failure cost which is associated with rework and prevention cost which is the cost of better planning and upkeep.

Many studies have been conducted to determine the factors that cause the quality issues in construction projects. In India, Jha & Iyer (2006) examined the factors that cause quality issues on construction projects and factors such as low bids due to competition, poor project administration, unfavorable climate condition and communication issues.

In Gaza, Rustom & Amer (2006) found that wrong documentation, access to materials, political condition and involvement of site staff as the major factors that cause quality issues on construction projects.

In China, Chan & Tam (2000) identified factors influencing quality in building projects to include nature of the client, project environment, project management team, and construction group

In Pakistan, Kamal *et al.* (2022) identified factors such as cost escalation of materials, inflation, material selection, procurement, poor site supervision and communication to influence quality issues on construction projects.

Other authors such as Larsen et al. (2016) identified factors like construction errors, cost reduction due to political influence, poor project planning, project document inconsistencies and inexperienced qualified consultants to affect the quality of construction projects.

The author noted that most of the risk factors that were identified to have caused schedule delay, cost overruns and quality issues have a lot do with the lack of risk

management at the bidding stage. Most of the risks involved are directly related to the risk factors explored during the tendering or bidding process of the project. It should be noted that issues such as project duration, cost planning and estimates, type of the project, scope, design, project specifications are documentations are all dealt with at the tendering or bidding stage. Hence silungwe (2015) highlighted that changes at the inception stage of a project are easier and cheaper than the later stages. And the project becomes difficult and expensive to effect changes as the project progresses (Fabrycky & Blanchard, 1991; Paulson, 1976).

## 2.5 Risk Management framework in construction projects

### 2.5.1 Risk management concept

The risk management concept is a concept that is largely becoming very popular in many organizations (Alsaadi & Norhayatizakuan, 2021). According to Ahmadi et al. (2017), the implementation of risk management concept in projects by many organizations has proven to increase productivity, profits and business performance. It also improves projects in the areas of costs, schedule and technical performance of new product developments (Aven, 2016). Akinbile et al. (2018) opines that when risks on construction projects are not correctly managed, the rate of project abandonment among many construction companies becomes very high.

Risk management is a systematic process where management policies, processes and procedures are applied to appropriate tasks to identify, analyse, evaluate, treat, monitor and communicate risks (Bahamid & Doh, 2017). However, PMI (2017) defines risk management as a process that includes risk management planning as the first step then identification, analysis, response planning, response implementation and concludes with monitoring of risks on a project. However, many researchers argue that in the risk management process, risk identification is the first step and probably the most critical stage (Rezakhain 2012; Dutta, 2014; Rehacek, 2017).

Alsaadi &Norhayatizakuan (2021) emphasizes that risk management is not a tool that ensures success but rather helps in increasing the chance of achieving success. Hence it is important to understand that risk management is a more proactive process rather

than a reactive mechanism (Ahmadi et al., 2017). The risk management process has been recognized by the construction industry to manage the risks affecting the building construction projects (Odimabo & Oduoza, 2018). On many infrastructural projects, construction professionals and other practitioners visualize the risk management process as shown in figure 2.4. However, project Management Institute visualize the risk management process as shown in figure 2.5. These processes are explained in details below.

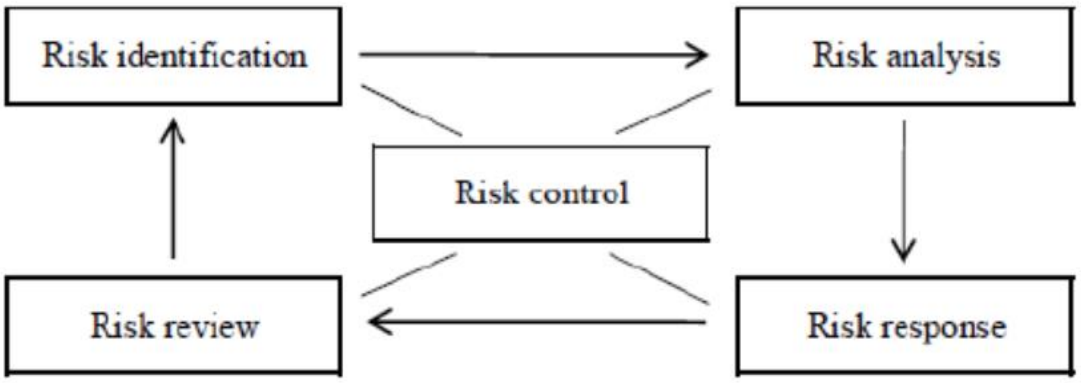


**Figure 2.4** Risk Management process - 1
**Source:** (Bahamid & Doh, 2017; Hillson, 2020; Alsaadi & Norhayatizakuan, 2021)


**Figure 2.5** Risk Management process - 2
**Source**: (PMI, 2013)

Step 1: Risk management planning

Risk management planning is the process of outlining the procedure to be used in project risk management and its importance in obtaining support of the risk management effort from all relevant stakeholders at an early stage of the project (PMI, 2013). In short, risk management planning is the formulation of the risk management strategy (Karim et al., 2012).

The PMI (2013) considers risk management planning as the first stage in the risk management process. The risk management planning is very important because it outlines the components of a risk management plan such as: establishing methodology; roles and responsibilities; budgeting; scheduling and timing; scoring; risk categories; formats and templates and tracking (Keshk et al., 2018). In order to achieve effective risk management planning, PMI (2013) suggest the use of expert judgment where opinions are sought from senior management and experts in the field as well as

meetings amongst concerned stakeholders. Beyond obtaining consensus amongst stakeholders, risk management planning ensures that the risk management measures chosen are equal with the project type, size and importance (Goh and Abdul-Rahman, 2013).

The tools and techniques that are used in risk management planning include but not limited to the following:

*Expert judgment:* During this step, expertise is identified from individuals or groups within or outside the organization with specialized knowledge to identify and manage risks with the project in question.

*Data analysis technique:* This involves but not limited to stakeholders to analyse the available data with regard to the project to determine the risk appetite of the stakeholders.

*Meetings:* meetings are conducted to plan risk management activities and document in the risk management plan

Step 2: Risk identification

Risk identification is considered by much literature as the basic step in the risk management process. All potential risks that are inherent to the project are determined in this stage with all its sources, possible impacts and all entities affected by the risks are identified in this stage (Hansen-Addy and Fekpe 2015; Szymanksi 2017). According to the Project Management Institute (2017), the main purpose of this step is to formulate the risk register in form of a table which highlights both positive and negative consequences. Smith *et al.* (2014) stated that identification of risks at an early stage is critical in order to govern and manage them effectively.

Risks are very difficult to manage if they are not identified at an early stage (Bajaj *et al.,* 1997). However, Potts (2008) argues that identifying all risks related to the project is impossible. However, it is every projects desire to achieve exhaustive risk identification

using experienced participants with experience and good backgrounds with similar projects (Perera *et al.,* 2014). This is backed up by Winch (2010) who highlighted that the success of the risk identification process is mainly dependant on the experiences of personnel within the company.

To identify risks inherent to projects, literature has recorded various tools and techniques that are used to identify risks. In the construction industry, Garrido *et al.* (2011) conducted a research in Brazil and found that root cause identification, checklists and flowcharts were the most used identification tools. The United Kingdom showcased a high use of checklist, expert judgment, document reviews and information gathering according to the study conducted by (Rostami, 2016) on construction small to medium enterprises (SMEs). Amongst SMEs complex techniques like Delphi technique has recorded less use because of lack of expertise (Garrido et al., 2011; Olamiwale, 2014; El-Sayegh, 2014).

Another study conducted by Olamiwale (2014) on Swaziland contractors highlights brainstorming and document review to be the most used while questionnaires, interviews and Delphi techniques had limited usage. The project management Institute (2017) has listed expert judgment, data gathering, data analysis, Interpersonal and team skills, Prompt lists and meetings among many existing tools and techniques that are used to identify risks. These tools and techniques are briefly described below.

*Expert judgment:* This process considers expertise from groups or individuals with highly specialized knowledge and experience of similar projects to consider all aspects of individual project risks and their possible sources (PMI 2017).

Data gathering: In this process, various methods are used to gather data, but three most used methods have been highlighted by PMI (2017);

*Brainstorming:* This technique includes people from the project team having different knowledge to give their point of view pertaining to the risks. All views are welcome at this stage; conclusively the facilitator will review and only pick the ones which are relevant. According to Mahendra *et al.* (2013), this tool is popular and useful because it promotes idea generation and hence intensifies risk identification. Smith *et al.* (2006)

advises to mix and engage the right people with different background and gender for the best outcomes.

*Interviews:* Another important method to identify risks is to conduct interviews with the project team from different relevant areas of the project. These people must have vast experience and knowledge from related projects that will contribute to the process of identification. According to (Garrido et al. (2011), interviews can be structured, semi structured or unstructured and should be conducted either individually or collectively. This method make respondents to feel responsible and involved in the in the process (Smith *et al.,* 2006).

*Checklists:* A check list is a list of specific individual project risks of similar projects that captures the lessons learnt that may be relevant to the proposed project. The project may identify risks by referring to the list and further explore more risks that are not on the list and add them for future reference.

*Data analysis:* In the data analysis process, many techniques are involved to identify risks four of them are highlighted as follows (PMI, 2017);

*Root cause analysis*: This tool is used typically used to unearth underlying causes of a problem and then develop and action plan to stop it. It is used to identify risks using a problem statement and then explore the potential risks with regard to that problem.

*Assumption and constraint analysis:* It is undeniable fact that every project is developed based on certain assumption and within a number of constraints. This method is used to identify risks by exploring the validity of assumptions and constraints through inaccuracy, inconsistence or incompleteness of assumptions.

*SWOT analysis:* This technique identifies risks by first examining the strength and weaknesses of the company with regard to the project. Then opportunities can be determined by the strengths and the threats by the weaknesses. This tool goes beyond one particular project to a strategic decision making tool (Garrido *et al.,* 2011).

*Document analysis:* This tool identifies risks by studying project documents such as drawings, bills of quantities, contracts, assumption, and constraints e.t.c. Any gaps,

inconsistent, uncertainty or ambiguity with the documents signifies the risks of the project.

Stage 3: Risk analysis

Risk analysis is process that follows after the identification process to quantify the effects of the identified risks (Ågren, 2012). It is arguably considered to be the most difficult process but also the most critical (Taroun *et al.,* 2011). Its ability to determine the likelihood and severity of the risk event makes it a very critical process; it helps decision makers to formulate a response plan (Othman & Harinarain, 2009). It also gives a warning indicator of the consequences that the project is not going as planned (Abu Mousa, 2005).

According to the ISO 31000 of 2018, the risk analysis techniques can be qualitative, quantitative or both depending on the size of the project, risk characteristic, resources available and the purpose of the analysis. However, the analyst's knowledge and experience determines the choice of the technique to be used (Flanagan et al., 2007). The factors to consider during the risk analysis include probability of occurrence of events and its consequences, nature and scale of consequences, connectivity and complexity, vitality and time associated factors, effectiveness of current controls and also the sensitivity and confidence level (Cabral & De Lima, 2020).

Qualitative methods are merely dependent on the experience of the analyst while quantitative methods depend on the probability distribution of risks (Azhar et al., 2008). According to Ali et al. (2007) and Ubani et al. (2015), qualitative analysis results are influenced by descriptions, comparisons, ranking and direct judgment while the results in quantitative analysis are influenced by the use of statistical analysis.

The PMI (2017) explains the three techniques used in qualitative analysis as follows;

*Risk data quality assessment***:** This tool evaluates how reliable and accurate is the data about individual project risks in order to conduct a risk analysis. This is because using low quality data to perform a qualitative analysis may not benefit the project.

*Risk probability and impact assessment:* This tool simply asses the likelihood of occurrence of a specific risk and its and its potential effect on project objectives such as time, cost and performance or quality.

*Assessment of other risk parameters:* In addition probability and impact, teams can consider risk parameters such as urgency to which the risk can be responded to, the strategic impact of the risk on the organization etc.

The results of the qualitative risk analysis can be used in three major ways (Kindinger & Darby, 2000); helps in prioritizing the highest order of project risks before putting in place the risk reduction actions, identification of the risk reduction with regard to the identified risks as it is easier if the risk is accurately identified and development of the input distributions for both qualitative and quantitative modeling.

The most used quantitative analysis methods according to many researchers include sensitivity analysis, decision trees and modeling and simulation (Mubin & Mubin, 2008); Radu, 2009; Mahendra et al., 2013; Thaheem et al., 2012; PMI, 2017). These are discussed below;

*Sensitivity analysis:* This is the most used tool to determine the most severe risks on the project (Chiswanda, 2021). Mhetre et al. (2016) refer to it as a tool in diagram form that determines uncertain elements with large impacts on the outcome of the project. ISO 31000: (2018) considers it to be an effective tool and advises project based organizations to perform a sensitivity analysis. Nevertheless, Smith *et al.* (2014) argues that it is not an appropriate tool for projects where an organization does no experience from a similar project. The tool is seen to have limitations during calculations for leaving all other elements constant when the evaluated parameter changes (Smith *et al.,* 2014). This seem to have an impact on the project objectives because in reality events relate to each other, which means that changing one has an impact on another and eventually on the project outcome.

*Decision trees:* This tool is used where the best alternative courses of action are to be selected (PMI, 2017). According to Chiswanda (2021), this tool considers to different situations with their implications in terms of cost and risk possibilities in order to select

the best option. This tool helps decision makers to have a full view of the available options at an early stage of the project (Cabral & De Lima, 2020). This tool is a graphical model of a tree where branches are used to show different decisions with costs attached to each branch including projects risks as alternative paths (PMI, 2017).

*Modeling and simulation:* This tool utilizes a model that stimulates the total effects of individual project risks and any other sources of uncertainty in order to find their potential impacts on the objectives of the project (PMI, 2017). Simulations such as Monte carlo simulation analysis is mainly used. This tool quantifies cost and schedule risks and their impact on the project using computer software that iterates these risks several thousand times and deduces the probability distribution of outputs and hence expected outcomes. According to Akkoyun (2012), this tool is profitable for situations where there are too many risks treatments with high costs. And Loizou & French (2012) also added that it helps decision makers to make appropriate decisions because of its clarity and comprehensiveness. However, it is noted that Monte carlo simulation can only be effective it is combined with other risk management methods.

Stage 4: Risk response

Risk response is the process where means and ways of dealing with identified and analysed risks are formulated (Hansen-Addy & Fekpe, 2015). According to PMI (2017), response strategies are picked from options that are developed and agreed by all stakeholders and team members on the strategy to implement. This stage is considered to be the final stage for the systematic risk management process according to Hansen-Addy & Fekpe (2015). At this phase risk response plans are implemented Rezakhain (2012) in order to track all identified risks, monitor residual risks that remains after risk responses, identification of new risks which are called secondary risks that arises after the risk response and finally evaluate how effective the whole risk management process is (PMI, 2017).

The type of threat involved determines the risk strategy to be implored (Smith et al., 2014). In much literature, avoidance, transfer, mitigation and acceptance are the main strategies used to respond to risks. Avoidance is mainly achieved by changing the

scope, schedule extension, addition of resources or change in the strategy Tembo Silungwe *et al.* (2015) or shutting down the whole project as a total strategy (ISO 31000, 2018). The option of transfer allows the team to transfer the financial impact of the risk by contracting some of the work Nawaz *et al.* (2019) to the other party with the ability to bear and manage the risk on its occurrence (Tembo Silungwe *et al.*, 2015).

Mitigation option seeks to reduce the probability and consequence of the risk event to acceptable levels by taking an early proactive action effectively than taking a reactive action after the risk occurrence (Banaitiene & Banaitis, 2012). Acceptance is a strategy where the team decides to accommodate certain risks and agrees to deal with them instead of changing the project plan (Tembo Silungwe *et al.*, 2015) by using the contingency reserve for the project inform of time, money or other resources to use when the project goes beyond its threshold (PMI, 2017). According to Banaitiene & Banaitis (2012), critical risks usually use avoidance and mitigation strategies while risks with low impact uses acceptance and transference as response strategy options.

Step 5: Risk Monitoring and review

Risk monitoring and review is considered to be the final stage of the risk management process but not the end of the risk management process (Ågren, 2012). This stage monitors how the agreed risk responses are implemented, check out for residual risks which are then documented and transferred to the next risk management process (ISO 31000:2018). under this stage risk are monitored to make sure that the changing environment does not change the risk priorities (Tembo *et al.*, 2015).Tah & Carr (2000) considers monitoring and review to be the most important process in the whole risk management process.. Furthermore the process continues to identified new risks, analyse them and continues to evaluate the effectiveness of risk process throughout the project (PMI, 2017).

### 2.5.2 Risk management framework

Alsaadi & Norhayatizakuan (2021) conducted a study on the impact of the risk management practices on the performance of construction projects. The findings for their study revealed the application of systematic risk management improves the

performance of construction projects extensively. Pham *et al.* (2021) also did a study to develop a risk management process for general contractors in the bidding stage for design and build projects, and the results revealed that the use of the risk management process reduces risks by adjusting the risk management target and yet still maintaining the competitiveness of the bids. In Pakistan, a survey was conducted by Nawaz *et al.* (2019) to investigate the risk management practices used in the construction industry and the results disclosed that there is a strong relationship between project success and effective risk management.

According to KPMG (2013), effective risk management in construction and engineering has been identified to be a key driver to the growth of the company considering how most investments have paid off when implemented. Hence an effective risk management frame is critical for organizations. However, Guasch (2004) argued that all stakeholders should be consistently and clearly involved for a risk management framework to be effective. This is because most projects fail because stakeholders are not effectively and clearly involved during the project implementation (Ignatius *et al*., 2016).

According to Akintoye & Macleod (1997), risk management is important to all construction stakeholders (clients, design team, suppliers and contractors e.t.c) because they are all concerned with the time, cost and quality of the completed project. However, when stakeholders are not clearly and consistently involved, their participation in the project becomes ineffective and eventually comprises the quality of the project (Khan & Kamal, 2017). Therefore, Kishk & Ukaga (2008) highlighted that the integration of the project decision making processes creates an efficient risk management process. Rehacek (2017) indicates that a risk management strategy should be based on the specification of the project because Siang & Ali (2012) every project is unique and has different constraints in terms of time, cost and quality. Moreover, some projects are more risky than others (Perera *et al.,* 2014).

Literature has recorded different risk management frameworks proposed for the construction industry. In Pakistan, Nawaz *et al.* (2019) proposed a risk management framework which focused on the risk management process which involves risk

identification, risk assessment and response which then was followed by risks treatment where the problems of identified and assed risks are solved. To achieve the success of the project, the risk management cycle is followed. Figure 2.6 below shows the whole proposed risk management framework for the construction industry.

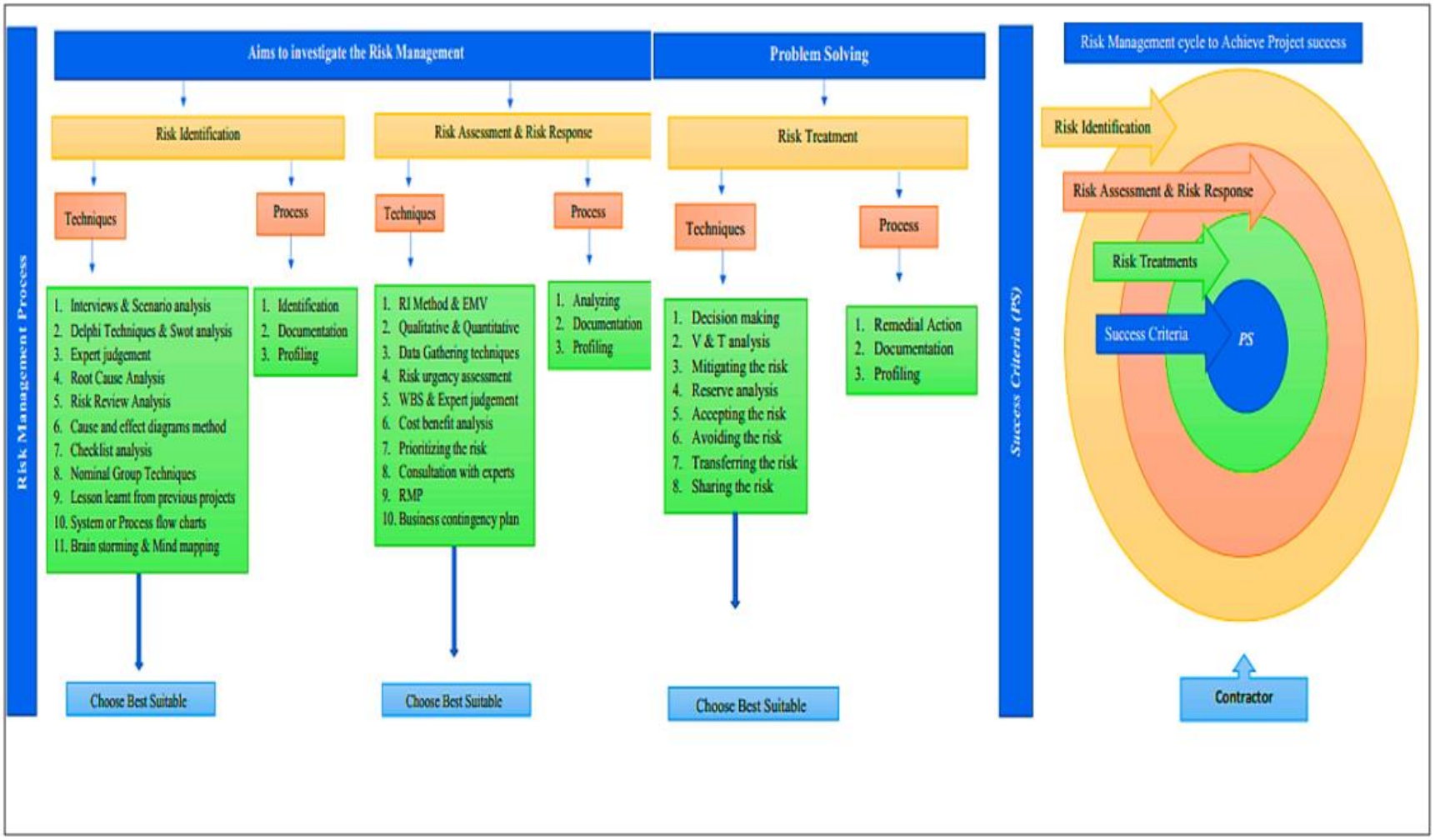


**Figure 2.6** Risk management framework for the construction industry

**Source:** (Nawaz *et al*., 2019)

In Zambia, An Integrated risk management framework (IRM) was adopted by Silungwe *et al.* (2015) which encourages the involvement of all stakeholders at the beginning of the project and its focus is the best outcome final cost of the project. These stakeholders include clients, contractors, consultants and suppliers to give the client the best possible project. These stakeholders are selected based on the technical competence, experience, and commitment to minimise on the effects of avoiding, transferring and mitigation of risks. The advantage of IRM is that the owner gets an assurance that the project will complete on time and within cost by integrating the team together at the early stage of the project to formulate a high level common understanding of the project. The other advantage is that the system breaks tradition boundaries and connects each member to the whole project.

In South Africa, Chiswanda (2021) adopted a risk management process according to PMI (2013) because he considered it to have a more refined outline as far as the risk management process is concerned such as risk management planning, risk identification, qualitative and quantitative risk analysis, risk response and control. As opposed to the traditional risk management process that have been adopted by many, the project management institute of 2013 considered risk management planning to be the first stage and not risk identification.

Based on the literature on risk management frameworks in the construction industry, the author recommends the risk management process from PMI (2017) as ideal for local building contractors because it combines both the traditional risk management process and the integrated risk management process. The process incorporates risk management planning as the first stage of the risk management process unlike the traditional process where risk identification is the first stage. Risk management planning brings in the component of involving critical different stakeholders at the beginning of the project to develop a risk management strategy. The involvement of different stakeholder plays a vital role in the bid decision making, cost estimation and ultimately in the pricing of the tender document. Figure 2.7 below shows the proposed risk management framework for the local contractors in construction industry by the author based on PMI (2017).

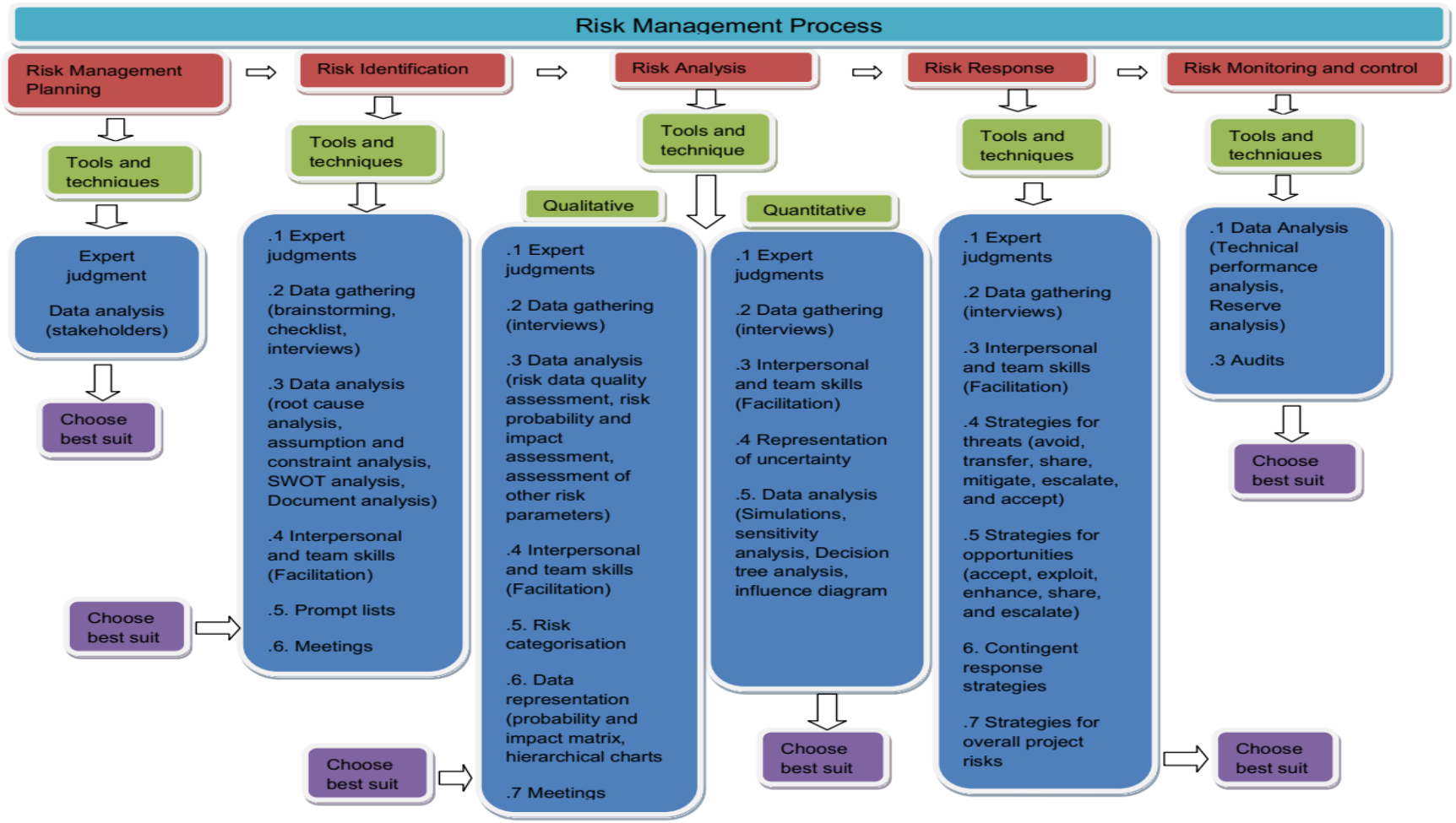


**Figure 2.7** Proposed Risk Management Framework

**Source:** (Author, 2023)

## 2.6 Knowledge Gap

**Table 2.1** Gap analysis

| Author | Topic | Study Findings | Research Gap |
|---|---|---|---|
| Cabral & De Lima (2020) | Evaluation of Risk Management Practices in the Tendering Process within the Construction Industry in Mozambique | The results also show that intuition and experience is used by majority to manage risks during tendering. Risk management process is used at a very low scale and when used it unstructured and there is no specific procedure to follow. However, awareness is improving from time to time. | The study did not explore the risk factors involved at different stages of the tendering process. |
| Silungwe *et al.* (2015) | Risk Reduction on Infrastructure Projects in the Zambian Construction Industry through Integrated Risk Management | The study reveals that there is lack of knowledge with regard to risk mitigation measures or methods in the Zambian construction industry | The study combined a wide range of projects such as telecommunication, building projects, earth works etc. |

| | | | |
|---|---|---|---|
| Tembo (2018) | Risk Management Practices on Building Projects in the Zambian Construction Industry | The study findings show that risks are managed in the Zambian construction industry mainly by experience from related similar projects and use of local knowledge. Meaning only risk identification is conduction when it comes to the risk management process. other processes such as risk analysis and monitoring are hardly conducted | The research only focused on building projects to establish the risk management practices used in the Zambian construction industry |
| Boateng, Ameyaw & Mensah (2020) | Assessment of systematic risk management practices on building construction projects in Ghana | The research results show that the poor performance of projects being witnessed across the sectors of the construction industry in Ghana is due to lack of a Lack of effective risk management practices. | The study has scant and little information of the risk management process |
| Alsaadi & Norhayatizakuan (2021) | The Impact of Risk Management Practices on the Performance of Construction Projects | The study reveals that risk management has a positive and significant relationship with project performance in the construction industry | The study does not cover the risks involved on construction projects and the effects on performance |

## 2.7 Chapter Summary

This chapter reviewed the process of tendering and risk management on construction projects. The chapter detailed the risk factors involved in the tendering process of construction industry and their effects on building projects. The chapter further reviewed the importance of the risk management framework with reference to other previous researchers. In conclusion the knowledge gaps were highlighted based on some of the existing literature. The literature reveals that tendering is one of the most important processes when it comes to the procurement of works in the construction industry. The quality of contractor procured to do the works has an impact on the performance of the project in terms of schedule, cost and the ultimate quality of the project. Hence if risks are not managed effectively at this early stage, they have negative bearing effects on the actual construction process and this cause the project to perform poorly. Hence there is need to manage risks at this stage to improve the performance of a construction project by applying a systematic risk management process that helps in identifying, analyzing, responding and monitoring all individual project risks.

# CHAPTER THREE

# THEORETICAL AND CONCEPTUAL FRAMEWORK

## 3.1 Introduction

This chapter dwells on the theoretical and conceptual framework related to the study investigations. Theories such as Organizational theory, transactional theory, and contingency theory are considered in this chapter. Furthermore, the conceptual framework is established to describe and explain the independent and dependent variables in line with the study.

## 3.2 Theoretical framework

A theoretical framework is defined by Varpio *et al.* (2020) as a connected set of concepts that are developed logically from one or two theories that a researcher creates to support a study. This implies that to create the theoretical framework, theories and concepts must be defined by the researcher in order to provide the basis of the research then put them together through logical connections and finally relate them to the study. Osanloo (2014) simplifies the definition of theoretical framework as “the reflection of the work the researcher engages in to use a theory in the given study”. The following theories are considered appropriate and adopted for this study.

### 3.2.1 Organizational theory

According to Draft (2008), organizational theory looks at formal social organization, their bureaucracies and their relationship with the environment in which they operate. Al-Fadhali (2017) states that this theory evolved because of different perspectives aimed at achieving effectives and reduces bureaucracy. This theory is centered on the decision to make a choice. The decision-making process is described by Shukla (2008) as one whose steps offer an occurrence to change the decision.

Organizations are made up of functional structures that are set into groups to have defined products. These structures depend on each other to produce an overall output and prevent organizations from unnecessary changes and deal with demands they face (Zetterquist *et al.,* 2011). Hence, organizational decision process needs time and resources to bring up solutions that can add value to the organization and avoid risks.

This theory is critical to this study because an organization such a construction company needs to make a decision on whether to tender for a project or not. According to Rodrigues (2006), the modern organization's focus is on how to increase efficiency, effectiveness and other objective indicators of performance through governing structures and controls. Hence it's important for contractors to consider the risk factors inherent to the project before making a decision to tender or not. This mainly calls for an organization to conduct a SWOT analysis by checking its internal strengths and weaknesses and external opportunities and threats before making a decision.

### 3.2.2 Transactional cost theory

According to the work of Coase (1937) and Williamson (1975) and (1985), transaction cost theory (TCT) is one of the most of the most influential theories in management research. According Cuypers *et al.* (2021), this theory originally helped in making vertical integrated decision to "make or buy" which is used in a wide range of organizational strategies such as supply chain relationships, strategic alliances, horizontal diversification and private public partnerships. It is noted by Koschatzky (2017) that transaction cost in many projects could rise externally but may be reduced internally and vice versa. Hence a decision can be made based on what is favourable and thus ultimately reduces risks.

During the tendering process of the building projects, contractors should look out for strategic supply chain partners during the cost estimation process. It is noted by Ibrahim & Elshwadfy (2021) that the success or failure of any project depends on the accuracy of the cost estimation. One of the factors that affect the cost estimation is the price of materials, hence strategic relationships with supplies plays a critical role in terms of cost of materials. And also based on what is prevailing with the suppliers, the contractor can decide whether to make or buy after considering the risk factors involved in each option.

### 3.2.3 Contingency theory

The third considered theory in this study is the contingency theory. This theory suggests that the best answer to the problem depends on various factors involved such as technology, people, environment and goals (Lartey, 2020). These factors are considered to be risk factors. Tosi & Slocum (1984), states that the best way depends

on the environment uncertainty and instability coupled with other factors. This theory doesn't believe in one best way but the solution depends on the situation.

This theory sees organizations as complex systems that that face with uncertainty while being subjected rational criterion at the same time (Thomson, 2003). Hence this theory is very useful in calculating the bidding price in the tendering price of building process to cover the cost of uncertainties. According to Olsson et al. (2006), the tender price is the sum of estimated costs, profits and risks inform of contingencies as shown in the equation below.

Equation 3.1

**TENDER PRICE** = Estimated costs + Profit + Risk (Contingencies) + Risk (Uncertainties)

(Olsson et al., 2006)

Contingencies are added to price of the construction projects because it is very difficult to evaluate the level of risks and uncertainties (Panthi *et al*., 2009). Hence the contingency theory is very critical in this study because it provides principles to cover for the costs of the unforeseen circumstances.

### 3.3 Conceptual framework

Varpio *et al.* (2020) describes the conceptual framework in three ways. (1) It describes state of acknowledged knowledge mainly through reviewing literature; (2) it identifies gaps in our understanding of the problem or happening and (3) gives details on the methodological ideas of the project research. According to Rajablu *et al.* (2017), Conceptual framework responds to the research objectives by depicting variables of the researcher. Bwalya, (2020) simply defined the theoretical framework as simply a sketch which shows the connection between the independent variables and the dependent variables. Hence, in accordance with the theoretical and literature review, a conceptual framework model was developed to show the relationships among the identified important factors with regard to the research problem.

### 3.3.1 Conceptual framework in managing risks in public private partnership projects – Lubinda (2019)

Project success is the ultimate goal of every project regardless of its complexity. PPP projects are normally complex; hence risk management is very critical for such projects. Lubinda (2019) recommends that in PPP projects, risks should be identified though out the whole risk management process in order to come up with an effective analysis and response planning. The study also considered various frameworks such as legal, policy, institutional and technical frameworks to be in place to ensure that the risk allocation for both public and private entities are equitably allocated. After considering all these risk factors a concession is approved to be drafted to ensure the project success.

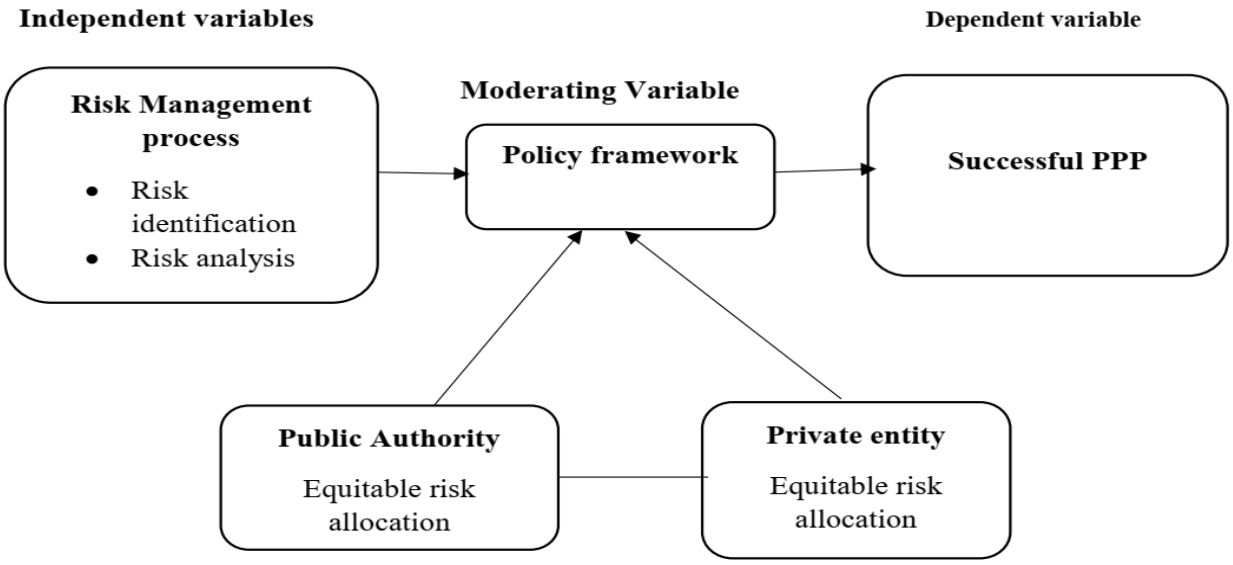


**Figure 3.1** Conceptual framework: Risk management in PPPs

**Source:** (Lubinda, 2019)

### 3.3.2 Conceptual framework in managing risks in toll road projects at development stage – Bwalya (2020)

Bwalya (2020) in his study highlights that risk management is effective if risks are managed at an early stage of the project cycle. Phases such as feasibility phase, planning phase and procurement phase were considered critical variables of the study. In each phase risks should be accurately and thoroughly managed depending on the potential occurrence. The framework promotes the management of risks at an early

stage because most literature reveals that addressing risks at early stages of the project life cycle minimizes the negative consequences of risks.

The framework considers key players such as Road development Agency, Ministry of Finance, Road Transport and Safety Agency and National Road Fund Agency as the legal framework to provide guidance and clearance on the management of risks at each stage. With these factors involved, the project success is enhance and hence providing value for money and project sustainability.

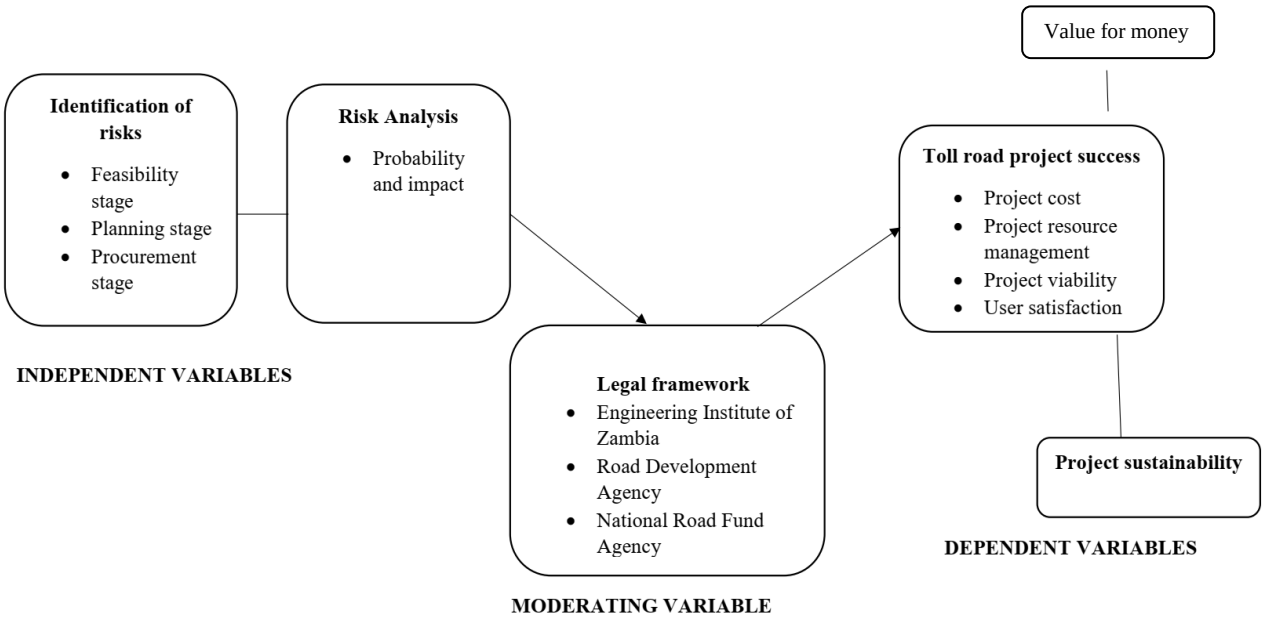


**Figure 3.2** Risk management in toll road projects at development stage
**Source:** (Bwalya, 2020)

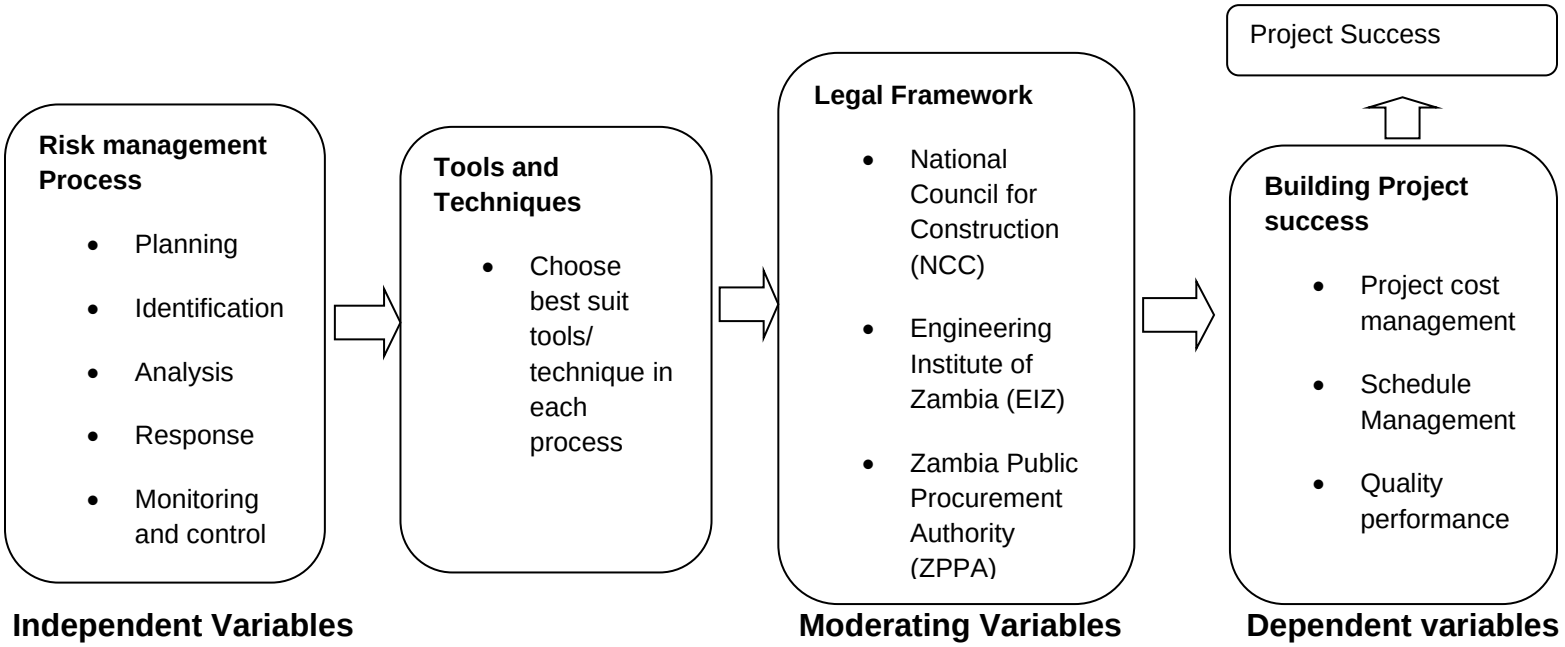


**Figure 3.3** Conceptual framework of the study: Risk Management during the Tendering process

**Source:** (Author, 2023)

### 3.3.1 Variables explanation

#### 3.3.1.1 Independent Variables

The independent variable that pertains to this research study is the risk management process which is to be measured by underlying variable such risk management planning, risk identification, risk analysis, risk response and risk monitoring and control. On construction projects, literature confirms that effective management of risks improves the performance the performance of projects in terms of schedule, cost and budget. However, Smith (2003) opines that it is important to identify risks in each stage by using the right tools and techniques and then come up with an appropriate action.

In the tendering of building works, the three major contractor's phases include the decision to bid, cost estimation and determination of the bidding price. Hence identifying factors that affects any of these stages is critical to manage risks at the tendering stage.

Hatamleh et al. (2018) highlights that proper evaluation of the factors affecting the accurate cost estimation help projects to perform according to the specific budget. It should be understood that the biggest challenge of construction firms is to surpass the project budget (Shash & Ibrahim, 2005).

#### 3.3.1.2 Moderating Variables

The legal framework is the moderating variable in this study. The project legal framework covers institutions with well defined rules and regulations that have influence on the success of the projects with regard to their executions. Therefore, the construction industry is governed by regulatory institutions such as the National council for construction (NCC) to register contractors and categorize them according classes, Zambia public procurement authority (ZPPA) to guide and regulate contractors and stakeholders on eligibility and participation on public tenders and the Engineering Institute of Zambia (EIZ) to regulate the practicing of all engineering related works in Zambia. These legal institutions ensure that all requirements are met in order to increase the project success.

#### 3.3.1.3 Dependent Variables

The dependent variable for this study is the project success. The project success variable has measurable underlining variables such as time, cost and quality. According Ibrahim & Elshwadfy (2021), the success of the project is measured by time, cost and quality elements. This means that if the project meets the underlying constraint, then it is considered a success. For example if time is the underlying constraint of the project, then it means that the project should be completed with the specified schedule for it to be considered a success. If it's the cost then it should be completed with the specified budget. And if the quality performance attributes are clearly defined then it should meet the prescribed performance indicators.

## 3.4 Chapter Summary

This chapter highlights the theoretical and conceptual framework of the research. Three different theories were adopted in the theoretical framework and their relevance to the study was highlighted. All the theories pointed out that management of risks during the tendering stage of the projects is critical to the ultimate project success. The chapter further formulated the conceptual framework and explained the independent variables and the dependent variables in line with the conceptual framework.

# CHAPTER FOUR

# RESEARCH METHODOLOGY

## 4.1 Introduction

This chapter highlights the methodology of this research study. It specifically gives details on the approach of the research, design of the research, the study philosophy, the population of the study, sample size, tools for collecting data and analyzing data. The chapter concludes by presenting research considerations of the study such as its ethics, reliability and validity.

## 4.2 Research approach

Literature reveals that there are three basic approaches of research. These approaches are qualitative, quantitative and the combination of the two commonly known as the mixed method approach. According to Greener & Martelli (2015), qualitative research approach is associated with an inductive approach where a theory is generated from the research problem using various research methods. This is often achieved using an interpretive model of many subject perspectives which are then used to construct knowledge instead of finding it in reality. Quantitative approach is associated with deductive approach where a theory is tested mainly by using a number or fact. This is done by using a positivist or scientific model and an objectivist view of the subject study.

According to Croswell (2012), in quantitative research, variables are measured using instruments so that the numbered data can be analyzed using statistical methods. The mixed approach simply means combining both approaches in carrying out the research study with the aim to converge the research findings. This research study used the mixed approach to garner an understanding on the risk management practices during the tendering process of building projects. The idea is that, because both qualitative and quantitative approach have biases and weaknesses, the use of the mixed approached neutralizes the weaknesses of each form of data (Croswell, 2014).

### 4.3 Research Design

A research design demonstrates how data is collected and analyzed. According Kerlinger (2018), the research design is a structured plan of investigation conceived in order to get answers to the research questions and to control variance. It is simply defined by Philips (2016) as the blue print that is used for data collection, measurement and analysis. This research study used a concurrent triangulation design in order to collect both qualitative and quantitative data in the same phase and see how they support each other (Saunders et al., 2016). This design was adopted to enable participants to provide information on the current status of the risk management practices during the tendering process of building projects from the questionnaires and interviews. The data was then arranged, tabulated and analyzed.

### 4.4 The research Philosophy

Research philosophy is defined by Bale (2014) as the development and utilization of knowledge. It is noted that researchers gather knowledge and understanding in a given study area when conducting a research study (Saunders, 2016). Hence generally, research philosophy is basically the synchronization of ideas and scenarios regarding the knowledge growth. This is mainly determined by the hypothesis of the Ontology or rather the beliefs on the nature of reality and human, Epistemology which is the research's knowledge theories and the methodology which is the way of acquiring knowledge (Saunders 2016).

#### 4.4.1 Ontology

Ontology is defined by Bracken (2014) as the process in which a number of people accepts the perceived social reality whilst revealing their interpretations shape actions. Ontology is basically referred to as concept formation. In both qualitative and quantitative researchers differ greatly in the way they specify the ontology of concepts. Qualitative scholars prefers a semantic approach and work hard to identify the native essential important attributes of the concept while Quantitative scholars believe an unmeasured or hidden variable and then seek to discover good indicators that have a casual relationship with the latent variable (Goertz & Mahoney, 2012).

### 4.4.2 Epistemology

Lubinda (2019) defines Epistemology as the understanding of what is known and what should be acceptable know how in a specific area. Epistemology is basically referred to as knowledge generation. However, the challenges of knowledge generation in both qualitative and quantitative approaches are quite distinct. According to Goertz & Mahoney (2012), , the challenge of knowledge generation is in Quantitaive approches is closely linked to error while the challenges of knowledge generation in Qualitative approches the are linked to fuzziness. Generally statistics is concerned with producing valid knowledge in a text in which error is present. Error estimate in statistics relates to epistemology where the nature or quality of knowledge is concerned while fuzzines is an ontological claim about the real world that has epistemological implications where there are no assumptions or statements with regard to error or the quality of the knowledge.

According to Goertz & Mahoney (2012) fuzzy logic is a natural way to model the qualitative approach to concepts and measurements. This research dwells on both approches because when coding cases both qualitative and quantitative methods exibit impotant epistemological differences in their beliefs about the quality of our knowledge. The kind of cases which the quantitative researcher assumes is subject to higher error measurement is often pricisely the kind of case that qualitative researchers assumes is subject  least amount of measurement error and vise versa.

## 4.5 Study population

The population of the study was determined by obtaining the number of registered Zambian building contractors and consultants in Zambia. The online data reveals that about 7000 building contractors (category B) ranging from grade 1 to 6 are registered under the 2023 National council for construction (NCC), 84 Engineering firms were registered under Association for consultant engineers (ACEZ), 11 Quantity surveying firms registered under the Quantity surveying registration board (QSRB) and about 69 Architectural consultant firms registered under the Zambia Institute of Architects (ZIA). Therefore the population of these categories was 7164. However, the number of clients was not possible to determine as they could be any stakeholder from both private and

public sector. The key players in the building construction and maintenance sector are Architects, Quantity surveyors, engineers, and clients.

### 4.6 Sample size

Basically a sample is an extract of a small portion of the population for examination and observation. According to Berg (2009), observing the features of the sample makes it feasible to come up with certain conclusions about the entire population. Hence, (Creswell, (2012) highlights that the main objective of the sample to make conclusions about a population. Registered professionals were approached in the study to ensure that different categories of respondents were reached from both public and private sector working in a contractor, consultant and client organizations.

The sample size was calculated using Cochran (1977) formula developed for infinite population;

Equation 4.1

$$n = \frac{m}{1 + [(m-1) / N]}$$

Where n, m and N sample size of limited, unlimited and available sample population respectively

Equation 4.2

$$m = \frac{Z^2 * P * [1-P]}{C^2}$$

Where Z represents Z value as 1.96 for 95% confidence interval, P is the estimated population value (0.05) and $C^2$ representing the sampling error.

$$m = \frac{1.96^2 * 0.05 * [1-0.05]}{0.05^2} = 385$$

Therefore, **n** = 385/1 + [(385-1)/7164] = 365.413 **= 365**

The required sample size was 365 respondents. However, the sample size was reduced to a convenient sample size of 109, which is a rule of thumb of 30% of the total sample because of the time limitation of the research period.

### 4.7 Sampling Techniques

Sampling according to Kombo (2016) is the picking of individuals or objects from the entire population to be representatives of the population. Croswell (2014, defines it as the process of selecting an established sample from the population. The respondents of this study were selected using purposive sampling technique. Purposive sampling is a form of non probability sampling where the criteria to include a sample is defined and screened to check if they meet the criteria for inclusion (Easterby et al., 2012). The research only considers those entities that qualify. Purposive sampling is used both on qualitative and quantitative data because of the required technical knowledge and experience.

### 4.8 Data Collection tools

According to Douglas (2017), data is in two categories. These are primary and secondary data. Primary data is the data that a researcher collects for the first time and secondary data is data that is already produced or collected by other researchers (Oluwatosin, 2017). The forms of data according to Oluwatosin (2017) include surveys, questionnaire, experiments, observations and personal interview while on the other hand secondary data sources comes from books, journal articles, government publications websites, internal records etc. Researchers like Easterby et al (2012) opines that collecting your own data provides the researcher control of the structure of the sample and the respondents data, besides it give a researcher more confidence as compare to using archived secondary data.

This research study implored surveys, questionnaires and interviews as tools to collect data. Surveys were conducted to identify construction professionals who qualify to participate in the study. After the identification of the right stakeholders, then self completing questionnaires were administered to the stakeholders categorized in form of client, consultant and contractor from both private and government organizations. Interviews were also conducted either face to face or through a telephone to get an in-

depth understanding on the research problem. The questionnaire was designed in a way that would gather information relevant to answer the important research questions. The questionnaire had both open and closed ended questions for collecting data purposes. The uses of closed ended questions helps in the coding of the key research constructs and further analyses and compare numerous responses.

A 5 point Likert scale questionnaire was adopted to collect the study responses where 1 means ‘strongly disagree’ 2 ‘disagree’ 3 ‘Neutral’ 4 agree’ and 5 ‘strongly agree’ to measure the level of agreement or disagreement to a proposed statement made by the research. Additionally a 4 point scale was also used were 1 represented ‘never’ 2 ‘sometimes’ 3 ‘often’ and 4 ‘very often’ measuring the frequency use of the risk management techniques. The use of open ended questions provides flexibility in answering the questions provided by the study with regard to what they believe is the ideal situation.

The questionnaire was designed two sections. The first section covers the personal information and the second section provides detailed questions aimed at collecting key information that addresses the concerns of the research. The second section was further divided into sub sections to cover the three research objectives to obtain information with regard to the research objectives.

### 4.9 Data analysis

According Croswell (2014), data analysis is the modeling of collected data in a given research with the aim of determining important information with regard to the identified problem. With quantitative data, responses from the closed ended questions were coded and uploaded into Microsoft excel for exportation into a statistical software called statistical package for social sciences (SPSS). SPSS provides descriptive statistics of the findings of the study by presenting information using cross tabulation and gives a better understanding on findings in relation to the demographics. To analyse the qualitative data the analytical hierarchy framework was implored by the researcher by identifying key themes of data collected through interviews before managing it. Quantitative data was analysed using the mean analysis and frequency analysis and

the qualitative data was analysed using content analysis there by creating themes and code the responses.

### 4.10 Reliability and Validity

Reliability of data according to Klenke (2008) refered to as similar observations as observed by others or obtaining same results by repeating the occasion or using the method. Hence the use of structured questionnaires was to ensure that similar data would be observed if the exercise is repeated. The researcher undertook a reliability test prior to the distribution of questionnaires to the study respondents. This was done after 5 questionnaires were distributed to different stakeholder within the scope study.

According to Creswell (2005) validity means that scores from an instrument are meaningful, make sense and allow the study to draw good and conclusive results from the sample of the population. Validity is also argued by Taherdoost (2016) explanation of how sound the collected data covers the study area. Hence the validity of this study comes in three forms (i) by triangulation using two instruments with secondary data (ii) conducted a pilot test where 8 respondents answered the questionnaire and provided feedback on the clarity of the questionnaire (iii) providing logical and comprehensive instruments.

### 4.11 Ethics

Ethical considerations are highly considered in this research by ensuring that the opinions and willingness of respondents are highly respected. Personal details of respondents shall be considered highly confidential in this research and shall not be linked to any suggestions drawn from analysis and conclusion.

### 4.12 Chapter Summary

This chapter provided information on how the research shall be conducted detailing the ideal research design and approach, its research philosophy in form of it ontology and epistemology with respect to its application to the area of study. The chapter further looked at the study population and its sample size using the formula formulated by Cochran in 1977. The sampling technique was also highlighted in great detail complete with the data collection tools. Conclusively the chapter gives provides information on the

data analysis software to use when analyzing data which is considered to be valid and reliable.

# CHAPTER FIVE

# DATA PRESENTATION AND FINDINGS

## 5.1 Introduction

The results of analysis and statistical tests made on data collected by the research instrument are presented in this chapter. This chapter begins with descriptive statistical results analysis of the demographic characteristics of participants in the study. These are presented as percentages and frequencies in table 5.1 and 5.2. Secondly, results for variables of the three objectives presented as Means (M), Standard Deviations (SD) in table 5.4 and table 5.5 then frequencies and percentages in table 5.6 table 5.3 and table 5.7.

## 5.2 Demographics

This segment presents general demographic characteristics of the respondents. According to table 5.1 below the research revealed that 17 % of the respondents were female and 83 % were male. This implies that data was collected from both male and female thereby reducing the aspect of gender biasness. The data was also analysed for professional qualification, experience and Job position.

### 5.2.1 Sex, Qualification and Experience

Most of the respondents (31%) held Degree qualification in Architecture and Building Science (Quantity Surveying), 13% posses' qualifications in Engineering (Civil, Structural, Geomatics etc.), While 11% held qualifications in other engineering fields such as mechanical, Electrical, water etc. Lastly one responded representing 1% holds a qualification in contract management. This clearly indicates that the respondents were well able to understand and provide the needed information for the study.

Regarding the work experience of the respondents, the majority (52%) of the respondents have worked in their respective profession and organization above 12 years, while 25% have worked between 4– 8 years, 15 % of the respondents have worked between 8 - 12 and 8 % have been working for less than 8 years as shown in Table 5.1 below.

The researcher sought through an interview to get an understanding from the construction professionals on the subject of risk management. Majority of the respondents indicated that the understanding on the subject of risk management is merely general knowledge because risks are everywhere. On the other hand, only a few minorities acknowledged having a defined understanding of risk management

**Table 5.1: Demographics of respondents**

| | | **Frequency** | **Percentage** |
|---|---|---|---|
| **Gender/Sex** | Male | 72 | 83% |
| | Female | 15 | 17% |
| **Professional Qualification** | Engineer (Civil, structural etc) | 13 | 15% |
| | Contract Manager | 1 | 1% |
| | Architect | 31 | 36% |
| | Quantity Surveyor | 31 | 36% |
| | Other | 11 | 13% |
| **Experience** | Less than 4 years | 7 | 8% |
| | 4 – 8 years | 22 | 25 % |
| | 8 - 12 years | 13 | 15% |
| | Above 12 years | 45 | 52% |

**Source:** (Field data, 2023)

### 5.2.2 Job Position

Figure 5.1 displays the Job category of respondents below. The results revealed that most respondents were Architects and Quantity Surveyors each at 36%, Engineers at 15%, other professionals were standing at 13% and the least were contract managers at 1%. In terms of Job position, more were Project Managers at 32%, Managing Directors at 30%, Quantity Surveyors at 26%, Contract Managers at 10%, and Development Managers at 1%.


**Figure 5.1** Job Position
**Source:** (Author, 2023)

### 5.2.3 Size of estimation team

The respondents were also asked to state the size of their estimation team. The results showed that most respondents 34 of them are between 2- 4 members, 32 are above 6 members, 13 are less than 2 members and 8 are between 4 -6 members. This implies that the ideal size of an estimation team is between 2 – 4 members. Figure 5.2 below shows the size of the estimation team.

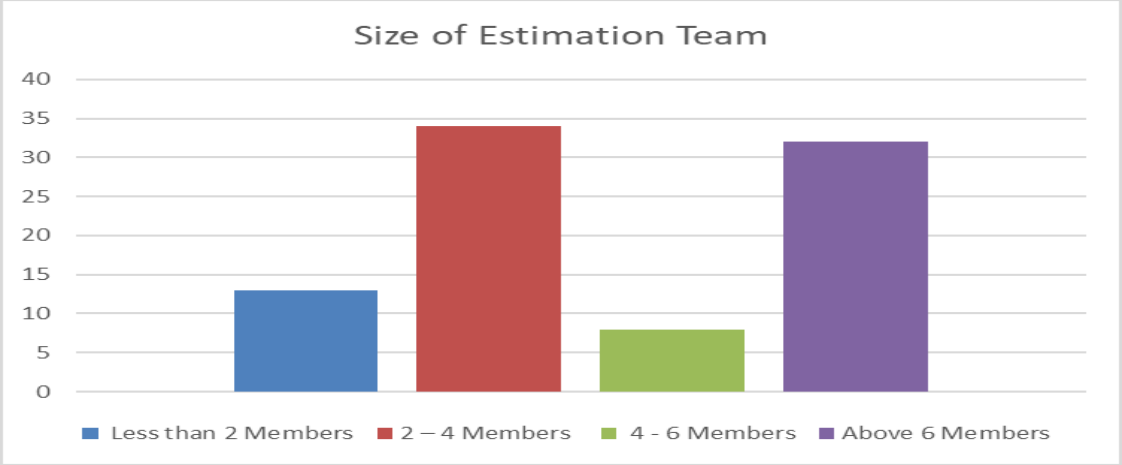


**Figure 5.2** Size of Estimation Team
**Source:** (Author, 2023)

### 5.3 Registration with Professional Bodies

The respondents were also asked if themselves, their members and their organisations were registered with professional bodies such Engineering Institute of Zambia (EIZ), SIZ, ZIQS and NCC. The results in table 5.2 revealed that 93% of respondents agreed that they are registered with EIZ, SIZ and ZIQS. In terms of registration with NCC, the results showed that 47% of the respondents are registered with NCC while 57% were not. This simply implies that 43% were from the contractors and 57% from the consultants and others. Interviews were also conducted with key stakeholder's regard to the effectiveness of these professional bodies in ensuring effective risk management. Most respondents indicated that these bodies are more reactive and not proactive. They further explained that these bodies are more on faulty finding and only reacts when there is a problem with the contractors or consultants. As long as they collect subscription fees, they normally wait until the other year.

**Table 5.2: Registration with professional bodies**

| | Registration with professional bodies | | | |
|---|---|---|---|---|
| | NCC | | EIZ,SIZ, ZIQS | |
| | Frequency | Percentage (%) | Frequency | Percentage (%) |
| Yes | 41 | 47 | 81 | 93 |
| No | 46 | 53 | 6 | 7 |

**Source: (**Field data, 2023)

### 5.4 Responsibility of Pricing Tenders

Form the findings, 64% of respondents indicated that the estimate coordinator is ultimately responsible for the pricing of tenders while 20% indicates it's the managing director with 8% indicating tender manager and the other 8% indicates others. This implies that in the construction industry majority of tenders are priced by Estimate coordinators or Quantity Surveyors. Table 5.3 displays results of the field data.

**Table 5.3: Tender Pricing**

| | Pricing of Tenders | |
|---|---|---|
| | Frequency | Percentage |
| Estimate Coordinator | 56 | 64% |
| Tender Manager | 7 | 8% |
| Managing Director | 17 | 20% |
| Others | 7 | 8% |
| N | 87 | 100% |

**Source: (**Field data, 2023)

### 5.5 Risks associated with building projects

The first research question as guided by the objective was to assess the risk factors associated with bidding process of building projects. The respondents were asked to rate how important it is to consider the following factors of risks during tendering process using a Likert scale where Very Important = 1, Important = 2, Moderately Important = 3, Slightly Important = 4 and Not Important = 5.

**Table 5.4: Risks during tendering**

| Risk Factors | Mean | Std Deviation |
|---|---|---|
| Level of competition | 1.607 | 0.721 |
| Weather and Environmental Conditions | 1.625 | 0.739 |
| Clarity of bidding documents | 1.589 | 0.719 |
| Resource availability (Finance, material, labour) | 1.607 | 0.721 |
| Project site location | 1.571 | 0.717 |
| Perception and experience of the estimator | 1.600 | 1.611 |
| Actual direct cost | 1.589 | 0.735 |
| Payment system | 1.661 | 0.725 |
| Time delivery | 1.607 | 0.721 |
| Fluctuations in exchange rates | 1.696 | 0.743 |
| Project scope | 1.589 | 0.719 |
| **Composite mean** | 1.613 | 0.807 |

**Source:** (Author, 2023)

With regard to the 11 statements on the risk factors the findings revealed that all the risk factors are rated as important (2) in the tendering process considering that all the mean values in table 5.4 ranges from 1.589 to 1.696 which when rounded off to 2 denoting the rating important. This implies that all these factors namely level of completion (mean =1.60), weather and environmental conditions (mean=1.63), clarity of bidding documents (mean =1.59), resource availability such finance, material and labour (mean =1.61), project site location (mean =1.57), perception and experience of the estimator (1.60), payment system (mean =1.66), time delivery (mean =1.61), fluctuations in exchange rates (mean =1.70), project scope (mean =1.59) and actual direct cost (mean =1.57) were considered important to by the respondents. Project scope is to be considered and examined during the tendering process.

### 5.6 Probability and Impact of risks on Building projects

Respondents ticked (√) as appropriate to indicate their assessment of the probability of occurrence and criticality of the impact of identified risk on the tendering process for building projects.

The scale for the assessment of impact of the risks was as follows:

Very high = 5 High = 4 Moderate = 3 Low = 2 Very Low = 1

Very High = project investment could not be sustained, High = serious threat to project objectives, Moderate = reduces attainment of project objectives significantly, Low = small effect on project objectives, and; Very low = trivial effect on project objectives.

While the scale for the assessment probability of occurrence of the stated risks the tendering process of building projects was as follows:

Very likely = 5 Likely = 4 Somehow likely = 3 slightly likely = 2 Not likely = 1

**Table 5.5: Probability and Impact**

| Risks | Probability (P) | Impact (I) | Effect (P*I) | Rank within category ( out of 8) |
|---|---|---|---|---|
| Changes in design affects the delivery of the project | 1.625 | 3.696 | 6.01 | 8 |
| Unnecessary approval processes affect the delivery of the project | 1.679 | 3.696 | 6.20 | 6 |
| Poor project scheduling causes project delays | 1.696 | 3.696 | 6.27 | 5 |
| Change in scope cause cost overruns | 1.714 | 3.786 | 6.49 | 4 |
| Contractor inexperience causes cost overruns | 1.714 | 3.821 | 6.55 | 2 |
| Access to materials affects the project quality | 1.732 | 3.768 | 6.53 | 3 |
| Political condition and involvement of site staff affect the project quality | 1.768 | 3.768 | 6.66 | 1 |
| Low bids due to competition affects the quality of the project | 1.661 | 3.661 | 6.08 | 7 |

**Source:** (Field data, 2023)

### 5.6.1 Probability of risks on building projects

According the field data collected on the probability of occurrence of the stated risks on building projects by the respondents.

The statement that changes in design affects the delivery of the project had the probability of occurring as slightly likely (1.625), while the assertion that unnecessary approval processes tend to affect the delivery of the project was also rated slightly likely (1.679) to occur, Poor project scheduling causes project delays (1.696), Change in scope cause cost overruns and Contractor inexperience causes cost overruns both have a the same probability of occurrence (1.714), Access to materials affects the project quality was rated as slightly likely to occur (1.732), Political condition and

involvement of site staff affect the project quality (1.768) and Low bids due to competition affects the quality of the project (1.661).

### 5.6.2 Impact of risks on Building projects

The second part of the research question was to evaluate the impact of risk on bidding process for local building contractors.

With regard to the impact of these risks, the results showed that respondents agreed with the statements that all the risks have the capability to impact the bidding process for building projects negatively if they are not given the required treatment or intervention.

The study findings show that respondents strongly agreed with the statements on the impacts of risks on the building projects and that design affects the delivery of the project was considered as having moderate impact (3.696), as well as the assertion that unnecessary approval processes tend to affect the delivery of the project (3.691) that it has moderate impact on bidding process of building projects. Furthermore, the respondents also stated that poor project scheduling causes project delays (3.696) had moderate impact, The risk of change in scope causing cost overruns (3.786), Contractor inexperience causes cost overruns (3.821), Access to materials affects the project quality (3.768), Political condition and involvement of site staff affect the project quality (3.768) and the statement that low bids due to competition affects the quality of the project had same mean when rounded off (3.652).

The researcher also enquired from the respondents through an interview on the methods used to mitigate risks during the tendering process. One contractor indicated that they mitigate these risks by ensuring that they conduct site visits, understanding the client and engage clients before making a decision to tender for the project. On the other hand another contractor responded that checking the market trend in pricing and inflation helps them to mitigate pricing risks during the tendering process.

### 5.7 Technical Inputs for Establishing an effective Risk Management Framework in Building projects during the tendering stage

This is demonstrated by the mean values and standard deviations shown in Table 5.6, 5.7 and 5.8 after the following scale (1=strongly agree, 2=agree, 3=undecided, 4= Disagree, 5=strongly disagree) was used to rate the preferred answer indicating the degree of agreement on the validity of the following importance of the statement as a factor to consider when developing a risk management framework.

#### 5.7.1 Internal technical inputs to Risk Management Techniques

From the findings shown in table 5.7 below the results showed that the respondents had mean value ranging from 1.84 to 1.98.

The need for planning capability and level of resource utilization ranked highest with mean = 1.98, followed by the mean (1.96) on the risks arising from current work. A mean of 1.93 was recorded on the need for the contractor to be in sound financial capability of contractor. The least mean 1.84 was noted on the risks that may result from management team (suitability, experience, performance) and experience on similar projects as critical.

**Table 5.6: Internal technical inputs in establishing risk management framework**

| Risk technical inputs | Mean | Std Deviation |
|---|---|---|
| Experience on similar projects is critical | 1.84 | 0.86 |
| Financial capability of contractor | 1.93 | 0.93 |
| Current work load | 1.96 | 0.92 |
| Management team (suitability, experience, performance) | 1.84 | 0.83 |
| Planning capability and level of resource deployment/ utilization | 1.98 | 0.95 |
| **Composite mean** | 1.91 | 0.898 |

**Source:** (Field data, 2023)

### 5.7.2 External risk factors considered as technical inputs

This was computed using descriptive statistics based on the data collected from the respondents as shown in table 5.7 below. The results of the findings indicate that all the provided risks were agreed to be critical in the risk management framework of contractors during the tendering process for building projects. The highest mean (1.95) was recorded on the number of competitors in the market and Labor and equipment (cost, availability, performance, productivity). The risks related to environment and weather conditions obtained mean (1.92). The second highest mean (1.88) was obtained on Interest rate and inflation rate and least mean (1.86) was recorded on the availability of other projects for tendering.

**Table 5.7: External technical inputs in establishing risk management framework**

| Risk technical inputs | Mean | Std Deviation |
|---|---|---|
| Number of competitors in the market | 1.95 | 0.91 |
| Labor and equipment (cost, availability, performance, productivity) | 1.95 | 0.91 |
| Interest rate and inflation rate | 1.88 | 0.87 |
| Availability of other projects for tendering | 1.86 | 0.80 |
| Weather conditions | 1.92 | 0.87 |
| **Composite mean** | **1.91** | **0.87** |

**Source:** (Field data, 2023)

Through an interview, respondents additionally asked to state certain challenges during the bidding process. among the challenges include Scarcity of information about material prices on the market, some suppliers have monopolized the market and does not provide quotations, Quotations are only valid for a few days, cost of tendering is high (performance guarantees, performance bonds, bank guarantees etc.), challenges accessing the site, political influence and lack of Experts such as estimators.

### 5.8 Risk Maturity

Which statement best describes the status of your organization's Risk Maturity? The results revealed that 43.7% respondents stated that the companies are at aware (Scattered approach to risk management) state of the risk maturity. 28.7% of the respondents described their companies risk maturity at Define (Strategies and policies in place and communicated) stage. While 17.2% described their maturity stage as managed (Organization's approach to risk management is developed and communicated). 8.1% of the respondents felt that their companies risk maturity is best described as Enabled (Risk management and controls are fully embedded into the operations) and lastly, 2.3% of the respondents indicated that the risk maturity of the organisations is Naïve (No formal approach developed for risk management).

The research also sought through an interview to found out if construction organizations have put in place risk management frameworks or policies in their organizations and their effectiveness if any. Majority of the respondents indicated that they have no company risk management policies or frameworks. Most of them use experience and best practices to manage risks.

Furthermore, respondents were also asked through an interview if there is a relationship between effective risk management and the performance of the project. In this regard all the respondents acknowledged that there is definitely a positive relationship between the effective management of risks and the performance of the project. Others further highlighted that when risks are well managed the project makes profit, completes on time and saves the cost and ultimately quality is attained.

**Table 5.8: Risk Maturity**

| Risk Maturity level | Frequency | Percentage (%) |
|---|---|---|
| Naïve (No formal approach developed for risk management) | 2 | 2.3 |
| Aware (Scattered approach to risk management) | 38 | 43.7 |
| Define (Strategies and policies in place and communicated) | 25 | 28.7 |
| Managed (Organization's approach to risk management is developed and communicated) | 15 | 17.2 |
| Enabled (Risk management and controls are fully embedded into the operations) | 7 | 8.1 |

**Source:** (Field data, 2023)

## 5.9 Chapter Summary

This chapter presents an analysis of the findings gotten from the questionnaires and interviews with regard to the three objectives of the research study. The first part provided the quantitative analysis the risks that are associated with the tendering process of building projects, the probability and impacts of these risks on building projects. The chapter also analysed the technical inputs considered in establishing an effective risk management framework. All these mainly used the Likert scale of five-to-six-point scales to ascertain the respondent's level of agreement or disagreement.

The study further used also the qualitative analysis in form of an interview guide to provide even more information that was used as an input to develop a risk management framework for building projects during the tendering process in the building sector.

# CHAPTER SIX

# DISCUSSION OF FINDINGS

## 6.1 Introduction

This chapter focuses its attention on discussing the important findings of the study whose focus was to explore the risks the risks in the tendering system of the building sector and analyse their probability of occurrence with their impact on building projects. The chapter further looked at the critical technical inputs that must be considered in establishing an effecting risk management framework during the bidding process of building projects.

## 6.2 Discussions of findings

This chapter provides insights and details of the research findings relating the obtained results to the literature review. Below is the discussion of the findings presented in the order of the research objectives.

### Objective 1: To explore the risks in tendering system in building sector

### 6.2.1 Risks associated with building projects at the tendering stage

The study findings established 11 highlighted risks factors. The study findings have regarded all these risk factors important. This was demonstrated by the composite mean value of 1.613 denoting important and lies within the Likert scale of (1) Very important and (2) important as shown in table 5.4. These risk factors included: Level of competition, Weather and Environmental Conditions, Clarity of bidding documents, Resource availability (Finance, material and labour), Project site location, Perception and experience of the estimator, Actual direct cost, Payment system, Time delivery, Project scope and Fluctuations in exchange rates. The respondents highlighted that if the level of competition is not scrutinized before bidding, the risk has potential to affect the cost and eventually the success of winning the tender. Therefore, the researcher notes that this risk is critical because it helps the contractor to make an informed decision on whether to bid or not to bid.

This is supported by Sash (1993) who conducted a study in the United Kingdom and identified the number of tendering competitors as one of the risk factors affecting the bidding decision of contractors. The study revealed that failure to understand the bidding document even creates more risks on the project performance. This is supported by Laryea and Hughes (2009) who indicated that the accuracy of a tender price depends on the clarity of the bidding document.

Resource availability was another consideration. According to the research findings, before a decision to tender is made, the demands of the resources needed by the project should be highly considered be it money, labour, equipment etc. Researchers such as Shokri-Ghasabeh and Chileshe (2016), Bageis and Fortune (2009) and Bakr (2019) considers this factor to have an influence the decision to bid and the accuracy of the cost estimate of the project. The site location of the project was also rated important by the study. Azman (2012) in his study indicated that the site located of the project has the potential to affect the accuracy of the cost estimate if not considered. This factor is critical to consider as it affects the cost of the project in terms of material availability, access to site and many other considerations that can affect the project negatively.

The research also rated perceptions and the experience of the estimator as critical. These results are also supported by a study conducted by Jarkas et al. (2013) and Bakr (2019 who highlighted that this risk affects the accuracy of the estimates and should be considered before making a decision to tender. This risk affects the accuracy of the tender price if the estimator has no experience. Sometimes an estimator has to make assumptions which are critical to the profitability of the project. Hence the experience and exposure of an estimator is critical during the tendering process.

Actual direct cost is another risk factor highlighted by the research finding as important. With the mean value of 1.589, direct costs are also very critical during pricing of the bidding document. Similar findings were also reported by Omran and Boon Hooi, (2018) who further identified tendering price to be made of three major components, the direct costs, indirect cost and, profits and risks. Laryea and Hughes (2009)also shared a similar sentiment that actual direct cost is another major risk factor that affects the success of the tender price. Hence the researcher acknowledges that this risk factor

should not be ignored because the price of the tender depends. It is important to know the payment system of the project even before a decision to tender is made. The payment system of the project is critical to note because it helps the bidder to plan his financial cash flow. Other clients can only pay at the end of the project, hence it is imperative to know the resource capability of the firm to avoid failing to complete the project. This is acknowledged by Bageis and Fortune (2009) who considered payment system to be among the most important risk factors that influence the decision to tender which is the quick payment system of the client.

Time delivery was also rated important with a mean value of 1.607. Time factor on any building project is considered critical, most building projects are time bound and failure to achieve the allocated time may call for damages and cost fluctuations. Most construction projects have recorded completion delays and this robs either the community or clients opportunities to use the facilities at the right time. Mpofu et al. (2017), echoed similar sentiments that schedule delays on a project frequently causes cash- flow challenges, arbitration, adversarial relationships and mistrust. The research study equally found project scope important. According to the research finding through interviews, not understanding the scope of the project is planning to fail. It was revealed that a defined scope helps in ascertaining the cost and scheduling of the project. In this regard, the researcher highlights that if the scope is not properly defined any project may land into a scope creep and consequently affecting the cost and the schedule of the project. This finding was supported by Akinradewo et al. (2020) who advised that it is cardinal for estimators should pay particular attention to factors such as clear scope definition at an accurate cost estimate and be able to complete the project within schedule.

The study also rated Fluctuations in exchange rates to be another important factor. Most respondents via interviews highlighted that the changes in exchange rates have an impact on the prices of materials during the project implementation phase and this affects their tender prices and eventually the cost of the project. The need to consider fluctuations in the exchange rates was also supported by Wang (2020) who highlighted that external macro and micro economic factors such as the interaction between

demand and supply (economic prosperity and decline) and exchange rate have influence on the decision to bid or not. However, according to Kim et al. fluctuations of exchange rates sometimes may lead to the project making loses, hence the research purports that the currency to be used must be consider to avoid loses during the project implementation. Furthermore, the study revealed several risk factors via interviews which includes but not limited to the following; procurement method types, project special requirements, company's reputation, materials availability, client financial muscle and organizational expertise among many other to also be considered as critical factors to contractor's success. Considering all these identified risks associated with the bidding process of building projects, it has been noted that institutions such as Engineering Institute of Zambia EIZ, Zambia Public Procurement Authority, Quantity surveying Registration board (QSRB), Zambia Institute of Architects and many other professional governing bodies have not been proactive in ensuring that these risks are reduced to minimal levels.

The study further revealed through interviews that these professional bodies are more reactive that proactive. Their concentration is on the collection of subscription fees, and only reacts when there is an exposed project issues on site. It is worth noting that since these institutional bodies' forms the regulatory framework for the construction industry, it is imperative that these bodies be proactive especially during the initial stages of building projects to scrutinize the quality of documents produced by different professionals within the construction industry both from the consultancy and the contractor's side and offer education and guidance.

In conclusion the study analysed 11 risk factors with a composite mean (1.613 ~2), this implies that the stated risk factors are important and have the potential to impact the tendering process for the contractor. Therefore, they must be considered at all times in order to ensure success when tendering.

**Objective 2: To analyze the probability of risk occurrence and effect on the local contractors during the tendering process.**

### 6.2.2. Probability of risk occurrence and impact on building projects during the tendering stage.

The study established that the highlighted risks have a slightly likelihood of occurrence but high impact on building projects at the development stage. This is demonstrated by an average mean of 1.69 ≈ 2 on the probability of occurrence and an average mean of 3.74 ≈ 4 on impact and an average mean of 6.345 on effect as shown under Table 5.5.This implies that these highlighted risks have a potential likelihood of occurring and if they occur they have a high bearing capacity on the success of building projects. Some of the effects of these risks include project cost overruns, project completion delays and project quality performance.

Serpella et al. (2014) supports these findings by highlighting that failure to manage risks of construction projects affects the performance of the project in terms time, cost and quality. Also the PMI (2013) backs up this finding by indicating that lack of preventive measures by participants for a scope definition risk issues like significant cost increment, delays, contractual disputes and scope creep are eminent.

Grimsey (2002) also asserts that, ignoring chances of risks in a project can bring about a lot of costs to the project sponsor hence spoiling the relationship between an organization and the public or client to which the project is being developed for. As a result of this, the concept of risk analysis and management continue to be a major feature of the project management of construction projects in an attempt to deal effectively with uncertainty and unexpected events and to achieve project success (Kaliba, 2010).

Relative to these findings Mpofu et al. (2017) postulated that schedule delays on a project frequently causes cash- flow challenges, arbitration, adversarial relationships and mistrust on building projects. Edison and Singla( 2020) also indicated that any form of delays on the project cause excess cost overruns on the contractor’s overheads and also the loss of revenue for clients. Therefore, it is evident that the lack of a structured

risk management at the tendering stage has an impact on the overall performance of the project during the implementation stage. Silungwe (2015) noted that issues such as project duration, cost planning and estimates, type of the project, scope, design, project specifications are documentations are all dealt with at the tendering or bidding stage. Hence the consideration of a defined risk management process during the tendering process cannot be over emphasized because changes at the inception stage of a project are easier and cheaper than the later stages

The study findings show that respondents felt that identified risks have moderate impacts. The study revealed that the effect of design on project delivery was considered moderate in terms of impact while unnecessary approval processes was considered to affect the project delivery moderately. Furthermore, the respondents also stated that poor project scheduling on project delays has a moderate impact while the risk of change in scope and contractor inexperience on cost overruns were found to have moderate impact. The risk factors such as access to materials a, Political condition and involvement of site staff, low bids due to competition on the quality of the project were all found to have moderate impact.

Shrivastava et al (2019) also supported those cost overruns on infrastructure projects results in huge losses on national treasury because it uses tax payers' money. This support is backed up by Kamal et al. (2022)who pined that the performance of any building project is measured by time, cost and quality. Hence whatever affects any of the three factors affects the performance of the project.

In conclusion the study revealed that political condition and involvement of site staff had the most effect (6.66) ranked 1 out of 8 risk factors, while the risk factors arising from changes in design affecting the delivery of the project was found to have the least effect (6.01) ranked 8.

**Objective 3: To formulate the risk management framework of local building contractors during the tendering process**

### 6.2.3 Technical inputs required in establishing the risk management framework for building projects at Tendering stage

The third and final objective of the study was to establish the risk management framework for building projects at tendering stage. The building sector tends to experience a lot challenges during the tendering/bidding process in Zambia both internally and externally. The challenges includes, Scarcity of information on material prices, lack of expert capacity, high cost of tendering, award of contract to the lowest bidder, Political influence, inflation, interest rates e.t.c.

The research study recommended certain critical technical factors to consider during the tendering process. These factors may be used as technical inputs that help in establishing an effective risk management framework. In the analysis generally all the respondents supported these technical inputs as shown tables 5.6 and table 5.7 demonstrated by the composed mean of 1.91. These technical inputs include: contractors experiencing in executing similar projects, financial capability, current workload (current projects in which the contractor is undertaking), contractor ability to utilise resources and the strength, weakness and core competence of the management team. A project is reviewed based on its characteristics, contract form, client, geographical location and the available competences.

**Internal technical inputs**

#### 6.2.3.1 Experience on similar projects

Experience on similar projects is of outmost importance during the tender process of building projects. This factor reveals the inherent risks of the project hence help the contractor to plan on the mitigation measures. Lack of experience on similar projects exposes the contractor to more risks. Hence this factor is important to consider when establishing the framework. The mean 1.84 was noted on the importance experience on similar projects as critical from the results. This result has been supported by Fayek et al. (1999) and sash (1993) who indicated that experience on similar by the bidder

influences the decision to bid because the bidder has historical information of the similar projects and knows exactly what to expect.

#### 6.2.3.2 Financial capability of contractor

A mean of 1.93 was recorded on the need for the contractor to be in sound financial capability of contractor. This factor cannot be ignored by the bidders; bidder for a project requires financial resources. This input is key and must be considered when developing the risk management framework. This was also highlighted by Jarkas et al. (2013), that the financial stability of the bidder influences the bidder to make a decision to bid for the project or not.

#### 6.2.3.3 Current work load

The other factor that requires attention is the current workload of the bidder. Sometimes bidders get excited when they see a new project on the market and forget to consider their current workload. The research revealed the mean of (1.96) on the risks arising from current work. Jarkas et al. (2013) considers this factor critical when making a decision to tender for the project. The bidder should avoid overloading of work because it may compromise other projects in terms of labour force and financial demands.

#### 6.2.3.4 Management team (suitability, experience, performance)

The quality of the management team assembles have an effect on the success of the project be it at the tendering stage or implementation stage. The research revealed a mean 1.84 capturing this factor important to consider. Researchers such as Enshassi et al. (2013) highlighted that skill and experience of consultants affects the accuracy of cost estimates of the project. Therefore, it is important to consider suitability and experience of the management team during the identification stage of the project.

Alumbugu et al. (2014) also proved experience and skill level of consultant, project team experience on the construction type affects the accuracy of cost estimates during the bidding process. Bakr (2019) also had the same results.

### 6.2.3.5 Planning capability and level of resource deployment/ utilization

The need for planning capability and level of resource utilization ranked highest with mean = 1.98. The research ranked this to be the highest because everything begins with planning. Akinradewo et al. (2020) highlighted in their research that improper project planning affects the accuracy of cost estimates during the bidding process. Therefore, planning is very important during the bidding process of building projects because failing to plan is considered planning to fail in the field of project management.

**External Technical inputs**

### 6.2.3.6 Number of competitors in the market

On external technical inputs, number of competitors was recorded highest with a mean value of 1.95. The number of competitors for a project has the power to influence the decision to bid or not. This is because mostly when competitors are many, the tender price becomes competitive and when the number of competitors is few the tender price becomes reasonable practically. This factor is backed by Azman (2012) who supported that the number of competitors affects the accuracy of the cost estimates during the bidding process.

### 6.2.3.7 Labor and equipment (cost, availability, performance, productivity)

The resourcefulness of the bidder in terms labour and equipment was also recorded highest by the search with a mean of (1.95). During tendering, it is common practice to consider the source of labour and equipment demanded by the project. This factor is critical because production and performance of the project depends on them. Lack of this aspect renders the project a failed project. According to Omran and Boon Hooi, 2018, the cost of labour and equipment affects the pricing of the tender.

### 6.2.3.8 Interest rate and inflation rate

This factor was recorded second highest mean of (1.88) on external factors affecting the bidding process of building projects. This factor must be considered critical when developing the risk management framework of building project at the bidding stage. Musarat et al. (2020) noted that most bidders neglect the aspect of interest and inflation rate during the budgeting of construction projects. And this has caused a lot of cost

overruns for the project such as labor wages, machinery hire rates and prices of materials. This was proven by developing a framework that showed that there is a strong relationship between construction industry and inflation rate.

#### 6.2.3.9 Availability of other projects for tendering

Availability of other projects for tendering is another factor that the research considers important. The bidder should ensure that before making a decision to bid for a specific project, other projects on the market should be consider in order determining the project which the organization can handle effectively.

#### 6.2.3.10 Weather conditions

The risks related to environment and weather conditions obtained mean (1.92). Many times, this factor is neglected during the bidding process and yet it plays a very critical role during in the delivery of the project. Olatunji et al. (2017) and Biruk et al., (2017) considers the conditions of the site critical during the bidding process because the project delivery might depend on it. The researcher considers weather condition of the project area cardinal because the scheduling the project activities is affected by it. This is because weather conditions can cause delay on the project delivery.

### 6.2.4 Framework Validation and Evaluation

Taylor, (2013) postulated that the achievement of any probable attribute depends on its validation and comprehension by its users and a significant link between the parameter and the characteristic envisioned to be attained. Therefore, validation is the procedure that pursues to approve that the suggested framework exemplifies the eccentricities of the wider population and is not only applicable to the sample size (Arafat et al., 2016). Further, Heale, (2015) argued that validation enhances the reliability and resilience of the risk framework.

The risk framework for contractors during tendering process for building projects was validated by conducting semi-structured interviews with CEOs of the companies that participated in the research using purposive sampling which allowed the researcher to intentionally choose informants based on their experience and technical knowledge to

offer vital and accurate input in relation to answering the research questions. The findings were outlined as follows:

**Table 6.1 Credentials of key personnel that validated the framework**

| ID | Qualification | Duration of practicing engineering |
|---|---|---|
| Respondent 1 (R1) | Bsc. Civil, Msc Construction Management | 25years of experience |
| Respondent 2 (R2) | Bsc. Building Science, Msc. Project Management | 30 years of experience |
| Respondent 3 (R3) | Bsc. Building Science, | 35years of experience |
| Respondent 4 (R4) | B.Arch, Msc Project Management | 18 years of experience |

**Table 6.2 Themes and remarks by CEOs that validated the framework**

| | | Remarks |
|---|---|---|
| 1 | Role of professional organizations (NCC, EIZ, SIZ, ZPPA, ZIA) in ensuring effective risk management | R2: The professional institutions have no interpersonal relationships with individual contractors hence that impact is not seen. |
| | | R3: The other respondent indicated that once these professional bodies collect subscription fees, they again come on the scene when the subscription fees are due again. |
| | | R4: Most of these professional bodies are more on faulty findings than building the capacity of contractors to ensure that that right thing is done at an early stage |
| 2 | Knowledge of risk assessment and management | R1: Regarding the subject of risk management, I merely have general knowledge because risks are everywhere. |
| | | R4: Definitely I have a well understanding of risk assessment and management. |
| 3 | Identification of potential internal and external risks during the tendering process of building projects | R2: I have encountered a number of risks ranging from under pricing, understanding of the bidding document, scope of work, capacity (labour, money), and qualified personnel as critical factors to consider during the bidding process. |
| | | R3: Another professional indicated nature of the project, scope of work, site conditions, cost constraint, time constraint, availability of materials, Nature of the client and technological risks as critical risk factors worth considering during the tendering process. |
| | | R4: Yet another professional highlighted risks such as wrong contract, project scope, |

| | | |
|---|---|---|
| | | access to site, competition with established contractors and political influence as critical during the tendering process. |
| 4 | Incorporation of common challenges contractors face during the tendering process in the risk management framework | R1: I face challenges on the scarcity of information about material prices on the market, some suppliers have monopolized the market and does not provide quotations, Quotations only valid for one week and yet works commence at a later stage and Cost of tendering is high (performance guarantees, performance bond and bank guarantees) |
| | | R2: I have encountered a number of hurdles in collecting quotations, political influence, finding experienced estimators, clarity of tender documents (discrepancy between drawings and BOQs) and award of tender to lowest bidder and not best evaluated bidder |
| 5 | Management of risks during the tendering process | R2: I mitigate these risks by ensuring that site visits are conducted and engage the client to clearly understand the needs of the client before making a decision to tender for the project. |
| | | R4: The estimation in my company always checks for market trend in pricing and inflation this helps them to mitigate pricing risks during the tendering process |

### 6.2.5 Evaluation and feedback loop analysis

The researcher evaluated the remarks from the key personnel that answered the questions as follows

i. **Role of professional organizations (NCC, EIZ, SIZ, ZPPA, and ZIA):** The respondents emphasized the role of professional organizations (NCC, EIZ, SIZ, ZPPA, ZIA) in ensuring that contractor's employee qualified personnel to prepare tender documents. This is critical in ensuring that there is effective risk management. Despite the seemingly negative perception towards the professional bodies, the risk framework encourages CEOs to ensure that members of the management team in charge of cost estimates must be registered with professional bodies with strict adherence to regulations.

ii. **Knowledge of risk assessment and management:** The researcher echoes the sentiments of the R1 that risks exist in every sphere hence there is need to mitigate the adverse effects. Therefore, in the proposed framework the knowledge on risk assessment will be critical in identifying and analyzing the internal as well as well as external risks in the bidding process for building projects.

iii. **Identification of potential internal and external risks during the tendering process of building projects:** The researcher similarly cited and supports the stated risks as they have been proposed in the risk framework. Additionally, the ten risks identified to be continuously assessed before bidding for the building project, doing so will enable the contractor to analyse the internal capabilities to execute the project and the effect of the external processes.

iv. **Incorporation of common challenges contractors face during the tendering process in the risk management framework**: The researcher supports the consideration for other challenges that may arise such as the scarcity of information about material prices on the market and some suppliers tending to monopolize the market. The researcher further agrees with the observation by R2 that political influence must be considers and clarity of tender documents

(discrepancy between drawings and BOQs). Bidders must seek for clarity in order to be able to price the tender correctly.

v. **Management of risks during the tendering process:** The researcher disagrees with the recommendation because the framework has a risk score which will be derived from an assessment of the risk factors of which competitor analysis in terms of pricing and estimation team experiences is analysed. Therefore, site visit should only be considered if the internal and external risks meet the set risk score by the contractor.

### 6.3 Risk Maturity

The other component that the researcher looked at is the risk maturity of the local companies within the building industry. The study revealed that majority of the respondents (43.7 %) of the companies is at aware level in terms of risk maturity; however, they use a scattered approach to manage risks. This simply shows that there is not structured way of managing risks. On the other hand, a considerable percentage 28.7% of the respondents described their risk maturity level as define level with well communicated strategies and policies in place as shown under Table 5.9. The findings largely imply that the participants are at different levels of risk maturity. The findings are related to Ongel (2009) who concluded that the level of risk management varies per project and between local and international projects. Besides, companies, which do not allocate a budget to risk management activities, encounter immature risk management process.

Loosemore et al. (2006) postulated that several scholars have reported that, the risk management levels of construction organizations are not the same on different attributes. An example would be that an organization could have a high-risk maturity level in risk management process and practices but low risk maturity level in risk attitude and culture. The study findings simply implies that the many building contractors have no defined approach to risk management and these calls for trainings by the professional bodies on this subject.

## 6.4 Chapter Summary

The chapter covers the three specific objectives of the study by providing discussions and analysis of the findings as presented in chapter five. The chapter that follows highlights the conclusions and recommendations of the research study. The chapter also provides a risk management framework for building projects.

# CHAPTER SEVEN

# CONCLUSION AND RECOMMENDATONS

## 7.1 Introduction

This chapter highlights the conclusion and recommendations with reference to the research discussions and findings of the research objectives. The recommendations highlighted in this chapter consists of good measures that can be adopted by various stakeholder and implemented to ensure that risk management is improved in the building sector especially at an initial stage of the project. The chapter also presents a section on potential topics of future research.

## 7.2 Conclusion of the research Findings

The study was aimed at identifying risks that are associated with building projects at the tendering stage and their effects on building projects. The study identified the risks associated with building projects during the tendering stage. The study further investigates the probability of occurrence of these risks and their impact on building projects. Furthermore, the study looked at the critical technical inputs that can help in developing an effective risk management framework. These questions have been answered as follows:

### 7.2.1 What risks are associated with building projects at the tendering stage?

Considering that all the respondents regarded all the identified risks to be important, the study concluded that there is an urgent need to sensitize the building industry on the importance of risk management especially during the tendering stage. Various professional bodies in the building industry such as the Engineering Institute of Zambia (EIZ), Quantity surveying registration board, Zambia Institute of Architects (ZIA), National Council for construction (NCC) and Zambia Public Procurement Authority should start conducting trainings to their affiliated professional members and organizations. This will help professionals take cautions by having a risk management awareness mind when preparing tender documents and drafting contracts. These

documents include Architectural drawings, Engineering drawings, Bills of Quantities and contract documents.

The study further concludes that effective risk management during the tendering process of building projects reduce project costs, schedule delays and ultimately increase the project quality performance during the implementation stage. Hence the risk management subject is critical to all the professionals.

### 7.2.2 What is the probability of risk occurrence and impact on building projects?

The study concludes that the identified risks are likely to occur on building projects during the tendering process and do have high impact in the projects. These impacts include project schedule delays, project cost overruns, project profit loss, litigation issues, waste of. All in all the quality of the building projects are compromised during the implementation stage. Therefore, these calls for early identification of risks associated with building projects and apply effective control measures in order to enhance project success right from the tendering process.

### 7.2.3 What are the technical inputs required in establishing the risk management framework for building projects at tendering stage?

The research study concludes that technical inputs are occasionally used by contractors in the building industry because they use a scattered approach in managing risks. However building projects are prone to high risks during the tendering stage. Hence an effective way of managing risks is inevitable. However, to achieve this task the research study concludes that certain technical inputs should be considered to come up with an effective risk management framework. The risk management framework acts as a guide to manage risks especially during the tendering process of building projects. The technical inputs required to establish an effective risk management are both internal and external and these include; experience of the contractor in similar projects, Financial capability of the contractor, Current workload of the contractor, Management team competence, Planning capability and level of resource deployment/ utilization, Number of competitors on the project, Labour and equipment (cost, availability, performance, productivity), Interest and inflation rate, availability of other projects on the market and

weather conditions. These inputs are used to develop the proposed risk management framework.

### 7.2.4 Develop a risk management Framework with critical factors for Building projects during the tendering stage

The Author developed the risk management framework using the literature review data, research findings and validated by the experts. This framework was developed to serve as a decision-making tool that may help contracts to make a decision on whether to participate on tender or not. Figure 7.1 below illustrates a structured risk management framework.

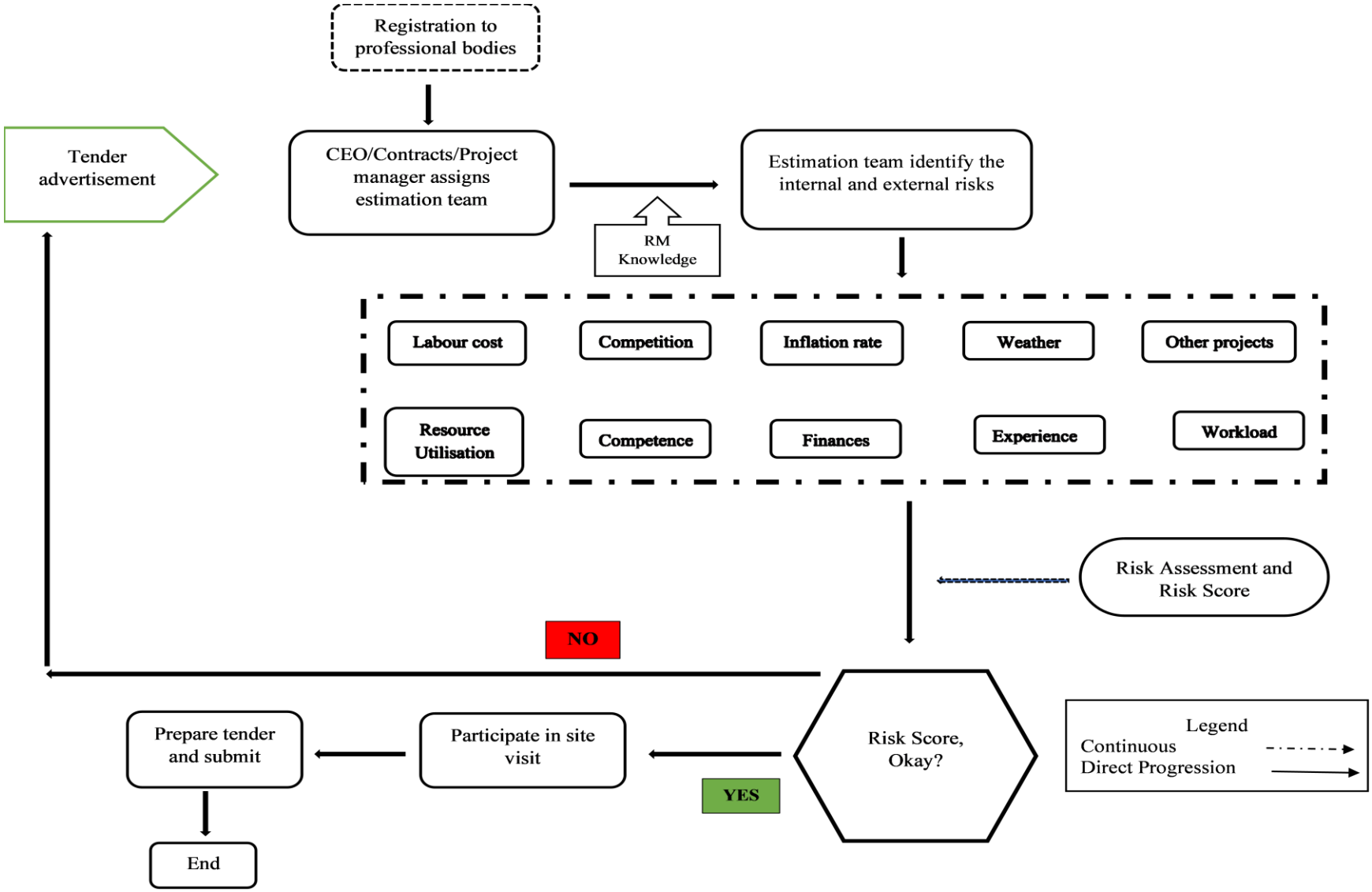


**Figure 7.1:** Proposed Risk management Framework

### 7.3 Recommendations

Based on the research findings, the following recommendations were made to the risk management during bidding process for building projects;

#### i. Expert stakeholder involvement

The study recommends that professionals should be involved right from the planning stage when the need or the tender is identified. These experts should be selected based on the nature of the project. These experts will be able to scrutinize the environment, tender documents such as drawings and bills of quantities, nature of clients, site locations, scope of works and more. The identification of risks starts right from the planning stage. Normally most projects are prone to more risks because the required experts were not involved from the beginning. This step helps both the contractor and the client to make a decision on whether to participate or invest in a project or not.

#### ii. Contractors to Involve professional during tendering to price the works

In construction industry, the tendering process is considered to a very risky process. Therefore, the study recommends that professionals should be highly involved in the tendering process to mitigate the risks associated with the tendering process.

#### iii. Institutional capacity

The study also recommends that construction companies should ensure that they have capacity both in terms of human resource and equipment to complete the project. Most local contractors tender for jobs even when they have no capacity to handle a project. This has contributed to a lot of abandoned projects.

#### ii. Governing Professional bodies should be proactive

The study further recommends that the building industry governing institutions such as National council for construction NCC, Engineering institute of Zambia (EIZ), Zambia Institute of Architects, Quantity Surveying Registration Board (QSRB) and Zambia Public Procurement Authority should proactive even during the tendering process by

ensuring that the tender documentations such as drawings, bills of quantities and contracts meets the minimum required standards. This institution should also ensure that contractor have the personnel that are used in the bidding documents. Most times the people on site do not represent the CVs that were used during tendering. The study also recommended that these professional institutions should start offering trainings to their affiliated professionals and organizations on the importance of risk management.

**iv. Risk management course to be Compulsory at high learning institution**

The study also recommends that Risk management courses should be introduced at in institutions of higher learning. This subject does not just affect the construction industry, it cuts across all industries and hence it is recommended that every professional should have the knowledge of risk management. This will help many organizations achieve their project success.

### 7.4 Limitations of the Study

The research did not just go smooth without challenges. Some of the challenges faced by the research include the following;

I. The rate of response by a number of respondents took a bit of time to complete the questionnaires and this greatly affected the speed of conducting the data analysis and ultimately the compilation of the whole document. The researcher made follow ups in form of phone calls to make sure questionnaires were answered.

II. Most of the respondents did not have time for the interviews; some respondents could not even finish the interviews because of their busy schedules. This affected the collection of full information as required by the research study.

### 7.5 Future Research

The following are the recommended possible future research areas:

I. This research study aims at exploring the risks of building projects and their impact on building projects and in turn proposed a risk management framework

to manage risks associated with the bidding process. It is recommended that further studies be conducted and evaluate the effectives of the framework during the construction stage of building projects.

II. This research was only conducted on building projects. It is proposed that a similar research be carried out in other sectors of the construction industry such as road projects and check if similar results may be attained or not.

### 7.6 Contribution to the body of Knowledge

The contribution of this study to the body of Knowledge is the development of the risk management framework to be used during the tendering process using the recommended technical factors or inputs. The study helps both clients and contractor in decision making using the proposed risk management framework. The study has demonstrated that if the identified risks occur, they have a negative impact on the performance of the project.

### 7.7 Chapter Summary

The building industry is a significant industry in the economy of any underdeveloped, developing or developed country in the world. Its contribution to the development of the country in form of Gross Domestic Product (GDP) of a country cannot be over emphasized. This industry provides outputs for other industries and uses outputs from other industries hence creating employment. However, the industry is an extremely risk seeking industry that lack a good reputation when it comes to handling of risks which are more prevalent during the tendering stage.

Hence the study strived to solve this problem by exploring the risks associated with building projects during the tendering stage and ascertain the probability of occurrence of these risks. The study further determined the impact of these risks on building projects when they occur. Additionally the research study identified critical technical inputs or critical to consider during the bidding process when developing the risk management framework. This research can be used by other researchers to do even further research that are related to the research study.

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## APPENDIX I: Research Questionnaire


Dear Respondent,

I am a research student at the University of Lusaka pursuing a Master of Science Degree in Project Management. In fulfillment of the dissertation requirements, I am undertaking a research on **Risk Management Practices in the Tendering Process of Building Projects in the Zambian Construction Industry: Case of Local Contractors in Lusaka**

The following are the research questions:

1. What types of risks are associated with building projects at the tendering stage?
2. What is the probability and impact of risk on building projects at the tendering stage?
3. What technical inputs are required in establishing an effective risk management framework for building projects at tendering stage?

Your help in sparing about 30minutes to share your valuable knowledge and experience by completing the questionnaire will be highly appreciated. Please be assured that any information given will be treated in the strictest confidence and used for research purpose only.

Thank you in anticipation.

Yours Sincerely,

Brian Kaoma (Masters Research Student)

**SECTION ONE**

**Demographics**

| What is your Sex? | | **Tick or Cross** |
|---|---|---|
| 1 | Male | |
| 2 | Female | |
| What is your Profession/Qualification | | |
| 1 | Engineer (Civil, Structural) | |
| 2 | Contract Manager | |
| 3 | Architect | |
| 4 | Quantity Surveyor | |
| 5 | Other _____ | |
| What is the size of the estimating team in the company you work for? | | |
| 1 | Less than 2 Members | |
| 2 | 2 – 4 Members | |
| 3 | 4 - 6 Members | |
| 4 | Above 6 Members | |
| Are you and members of estimating team registered with EIZ/ZIQS/SIZ | | |
| | Yes | |
| | No | |

| | | |
|---|---|---|
| Is your company registered with NCC for building construction works? | | |
| | Yes | |
| | No | |
| How many years of experience do you have in the tendering process and construction industry in Zambia? | | |
| 1 | Less than 4 years | |
| 2 | 4 - 8 years | |
| 3 | 8 - 12 years | |
| 4 | Above 12 years | |
| What best describes your job position | | |
| 1 | Chief Executive | |
| 2 | Managing Director | |
| 3 | Contracts Manager | |
| 4 | Project Manager | |
| 5 | Business Development Manager | |
| 6 | Estimator/ Quantity Surveyor | |
| 7 | Tender Coordinator | |
| 8 | Other _____ | |
| In the company you work for, who is ultimately involved in pricing for tenders | | |
| 1 | Estimator/Quantity Surveyor | |

| | | |
|---|---|---|
| 2 | Tender Manager | |
| 3 | Managing Director | |
| 4 | Other<br><br>_____ | |

**SECTION B**

**Risks associated with building projects**

Rate how important it is to consider the following factors of risks during tendering.

1. Very Important
2. Important
3. Moderately Important
4. Slightly Important
5. Not Important

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Level of competition | | | | | |
| Weather and Environmental Conditions | | | | | |
| Clarity of bidding documents | | | | | |
| Resource availability | | | | | |
| Project site location | | | | | |
| Perception and experience of the estimator | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Actual direct cost | | | | | |
| Payment system | | | | | |
| Time delivery | | | | | |
| Fluctuations in exchange rates | | | | | |
| Project scope | | | | | |

**Probability and Impact of risks on Building projects**

To what extent do you agree with the following statements on their impact on building projects?

1. Very Strongly Agree
2. Strongly Agree
3. Neutral
4. Strongly Disagree
5. Very Strongly Disagree

What is the probability of occurrence of the following statements on building projects?

1. Very Likely
2. Likely
3. Somehow likely
4. Slightly likely
5. Not likely

| **Risks during tendering stage** | **Probability** | | | | | **Impact** | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Statement** | **1** | **2** | **3** | **4** | **5** | **1** | **2** | **3** | **4** | **5** |
| Changes in design affects the delivery of the project | | | | | | | | | | |
| Unnecessary approval processes affects the delivery of the project | | | | | | | | | | |
| Poor project scheduling causes project delays | | | | | | | | | | |
| Change in scope cause cost overruns | | | | | | | | | | |
| Contractor inexperience causes cost overruns | | | | | | | | | | |
| Access to materials affects the project quality | | | | | | | | | | |
| Political condition and involvement of site staff affect the project quality | | | | | | | | | | |
| Low bids due to competition affects the quality of the project | | | | | | | | | | |

**Risk management framework**

| Agreement on the degree of importance of inputs in developing the Risk management Framework | Strongly agree = 1 | Agree = 2 | Undecided = 3 | Disagree = 4 | Strongly Disagree = 5 |
|---|---|---|---|---|---|
| | | | | | |
| **Internal technical inputs** | **1** | **2** | **3** | **4** | **5** |
| Experience on similar projects | | | | | |
| Financial capability of contractor | | | | | |
| Current workload | | | | | |
| Management team (suitability, experience, performance) | | | | | |
| Planning capability and level of resource development/utilization | | | | | |
| | | | | | |
| **External technical inputs** | **1** | **2** | **3** | **4** | **5** |
| Number of competitors on the market | | | | | |
| Labour and equipment (cost, availability, performance, productivity) | | | | | |
| Interest rate and inflation rate | | | | | |
| Availability of other projects for tendering | | | | | |
| Weather conditions | | | | | |

| How would you rate your organization’s Risk Maturity | Tick or Cross |
|---|---|
| Naïve (No formal approach developed for risk management) | |
| Aware (Scattered approach to risk management) | |
| Define (Strategies and policies in place and communicated) | |
| Managed (Organization's approach to risk management is developed and communicated) | |
| Enabled (Risk management and controls are fully embedded into the operations) | |

## APPENDIX II: Interview guide


Dear Respondent,

I am a research student at the University of Lusaka pursuing a Master of Science Degree in Project Management. In fulfillment of the dissertation requirements, I am undertaking a research on **Risk Management Practices in the Tendering Process of Building Projects in the Zambian Construction Industry: Case of Local Contractors in Lusaka**

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Thank you in anticipation.

Yours Sincerely,

Brian Kaoma (Masters Research Student)

## Interview Questions

1. What is your understanding on the subject of risk management?
   ……
   ……
   ……
2. What are the potential risks of building projects at the tendering stage?
   ……
   ……
   ……..
3. Do you have a structured risk management framework or policies in your organization? Is it effective?
   ……
   ……
   ……
4. What role do you play as an individual in your organization in the management of risks during tendering process?
   …….....
   .....
5. How effective does professional bodies like EIZ, NCC, ZPPA, ZIQS have in ensuring effective risk management?
   .....
   .....
6. How does your organization mitigate risks during the pricing of a tender?
   ……
   ……
   ……

7. Do you really think the tendering flotation period set up by ZPPA is adequate to factor in all the project risks during the tendering process?

   ……

   ……..

8. In your own opinion, do think there is a relationship between risk management and project performance?

   .....

   .....

9. What challenges do contractors face during the tendering process in Zambia?.....

   .....

   .....

10. What would be your recommendations in relation to challenges faced during the tendering process?

    …….....

    .....

    .....

11. What critical success factors do you consider during the tendering process in your own opinion?

    ……

    ……

    ……

**We have come to the end of the interview. Thank you for your time!**