

**DEVELOPMENT OF A RISK MANAGEMENT FRAMEWORK FOR PPP PUBLIC  
MARKET INFRASTRUCTURE PROJECTS IN ZAMBIA**

By

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A dissertation submitted to the University of Zambia in partial fulfilment of requirements for the  
award of the degree of Master of Engineering in Construction Management

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## DECLARATION

I declare that I have solely undertaken the research reported herein under supervision and to the best of my knowledge, it contains no materials previously published except where references have been duly acknowledged.

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## APPROVAL

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## ABSTRACT

Public Private Partnerships have become an alternative contract model for government infrastructure. Construction and management of public markets has not been left out in this shift. Public markets come with several benefits, some of which include creating additional tax base with minimal local cost and increasing consumption of local products and agriculture among other benefits. Management of public markets in Zambia is in the hands of local authorities and sometimes cooperatives or the private sector. Risk management in the process of implementing PPP projects has been a challenge. The aim of the study therefore was to develop a risk management framework for implementing PPPs in Zambia's public market infrastructure projects. A mixed method approach was used in conducting the study in that both qualitative and quantitative methods were used. Secondary data was collected from a comprehensive literature review whilst primary data was collected using interviews and questionnaires. From the results of the questionnaire survey, both the public and the private agreed that corruption, inflation, cost and time overruns, responsibility and risk distribution and errors in estimating project revenue inflows and project financing costs are the risks that are most likely going to occur in a PPP project. It was also established that no experience in dealing with PPPs, longer concessions, lack of understanding of PPPs by both government officials and locals and lack of guidelines on PPPs frequently caused risks in PPPs on public market infrastructure. Whilst expert judgement is mostly used as a risk planning, risk identification and analysis tool, it was evident that very few were using risk management processes due to lack of experience in PPPs. The allocation of risk was on the basis of an entity that will bear the risk at a lower cost and had the ability to bear the consequences of the risk. The developed risk management framework was validated using scoring approach.

**Keywords:** Public markets, risk, risk identification, risk planning, risk response risk management framework

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## **ABBREVIATIONS**

BOT	Build Operate and Transfer
DFI	Development Finance Institutions
ECA	Export credit agencies
MCA	Millennium Challenge Account
MNGT	Management
PSC	Public Service Comparator
UMDP	Urban Market Development Program
COV	Coefficient of variation
PFI	Private Financing Initiative
PPP	Public Private Partnership
SPSS	Statistical Package for Social Sciences
SPV	Special Purpose Vehicle
SWOT	Strengths, Weaknesses, Opportunities and Threats
TAZAMA	Tanzania Zambia Mafuta

## CHAPTER ONE: INTRODUCTION

### 1.1 Background

Many countries world over are facing infrastructure deficits because of the growing populations, economic growth and rapidly progressing urbanisation. This strong demand for infrastructure and its insufficient provision has led to a global infrastructure investment gap of at least \$1.0 trillion per year (Wong & de Ameida, 2013). Oyedele (2012), defined infrastructure as the basic physical and organisational structures needed for the operation of society like industries, buildings, roads, bridges and health services. Furmer (2009), as quoted by Oyedele (2012), further defined infrastructure as the physical components of interrelated systems providing commodities and services essential to enable, sustain, or enhance societal living conditions.

The government has long been a traditional provider of public services and infrastructure using public resources. However, the ever-increasing disparity between the public's capacity to generate resources and the demand for new resources has led to the birth of Public Private Partnerships (Beyene, 2014). Hannola (2013) has noted that in recent years, governments have found it very difficult to meet the funding needs for infrastructure and have tried to diversify the sources of finance. Akintoye *et al.* (2005) argued that public financing in developing countries has become so volatile due to the fact that projects for improvements rarely meet crucial infrastructure expenditure requirements in a timely and adequate manner; the situation is no exception in Zambia where building and infrastructure expenditures have been funded directly from the fiscal budget. In China, infrastructure provision used to be by the public but decentralisation has led to reduced revenues for the central government. As a result, the private sector has an increasingly important role to play in the provision of infrastructure through PPPs (Yuan, et al., 2010).

There is no single definition of public-private partnership (PPP); as such different scholars have defined it differently. Partnerships British Columbia (2003), defined PPPs as a legally binding contract between a government and a business entity for the provision of assets and the delivery of services that allocates responsibilities and business risks among the various business partners. Public-private partnerships are also defined as on-going agreements between government and private sector organisations in which the private organisations participate in the decision making and production of a public good or service that has traditionally been provided by the public sector



and in which the private sector shares the risk of that production (Chowdhury, et al., 2016). The PPPs rely on the expectation that the private sector is better suited to provide an infrastructure or public service through; higher operating efficiency, better service quality and/or reliability, more cost-efficient use of public money on other public services, better value for money, transfer of some of the risks to the private sector and transparency (Zambia Development Agency, 2014). Broadly, it is a long-term partnership between the public and private sectors for the provision of public assets and services with risk shared by the private party (Sehgal, et al., 2015). From these definitions, it can be seen that PPPs are legally bidding contracts or agreements between the public and the private, meant to provide an asset or services to the public by the private, where risks are shared between the two parties and is for a specified period of time. A PPP is therefore expected to produce results that, neither of the parties can achieve on their own given the same resources.

Zambia has not been left out in implementing infrastructure projects using PPPs. She, like many other developing countries, is striving to meet its infrastructure development requirements because of funding constraints (Ngoma, et al., 2014).

Much as PPPs are not a panacea to reducing the infrastructure deficit, implementing infrastructure projects using this method comes with advantages. Munya (2010) has argued on the other hand that much as implementing infrastructure projects using PPP methods come with lots of advantages, it equally has disadvantages. Some of the advantages noted include; tapping new money for infrastructure. This is mainly due to the limited capacity of local markets to finance infrastructure projects in developing countries. Cost savings; PPPs can save anywhere between six and 40 percent of the cost of construction and significantly limit the potential for cost overruns through innovative contracting. By raising private capital instead of public debt, PPPs can ease public debt burdens and release public funds for other purposes. Public Private Partnerships can spur innovation. For developing countries, one of the major problems facing government agencies is the lack of innovation within the human resource. Therefore, employing PPPs to work together with government agencies might help spur innovative ideas. Public Private Partnerships can shorten project delivery period by several years. By providing access to immediately available capital, PPPs can reduce the construction periods of projects that might otherwise be delayed or not built at all. Transfer of supply and risk demand to the private sector: In traditional procurement, all risks associated with the design, construction, financing, operation and maintenance of a project

are borne by the public sector. This is especially so in developing countries where governments fund 100% of projects. Public Private Partnerships allow for the transfer of risks to a party that is best suited to handle the risk.

Quium (2011), observed that often, lack of government funding has been the main reason for opting to a PPP for a project. However, lack of government funding alone should not be used as the main reason because PPPs come with additional costs, risks, and other disadvantages. Usually, the cost of borrowing is higher for the private sector than the public sector and administrative costs are higher for the management of PPP contracts. However, Cheung (2009) argued that the public sector is well aware of the fact that in many cases they cannot deliver projects as efficiently and effectively as the private sector because the private sector is able to introduce skills, innovation, technology, motivation, finance and most importantly get a share of project risks.

In the 1990s and early 2000, Lusaka City Council developed two urban markets using PPP procurement model in addition to the other urban markets that were developed under the Urban Market Development Program (UMDP), funded by the European Union. This was done in an effort to compliment government's efforts (Kalemba, 2011). The markets under the PPP model were Luburma and Chachacha markets. The two projects did not come without risks during and after the implementation stage. One of the risks included securing land for the development due to resistance by traders who were occupying the piece of land. Luburma market has a total of 121 stalls, a police post and toilets for ladies and gents while Chachacha market has 300 stalls with a police post, toilets and parking slots. The construction and operation of these markets have come with a number of risks. The sources of these risks and how they can be managed has not been documented.

Ngoma, *et al* (2014) evaluated twenty-four risks in the implementation of PPP construction projects in Zambia and came up with top five risks as follows: stakeholder project approval, corruption, inflation, environmental considerations and lack of experience in PPP arrangements. However, in the work on risks and constraints, causes of risks and constraints and how they can be managed for the successful implementation of a PPP project in construction were not looked at. Additionally, there are no existing guidelines and manuals on PPPs in Zambia (Zambia Development Agency, 2014). Once developed, these documents will guide contracting authorities in identifying, assessing and structuring PPPs effectively to ensure affordability, value for money

and optimal transfer of risks. The optimal transfer of risks does not necessarily mean the public sector will not remain with any risks to deal with. To whichever party the risks are transferred, they need to be managed properly.

This research therefore aims to develop a framework for managing risks that affect the different parties involved in PPP market infrastructure projects in Zambia. Thomas, *et al.* (2006) argued that the success of a Build- Operate- Transfer (BOT) project is greatly influenced by the degree to which various project risks are identified, assessed and allocated. It can therefore be seen that the success of PPP projects is dependent on proper management of risks.

## **1.2 Statement of the Problem**

India has developed a risk management framework aimed at helping the national, provincial, and city governments examine their approach to infrastructure projects (Mane & Pimpilikar, 2013). Nigeria has equally developed a conceptual framework that provides a step by step approach to managing risks in PPPs particularly for housing estate development (Anigbogu, 2016). China has not been left out in the development of frameworks. One of the frameworks developed by China provides step by step guidelines for project promoters who are keen to invest in China's infrastructure projects (Wang, et al., 1999).

Zambia on the other hand does not have guidelines on the implementation of PPPs despite having implemented projects using PPP in the past. Some PPP projects have been terminated due to lack of clear guidelines (Zambia Development Agency, 2014). Ngoma, *et al.*, (2014) looked at the constraints and risks in the implementation of PPP projects in Zambia. However, causes of such constraints and risks and how they could be managed were not looked at. Kalembe, (2011) observed that the implementation of two urban markets PPP projects had been characterised by challenges related to contract management, contract monitoring and enforcement, identification, *evaluation and allocation of risks* among other challenges. From Kalembe (2011) observations, it could be seen that Zambia lacked clear risk management guidelines which needed to be put in place during the implementation of PPPs. A risk management framework is one of the guidelines in risk management, therefore, once developed; a risk management framework will be one of the guidelines that will be used for successful implementation of PPPs and addressing some of these challenges. The framework will also show the process of allocating risks and provide guidelines to foreign companies intending to invest in PPP market projects.

### **1.3 Aim of the Study**

The aim of the study was to develop a risk management framework for implementing PPPs in Zambia's public market infrastructure projects.

### **1.4 Objectives of the Study**

- i. Identify the major risks in PPP market infrastructure projects;
- ii. Examine the causes of major risks on most PPP public market projects in Zambia;
- iii. Investigate how risks are currently being managed on Zambia's PPP public market projects;
- iv. Develop a risk management framework for PPPs on Zambia's market infrastructure projects.

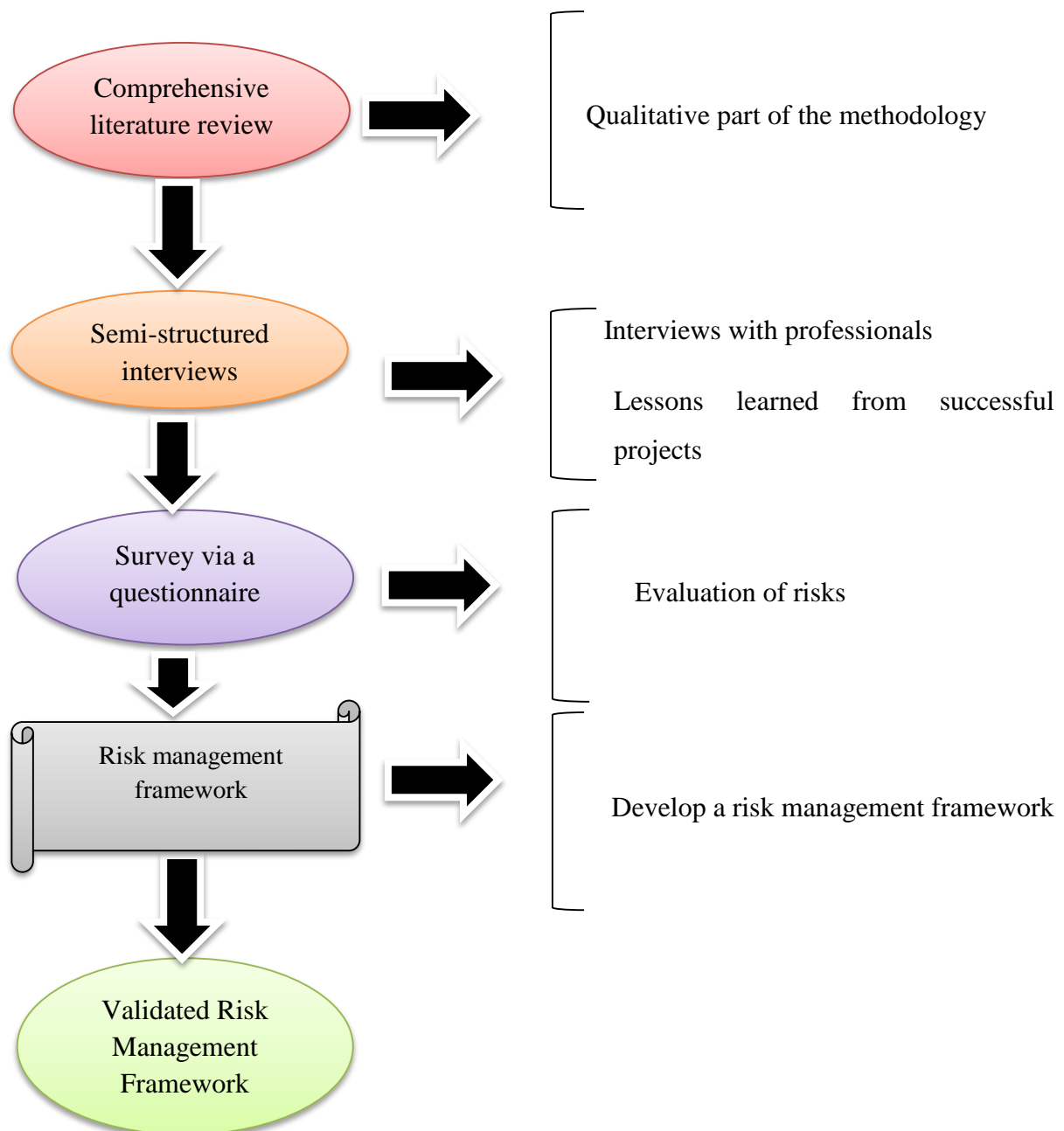
### **1.5 Research Questions**

- i. What are the major risks on PPP market infrastructure projects in Zambia?
- ii. How are these major risks in market projects managed?
- iii. What are the causes of major risks on PPP market projects in Zambia?
- iv. Is there need to develop a risk management framework for the management of risks in PPP market infrastructure projects?

### **1.6 Methodology**

The methodology for this study was in four stages. The first stage was a comprehensive literature review in order to get an in-depth understanding of the topic. This formed the qualitative part of the methodology.

The second step was the use of semi-structured interviews, lessons learned from previous PPP projects and discussions to identify the risks. In the third stage, questionnaires were sent to project sponsors, developers, lenders, investors, consultants and contractors to evaluate the criticality of identified risks. Finally, a risk management framework was developed and validated. Figure 1.1 below summarises the methodology and procedure undertaken for the study.



**Figure 1.1: Study methodology and procedure**

### 1.7 Significance of the Study

Once a risk management framework is developed it is hoped that it will improve investor's and government's decision making when it comes to investing in PPP public market infrastructure projects in Zambia. It is further hoped that the potential for PPP promoters of securing profitable projects and implementing them smoothly will increase. Additionally, the framework will provide

step by step guidelines for project promoters who are keen to invest in Zambia's market infrastructure projects.

## **1.8 Organisation of the Dissertation**

Chapter one introduced the concepts in PPP and gives a background of the research.

An extensive review of risks and risk management, in general, was conducted for this study. In chapter two past studies on risk management on PPP were reviewed in order to find the research gap in the field of risk management.

Chapter three gave details of how data was collected; the type of survey method used for data collection and stated the reasons for choosing a certain type of method instead of the other. It gave an account of how the reliability and accuracy of the data collected was tested.

Chapter four outlined the results from the questionnaires returned and interviews. In most cases, it is difficult to get a return rate of 100% but according to Akintoye and Macleod (1997), a return rate of 40% is sufficient. In this research, it was envisaged that a return rate of 60% and above would suffice.

Chapter five discussed the analysed data from chapter four

Chapter six used the analysed data to develop a risk management framework for market infrastructure in Zambia and validated the framework using guidelines sent to specifically identified professionals.

Chapter seven summarised the findings, made recommendations, identified the limitations of the study, and made a conclusion and recommendations for future studies.

## **1.9 Chapter Summary**

Chapter one introduced the concept of PPPs and the different definitions of PPPs by different authors. It also outlined the pros and cons of undertaking projects using PPPs. This chapter briefly introduced risks in the Zambia's PPP infrastructure projects as identified by Ngoma, *et al* (2014). It also outlined the aim and objectives of the study.

The following chapter reviews literature on PPP in detail and examines what other authors have written on the subject.

## **CHAPTER TWO: LITERATURE REVIEW**

### **2.1 Introduction**

The previous chapter introduced and gave a background to the topic of Public-Private Partnerships. This chapter now discusses the pertinent theories and concepts that will assist guide the study. This will provide a firm basis on which to make conclusions and recommendations on the subject of risk management of public market projects. It begins by looking at PPPs in general; goes further to look at the features of a PPP; and the different models of PPPs. The chapter reviews the literature on the general understanding of PPPs, risk management in PPPs and narrows down to literature on PPPs and risk management in the Zambian context. The whole purpose was to find the research gap on how Zambia deals with risks on its PPP projects.

### **2.2 Definition of Public-Private Partnerships**

There is no one definition of a Public-Private partnership, and as such several definitions exist. British Columbia (2003) defined a public-private partnership as a legally binding contract between government and a business entity for the provision of assets and the delivery of services that allocates responsibilities and business risks among the various partners. Public-private partnerships are long-term cooperation agreements between a public authority and the private sector to provide services (Moszoro & Krzyzanowska, 2011). Tan, *et al* (2012) further define PPPs as government sponsored initiatives or schemes which involve the use of private finance to facilitate the provision of services and/or the delivery of social infrastructure. The PPP is again defined as a way of delivering and funding public infrastructure projects where project risks are shared between the public and the private sector (Eldrup & Schutze, 2013). Dantala(2014) summarised the definitions of PPP that they are; a contractual agreement between a public entity and private entity; for the delivery of infrastructure or services in the public interest; where the public partner focuses principally on the output and allows the private partner to determine the input; a substantial transfer of appropriate risks takes place to the private party; where the private party or parties have investments at risk, and where better value for money can be demonstrated than traditional public provision.

Colverson (2011) as cited by Dantala (2014) went further to state that PPPs can be said to include; Long-term contracts/agreements/relationships, a private funding component, provision of services or infrastructure through the private sector, significant transfer of risk to the private sector, such as investment, design, construction, or operational risks, complex contractual responsibilities and

deliverables that vary over the contract period as the project moves through its phases, such as from finance to construction and operation, the return of infrastructure/services to the control of the state at the end of the contract term or; and the provision of services by the private sector on behalf of the state following the fulfilment of design and build responsibilities.

From the definitions given, it can be seen that much as there are discrepancies on the definitions of PPPs, they share many similarities, which Peter (1998) stated as being the five major characteristics of PPPs as:

- i. Involvement of two or more actors, at least one from the public and another from the private sector;
- ii. Having absence of principal agency relationship but each party is a principal and is capable of bargaining on its own behalf rather than referring to other sources of authority;
- iii. Parties entering into a long-term relationship;
- iv. A transfer of resources from both parties such as materials, authority and other symbolic values. Each party brings something to the partnership;
- v. Shared responsibility for outcomes or activities. Li and Akintoye, (2003) and Grant, (1996) agreed that the ideas of shared authority and responsibility, joint investment, sharing liability/ risk taking and mutual benefit are at the core of a partnership.

It can be summed up further that in a PPP (Build Operate Transfer), the private sector runs the infrastructure for a period of time and later transfers it to the public, and that various types of risks are identified, priced, and either retained by the public sector or transferred to the private partner through an appropriate payment mechanism and specific contract terms. The transfer of risks is based on the principle that each risk should be allocated to the partner where it can be best managed (Verhoest, et al., 2013).

### **2.3 Characteristics of Public-Private Partnerships**

A similar pattern is seen in the way PPPs are developed by different countries. They start with toll-road concessions to PFI model for social infrastructure and then become more diverse requiring closer management through central government PPP units, PPP laws or standardised forms of



contracts (Yescombe, 2007). Public Private Partnerships have two important characteristics: there is an emphasis on service provision, as well as investment by the private sector; and significant risk is transferred from the government to the private sector. Privatisation, joint ventures, franchising and contracting-out share some or all of these two PPP characteristics. In their typical form, PPPs represent cooperation between the government and the private sector to build new infrastructure and to provide related services (International Monetary Fund, 2004). United Nations Economic Commission for Europe (2008) has added on the characteristics of PPP by stating that they include: long-term (sometimes up to 30 years) service provisions, the transfer of risk to the private sector; and different forms of long-term contracts drawn up between private legal entities and public authorities.

Whilst there are many justifications for choosing PPP over traditional procurement, Alfen, *et al* (2009) argued that efficiency gains are used by most governments as the main objective and justification for the choice of PPP over conventional procurement. Major drivers of efficiency gains are the transfer of risk to the private sector, long-term nature of contracts, incentive structures and payment upon performance, output oriented service specification, competition between bidders, incorporate feedback and negotiation in the procurement process, innovation and management skills by the private sector, and administrative cost reduction. On the other hand, Germany uses the Public Service Comparator (PSC) as the basis for the decision whether to adopt a PPP approach or to procure the project conventionally. However, critics of PSC method have stated that it lacks reliable historic data for life-cycle cost estimation, has over-optimistic assumptions for public service delivery on time and on the budget, selection of appropriate discount rates and mechanism applied for risk stress testing. Therefore, PSC may not be the only approach in assessing efficiency gains. This is the case in most Asian countries where no PSC is set up for determining efficiency gains. Instead, efficiency is achieved by assuming, politically, that the private sector is by nature more efficient than the public sector.

## **2.4 Basic Features of a Public Private Partnership Project**

According to Tan, *et al* (2012), a typical PPP process works as follows:

### **2.4.1 Bidding Process**

A public sector entity identifies a need for a project and advertises the need for such a project through a competitive process to the private sector. The winning private sector is then awarded a “concession” to implement its solution.

- ❖ **Project Company:** A private entity will contract the public entity to raise funds from investors and lenders in order to deliver the project. Oftentimes, a new, separate private company will be set up to be the project company in order to insulate the private sector sponsors of the project from the risk of insolvency if the project fails. The new company is known as a “Special Purpose Vehicle” (an SPV”). The activities of the project company will be managed by one or more private sector companies called sponsors. There are different types of sponsors each with its own objective.

There are basically four types of sponsors and these are: Industrial sponsors, who see the initiative as an upstream or downstream integrated or in some way as linked to their core business; Public sponsors (central or local government, municipalities, or municipalities companies), whose aims centre on social welfare; Contractors, who develop, build, or run plants and are interested in participating in the initiative (Gatti, 2007).

### **2.4.2 Documentation**

The project company will enter into an agreement with the public sector called a concession agreement. This document details the terms and conditions of the project.

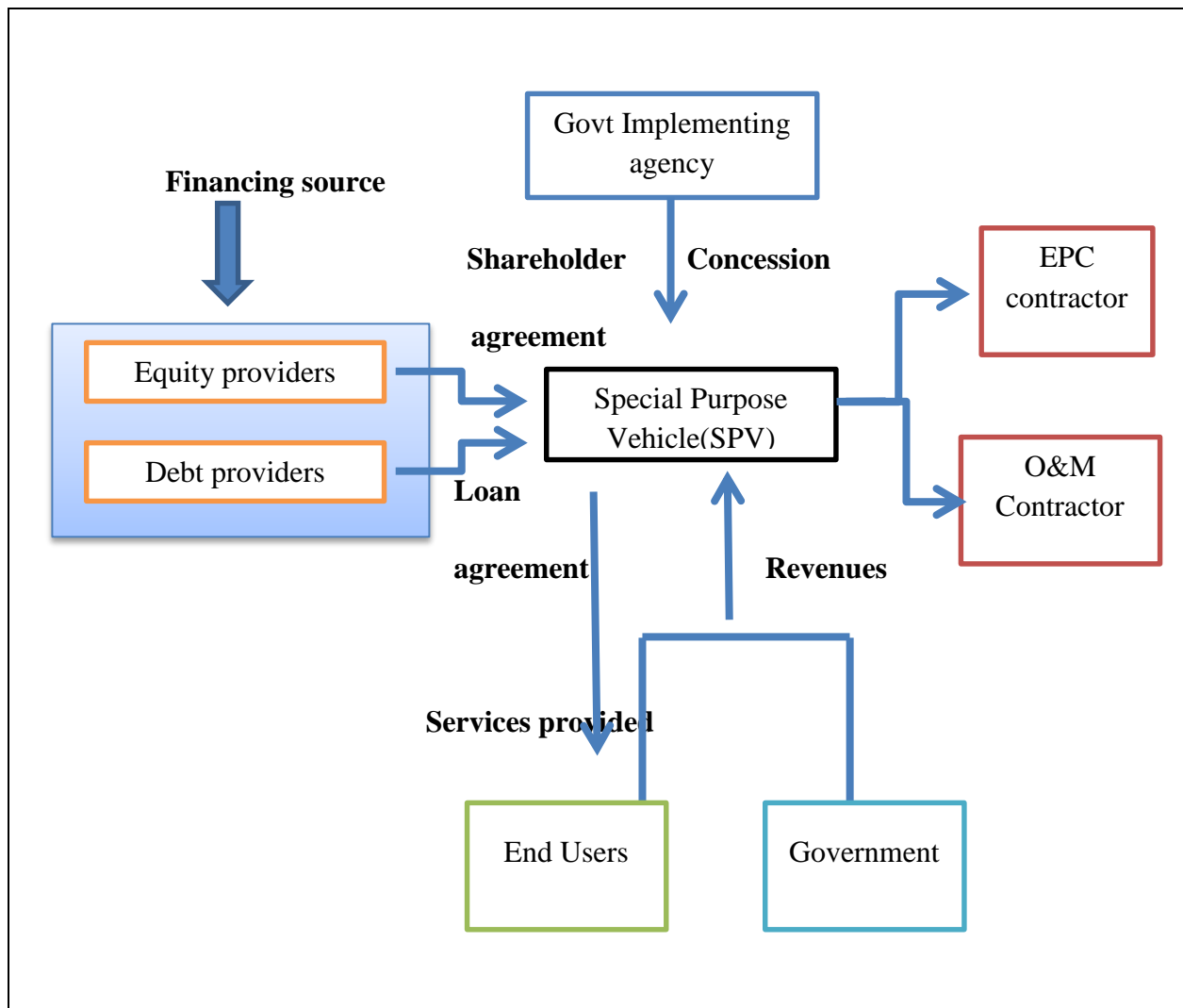
### **2.4.3 Funding**

The project company will obtain private funding in order to finance the PPP and usually funds are made up of a mix of investments by sponsors and loans from outside lenders. Lenders may include commercial banks, Export Credit Agencies (ECAs), Multi-Lateral Agencies (MLAs) and Development Finance Institutions (DFIs).

- i. Export Credit Agencies are government or quasi- government institutions whose aim is to provide finance to promote national exports or can be private companies operating on behalf of the government. An ECA can be a guarantor, an insurer or a lender.
- ii. Multi-Lateral Agencies are government institutions owned by a number of governments whose mandate is to foster economic developments in developing

nations. Examples of MLAs include the Asian Development Bank and African Development Bank.

- iii. Development Finance Institutions provide long-term development finance for private sector enterprises in developing countries. The PPP process is summarised in Figure 2.1.



**Figure 2.1: Typical PPP structure: (Adapted from Verougstraete, 2014)**

## 2.5 Types of Public Private Partnerships

The main types of PPPs are: Build-own-Operate(BOO): where the private business builds and operates a public facility and retains legal ownership; Build-Operate-Transfer(BOT): in this instance the private builds and operates the public facility for a period of time and transfers it at the end of the agreed time period; Buy-Build-Operate(BBO): the government sells a public facility

to the private who in turn refurbishes and operates the facility; Design-Build-Operate(DBO): here a single contract is awarded to a private entity who designs, builds and operates the public facility but the public retains legal ownership; and Build-Develop-Operate(BDO): this is a type of a PPP where the private buys the public facility, refurbishes using its own resources and then operates it through a government contract (Levinson, et al., 2006). Renda and Schrefler (2009) on the other hand summarised the different types or models of PPPs as in Table 2.1.

**Table 2.1: PPP models**

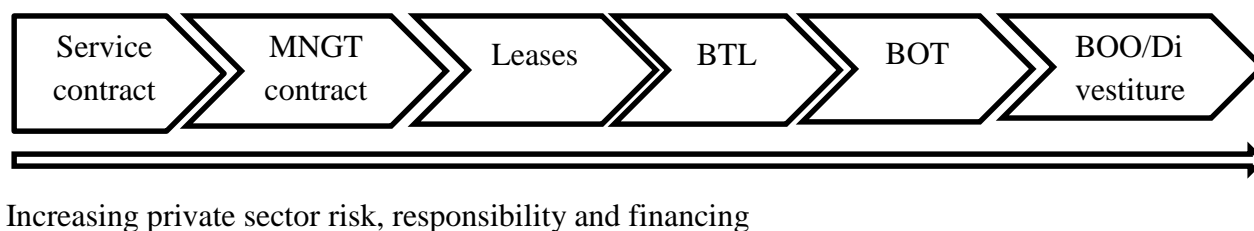
<b>Schemes</b>	<b>Modalities</b>
<b>Service contracts</b>	The private party procures, operates and maintains an asset for a short period of time. The public-sector bears financial and management risk.
<b>Operation and management contracts</b>	The private sector operates and manages a public owned asset. Revenues for the private party are linked to performance targets. The public-sector bears financial and investment risks.
<b>Leasing- type contracts</b> <ul style="list-style-type: none"> <li>❖ Buy-build-operate(BBO)</li> <li>❖ Lease-Develop-Operate(LDO)</li> <li>❖ Wrap-around-addition(WAA)</li> </ul>	The private sector buys or leases an existing asset from the government, renovates, modernises, and/or expands it, and then operates the asset, again with no obligation to transfer ownership back to government.
<b>Build-operate-transfer(BOT)</b> <ul style="list-style-type: none"> <li>❖ Build-own-operate-transfer(BOOT)</li> <li>❖ Build-rent-own-transfer(BROT)</li> <li>❖ Build-lease-operate-transfer(BLOT)</li> <li>❖ Build-transfer-operate(BTO)</li> </ul>	The private sector designs and builds an asset operates it and then transfers it to the government when the operating contract ends, or at some other pre-specified time. The private partner may subsequently rent or lease the asset from the government.
<b>Design-Build-Finance-Operate(DBFO)</b> <ul style="list-style-type: none"> <li>❖ Build-own-operate(BOO)</li> <li>❖ Build-develop-operate(BDO)</li> </ul>	The private sector designs, builds, owns, develops, operates and manages an asset with no obligation to transfer ownership to the government.

❖ Design-construct-manage-finance(DCMF)	
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(Adapted from Renda & Schreffler, 2009)

Depending on the sector of application, different PPP models can be carefully selected because some areas are better suited for risk transfer to the private sector than others and that different models imply various degrees of control by the public sector (Renda & Schrefler, 2009). Generally, the use of PPP is said to be desirable if; the private sectors' financing costs can be covered by the value of risks transferred to the private sector, the private sector is interested in the project and able to deliver it; the public sector is equipped with procurement skills, delivery skills and other capabilities in delivering of a PPP project; and the public interests are well addressed and protected (Ho, 2009).

It is established from the two scholars above that different models of PPPs are chosen based on the sector to which the model will be applied, the risks expected and who is better placed to handle the anticipated risks. Figure 2.2 summarises the different types of PPPs and the level of private sector risk, responsibility and financing.



**Figure 2.2: Examples of PPP arrangements (Adapted from Zambia Development Agency, 2014)**

## 2.6 Rationale of a Public Private Partnerships

PPPs are implemented for various reasons. The reasons can be grossly divided into: financial reasons (including risk diversification); development reasons; efficiency reasons; and ideological or political reasons or a combination of any of the reasons (Ruben, 2013).

- i. Development reasons: Kalembe (2011) pointed out that PPPs have become a famous means or model of delivering infrastructure and other services in Zambia

since the early 1990s. It was further argued that this was so because governments needed to respond to challenges such as rapid urbanisation, globalisation, decentralisation and climate change.

- ii. Efficiency reasons: Ng, *et al.*, (2007) said that governments world over are looking to PPPs as a preferred mode of project delivery in an efficient and effective manner without straining budgets.
- iii. Financial reasons(including risk diversification): According to the Ministry of Finance- Singapore (2012) in a PPP project, government and the private sector share risks of delivering service. It further observed that transferring financial risks to the private sector creates a greater certainty over future government's cash flows.
- iv. Ideological or political reasons: Public Private Partnerships are also implemented out of tactical desire for short term gains associated with pleasing a particular constituency. Public Private Partnerships can be used as an indicator of party identification or loyalty, symbol of their trust in the market or preference for business over government, rewards from financial markets, or reputational gains regarding the provision of particular goods or services (Shambaugh & Matthew, 2015).

Public Private Partnerships are therefore implemented because of the above reasons, a combination of all or some of the above reasons.

## **2.7 Selection of a Public Private Partnerships Model**

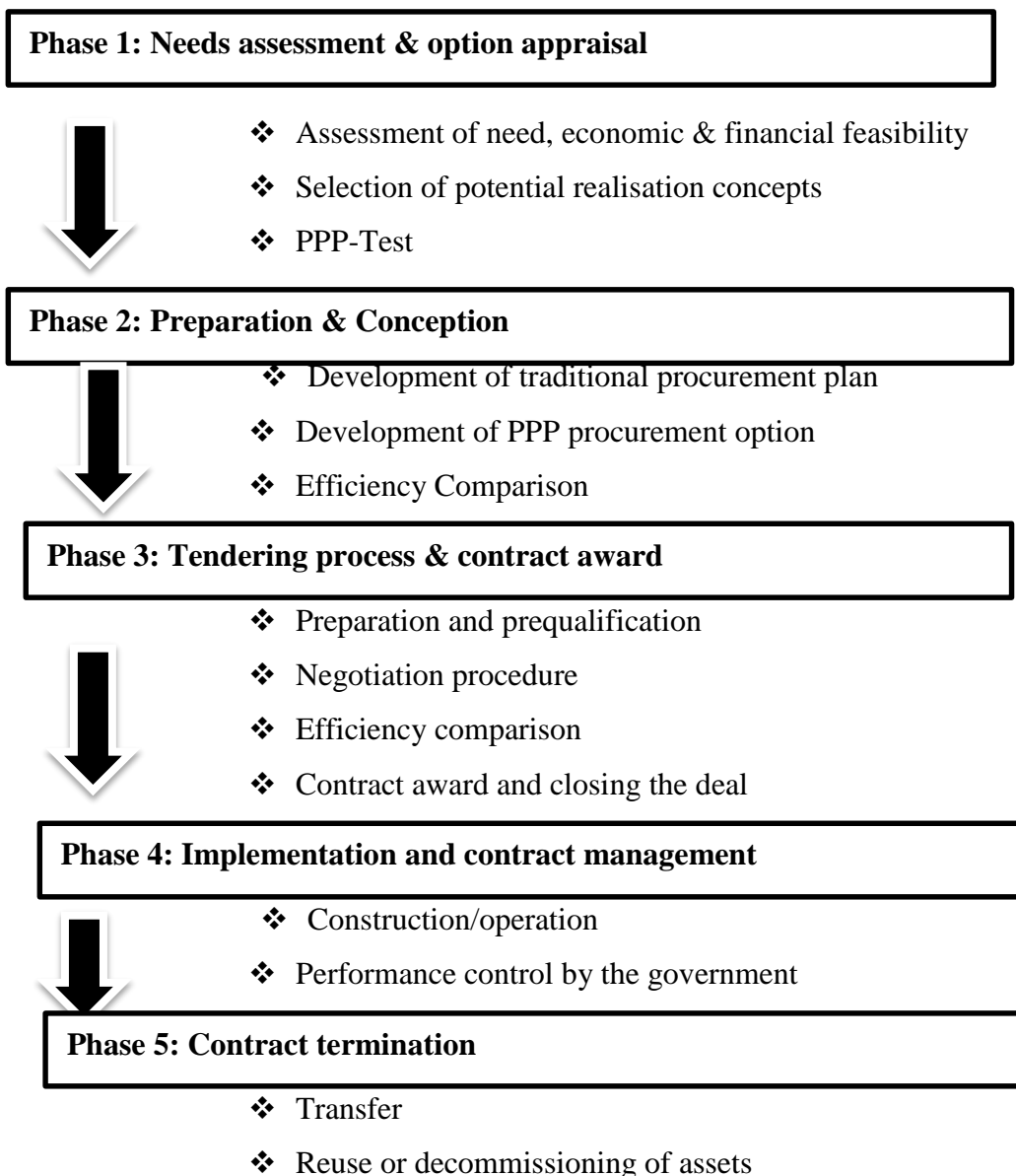
Mannapbekov (2007) stated that “there is no single PPP model that can satisfy all conditions concerning a project's locational setting and its technical features. The most suitable model should be chosen based on the country's political, legal and socio-cultural circumstances, the maturity of the country's PPP market and the financial and technical features of the projects and sectors involved. It was further argued that special characteristics of some sectors and their technological development, legal and regulatory regimes, and public and political perception about services in a sector can also be important factors in deciding the suitability of a particular model of a PPP”. On the other hand, Quim (2011) argues that “selecting an appropriate PPP option is based on a diagnosis of: Public Private Partnerships options available; technical constraints and goals of the sector; legal and regulatory constraints; institutional issues; commercial, financial, and financing

requirements and constraints; interest of both local and international market; and special requirements of the sector based on characteristics of the system or population”.

From the two authors, it can be deduced that one would choose the type of PPP to use depending on one or more of the factors from the two authors or a combination from both.

## 2.8 Phases of a Public Private Partnerships Project

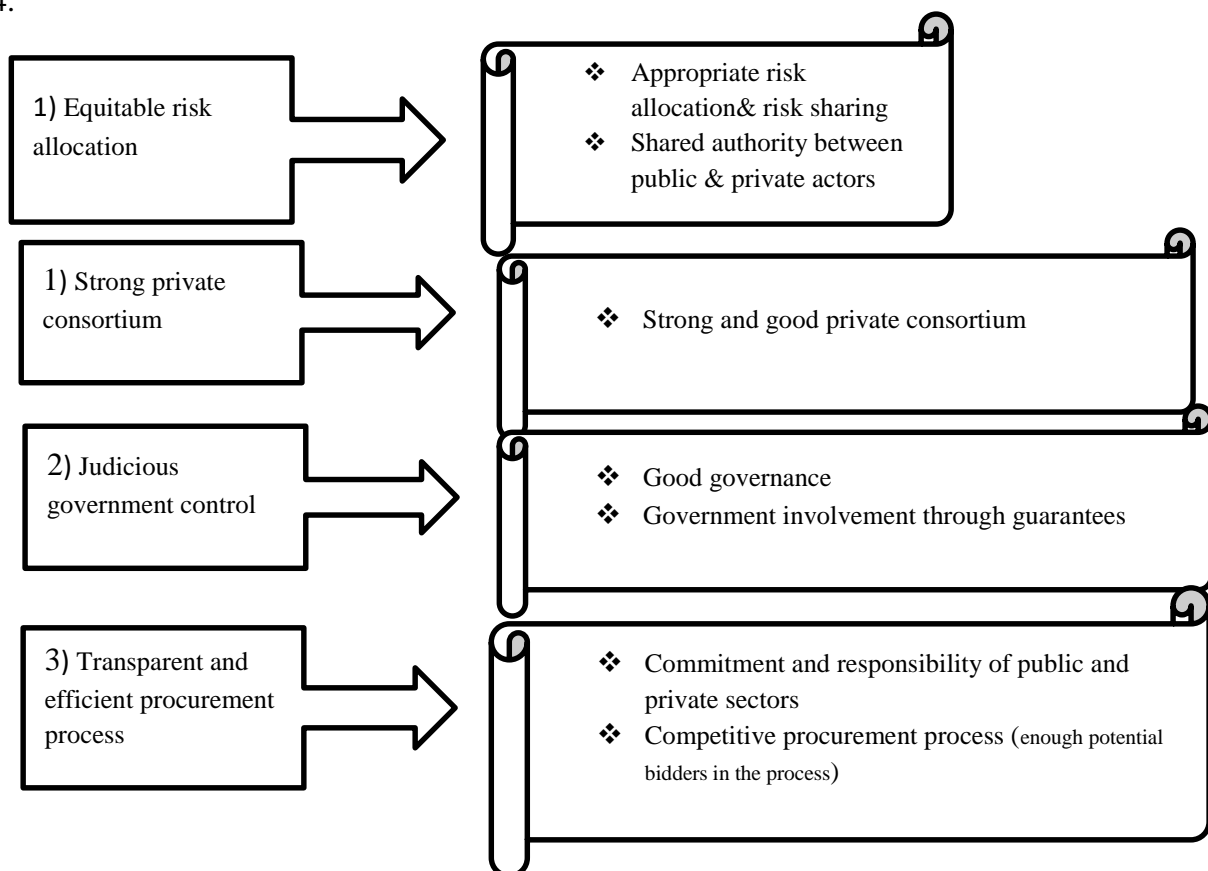
Alfen, *et al.*, (2009), summarised the five phases through which a PPP project passes as Phase 1: Needs assessment and option appraisal; Phase 2: Preparation and conception; Phase 3: Tendering process and contract award; Phase 4: Implementation and contract management; Phase 5: Contract termination. Figure 2.3 indicates the phases of a PPP project.



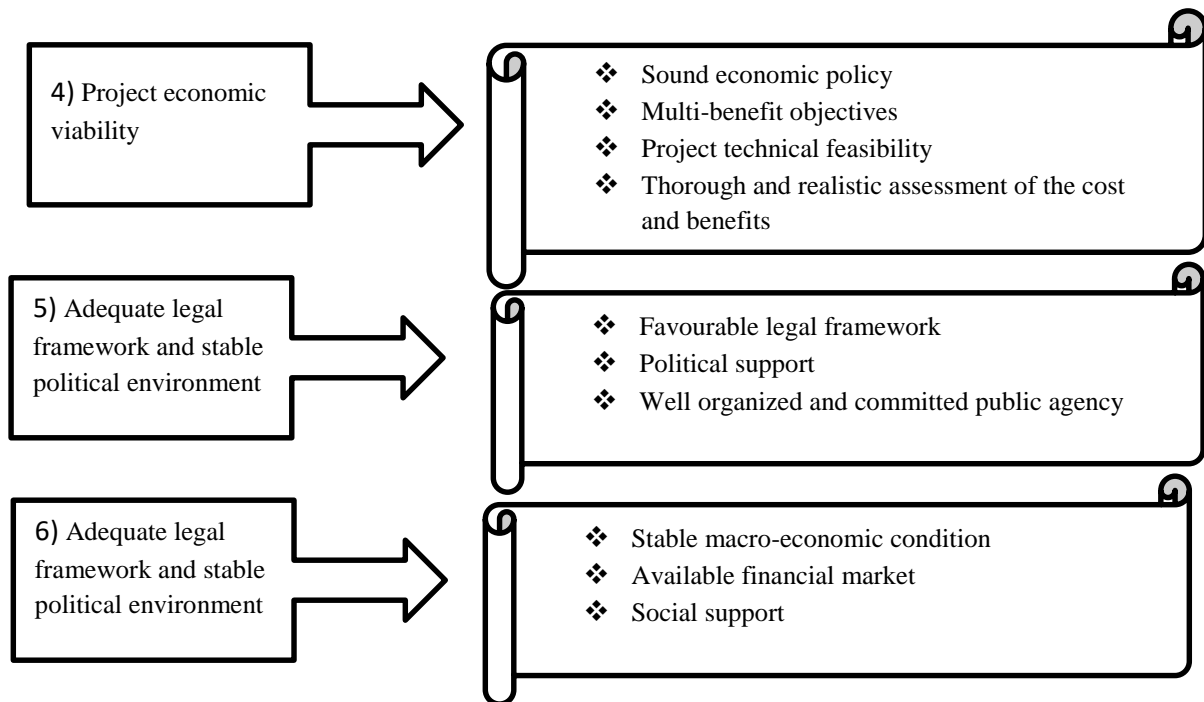
**Figure 2.3: Typical phases of a PPP. (Adapted from Alfen, *et al.*, 2009)**

Ho(2009) equally summarised the stages of a PPP into five stages namely: project initiation stage; planning stage; procurement stage; Development (roll out) stage; and delivery stage.

In order for a PPP to be successful, there are few areas on which focus should be concentrated. These areas are called critical success factors (CSFs). Critical success factors can be identified using interviews and through literature review (Maseko, 2014). Twenty factors were identified and were further grouped into five broad categories as favourable economic condition; project implement ability; effective procurement; stable political and social environment; and government control (Sehgal, *et al.*, 2015). Other scholars have identified critical success factors (CSFs) for PPP projects. Tiong (1996) as cited in Dada and Oladokun (2008) identified six CSFs for private contractors in competitive tendering and negotiation in BOT contracts as entrepreneurship and leadership, right project identification; the strength of consortium; technical solution advantage; financial package differentiation; and differentiation in guarantees. Chan *et al.*, (2010) added to the identification of CSFs for PPPs by grouping them under six principal headings as in Figure 2.4.







**Figure 2.4: Summaries of CSFs for PPP. (Adapted from Chan, *et al.*, 2010)**

There are several other authors who have developed CSFs for PPPs in general and CSFs for specific types of PPPs. It is worth noting that CSFs are country and project specific, PPP being undertaken and used at a particular time. It is, however, possible that some CSFs can be common from different countries and different types of projects. This is true from a comparison done between China and UK (Chan, *et al.*, 2010).

PPPs involve various types of risks that emerge at different stages of the project and these require appropriate allocation and management (Dada & Oladokun, 2008). It is, therefore, important that risks are identified, allocated and managed for a PPP project to yield positive results.

## **2.9 Up and Downside of Public-Private Partnerships**

Public-private partnerships are not a panacea to infrastructure deficit problems for governments. They have potential benefits as well as problems for both citizens and governments. Dennis, *et al.*, (2002) stated that PPPs allow optimal overall risk allocation between the public and private sector, facilitating the distribution of risk to those organisations that can effectively handle them. Price (2000) added that the construction period for PPP/PFI projects is shorter and 80% of the projects

are completed on time or ahead of time, which according to Chinyio and Gameson (2009), is better than that which occurs with most other forms of procurement. The British Columbia partnership (2003) asserted that by taking advantage of private sector innovation, experience and flexibility, PPP/PFI schemes are more cost effectively than traditional approaches. Whilst there are all these benefits, PPP projects equally have demerits including: (a) high transaction costs; (b) unusual alliances; (c) quantification of risks; (d) justification of PFI; (e) unusually high profits; (f) demanding negotiations; and (g) bland products (Chinyio & Gameson, 2009). Zou *et al* (2008) summarised the benefits and demerits as shown in Table 2.2.

**Table 2.2: Up and Downsides of PPP projects**

Upsides of PPPs	Downsides of PPPs
Reducing the cost of implementing the project (Li & Akintoye, 2003)	Being negotiated for a long-term (30years or more), PPP planning is more complicated
A favoured form of financial engineering or off-balance sheet financing which have been devised to avoid treating financing agreements as debt	The up-front cost of PPP projects is much greater than the preparation and negotiation costs of conventional procurement methods
Potentially best practice of risk sharing to improve productivity and performance	May lock in governments to existing models of service delivery and lead to a loss of public sector skills
Transferring risks to competent private partners	Complexity of contractual structure, which in turn results in longer negotiation periods
Superior value for money	Although through PPP governments try to remove the capital expenditure for the assets from their capital accounts, the possibility of expenditure realisation in the capital accounts, due to the government liability in case of partnership failure should not be disregarded
Shorter construction period (Price, 2002).	Lead to a loss of services to the community

Attracting larger, potentially more competent and productive bidders to the project (Li & Akintoye, 2003)	Distorting spending and urban planning priorities, since priority may be given to projects that are readily packaged as PPPs, instead of those producing greatest benefit to the community
<b>Upsides of PPPs</b>	<b>Downsides of PPPs</b>
Facilitation of innovation, bringing diverse interests together and enabling public authorities to cohere around common objectives	
Getting away from bureaucratic and political processes involved in publicly procured projects (Grimsey & Lewis, 2004)	
An effective manner in introducing new technology transfer	
Access to skills, experience and technology of the private sector (Li & Akintoye, 2003)	
Effective vehicle bringing about environmentally efficient buildings, resulting from whole of life view of the project (Grimsey & Lewis, 2004)	

**Adapted from Zou, *et al.* 2008**

The benefits of PPPs far outweigh the demerits as can be seen from Table 2.3. This in most cases makes governments choose PPPs against traditional procurements.

## **2.10 Risks in Public Private Partnerships Projects**

Risks are defined as uncertain events or conditions that, if they occur, have a positive or negative effect on project objectives (Flanagan & Norman, 1993). Risks have causes, and if they occur have consequences (Larson & Gray, 2011). Risks are however not the same as uncertainties. Some uncertainties cannot affect objectives and are therefore not risks (Hillson, 2006).

According to Anigbogu (2016) risks associated with PPPs can be grouped into two broad categories: endogenous- these are risks related to the project; and exogenous-these are risks outside the scope of the project occasioned by external factors. On the other hand, Li, *et al* (2003) argued that risks associated with PPP projects are classified into three categories namely:

- i. Macro level PPP risks. These are sourced exogenously i.e. are external to the project itself. These are risks at national or industry level and natural risks. These include risks such as political, legal conditions, economic, social and weather;
- ii. Meso level PPP risks. This type of risks arises endogenously or internally through the processes of the project itself. These represent the PPP project implementation problem and involve issues such as project demand/usage, location, design and construction, operational requirements and technology; and
- iii. Micro level PPP risks. These are risks that are difficult to define but represent risks associated with stakeholder relationships formed in project procurement process, and which arise in inherent differences between the public and the private sector in ethos and contract management approach. The private sector is profit driven whilst the public sector is driven by social responsibility.

Risk is a fundamental factor in a PPP contract. The negotiation and subsequent allocation of a risk between public and private entities is the defining characteristic of a PPP (Wentworth, 2013).

Risks are both threats and opportunities to the success of the project (Bolai & Price, 2003). Threats tend to reduce the success of meeting the project goals whilst opportunities tend to increase the success. The chances of a project succeeding depend partly on how identified risks are managed.

### **2.11 Typical Risks in a Public Private Partnerships Project**

Different risks occur at different stages of an infrastructure project. They occur at engineering and construction phase, project start-up phase and operation phase. However, typical risks in a PPP infrastructure project are:

- i. Availability risk: This is the risk that comes about when the services provided by the private sector fall below the required standard by the public sector (Akerele & Gidado, 2003);

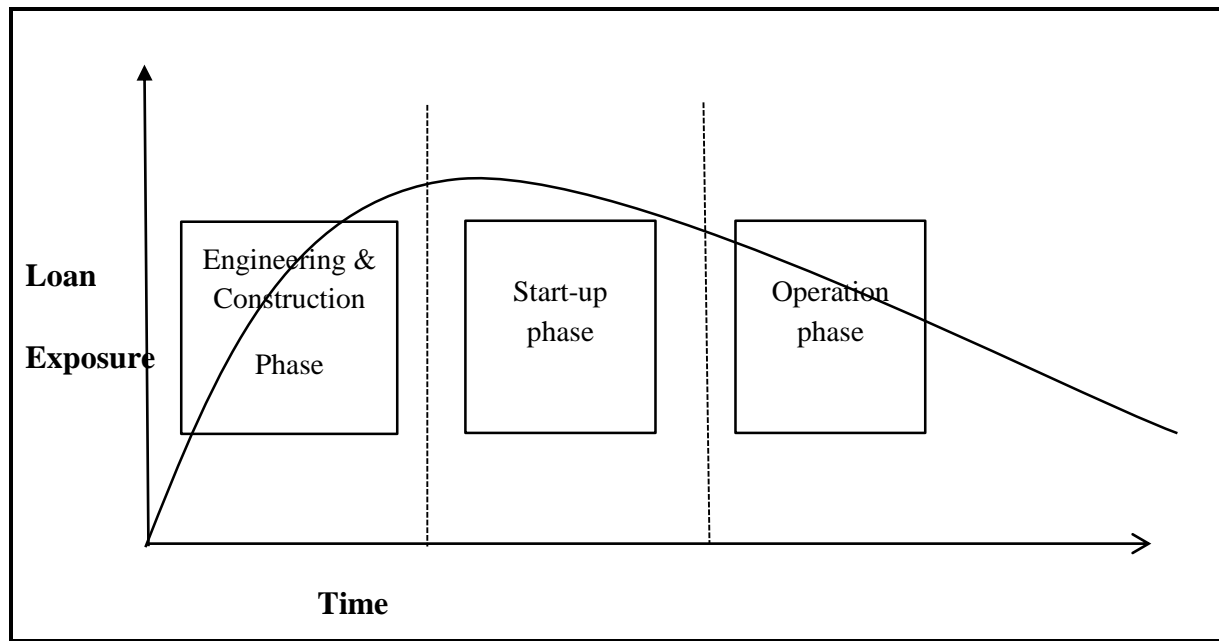
- ii. Completion risk: This is the risk that results in time and/ or cost overruns and it requires a substantial capital and interest expenses. This comes as a result of bad weather, labour strikes or late delivery of equipment and supplies. This includes construction and design risk;
- iii. Project related risk: These are risks such as construction cost escalation, land cost escalation, and protracted negotiation;
- iv. Political risk, due to nationalisation or expropriation, non-availability of foreign exchange, premature termination by government, changes to legislation and breach of contract by government;
- v. Force-majeure or Natural risks: These are risks due to adverse environmental impacts and hazards. These may be due to declared wars, terrorist attacks, labour strikes, riots, epidemic diseases, storms, embargo, floods, fires etc.;
- vi. Economic risk, due to poor financial market, volatile interest rates, and inflation;
- vii. Market risk due to the demand or price of a product becoming low and consequently leading to low revenues than the forecasted levels;
- viii. Legal risk: this risk arises due to government regulations. These risk factors are change in tax regulation, corruption and lack of respect for law and legislation change;
- ix. Operation risk, due to higher operating and maintenance costs. The significant factor is cost overruns. This results from improper measurement, ill-planned schedule or low operating efficiency;
- x. Project selection risk: this risk may arise if and when the public opposes the project;
- xi. Relationship risk due to the differences in the way parties involved organise themselves, coordination, responsibilities, and levels of commitment to the project;
- xii. Project finance risk arising from inadequate hedging of revenue streams and financing costs; and
- xiii. Technology risk: This risk refers to the possibility that there is a change in technology from the one that was previously planned. This may result in services being provided with sub-optimal technology (Karim Abd, 2011); (Wibowo, 2008); (Akerele & Gidado, 2003).

### **2.11.1 Risks at Different Stages of a PPP Project**

There are several and different risks at different stages of a PPP project and as such they need to be mitigated appropriately.

- i. Project start- up phase: This is the stage at which equipment is tested, raw materials ordered, project staffing completed and marketing starts. Working capital and final payments to contractors and equipment suppliers may cause loan exposure to rising slightly.
- ii. Engineering and Construction phase: The project company (SPV) draws down the majority of the loan to finance construction activity, equipment purchase, and other pre-operating costs. As such risks are highest during this period.
- iii. Operation risk: Inadequate revenue is the most significant risk in this stage. This is because at this stage the project company is expected to service the debt and also provide acceptable returns to project investors. Over the period of time, this risk reduces (Pathan & Pimplikar, 2013).

Figure 2.5 summarises the amount of risk expected during a project cycle. Risks grow exponentially from the beginning of the project and are highest during engineering and construction phase and begin to fall again in the operation phase. This is so because at the engineering and construction phase, the project company draws huge loans to finance the construction, purchase equipment and other operating costs. Whilst at the operating stage it is expected that the project company will be servicing the debt and also provide returns to project investors.



**Figure 2.5: Project risk phases. (Source: Adapted from Risk management in PPP)**

Specific strategies have to be adopted at different stages of the project's life either to reduce the likelihood of adverse events or to allocate risks to the party best positioned to deal with them.

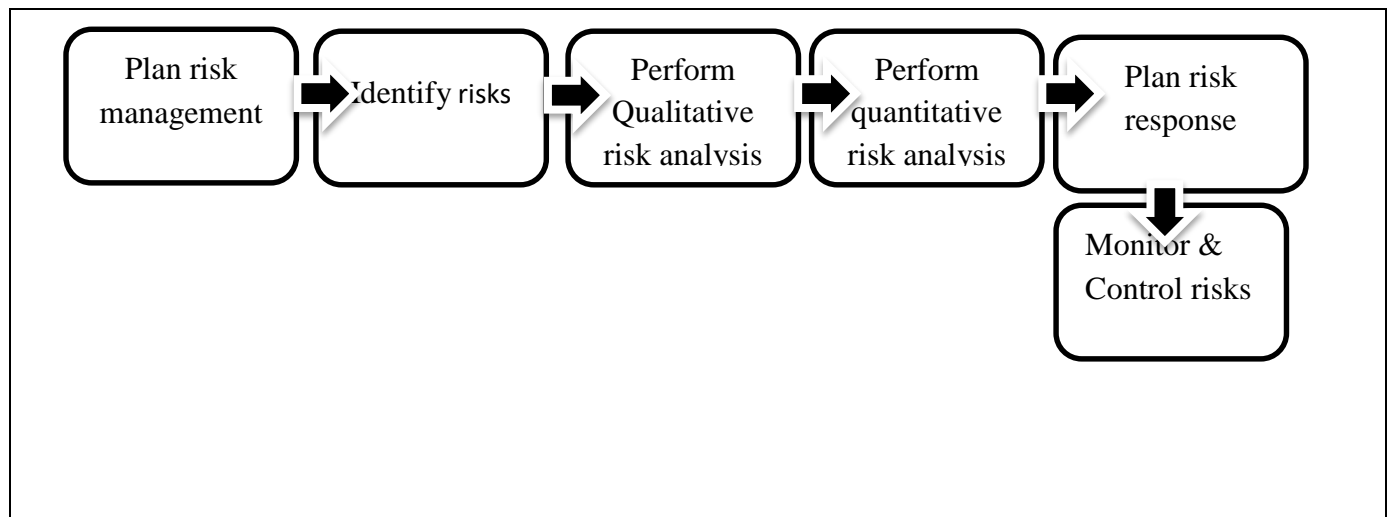
## **2.12 Risk Management**

Risk management is defined as the process of identifying, analysing, qualifying and quantifying the risks and developing a plan to deal with them (Mubarak, 2010). Flanagan and Norman (1993) further defined risk management as a process comprising the following main steps: risk management planning; risk identification; risk assessment; risk analysis; risk response; risk monitoring and risk communication. Kezsbom and Edward (2001) stated that risk management is an important and integral element of project management. Managing risk enables balanced thinking to be achieved, which provides a framework to facilitate more effective decision making. All managers manage risks either consciously or unconsciously. The ISO 31000 identifies risk management principles as being that risk management creates and protects value; is an integral part of all organisational processes, is part of decision making; explicitly addresses uncertainty; is systematic, structured and timely, is tailored, takes human and cultural factors into account, is transparent and inclusive, is iterative, dynamic and responsive to change; and facilitates the continual improvement of the organisation.

A typical risk management process includes the following key steps: Risk identification; Risk assessment; Risk mitigation; and Risk monitoring. Ashok and Birajdar, (2015) on the other hand indicated that the process of risk management is broken-down into Risk Identification; Risk classification; Risk analysis; and Risk response.

Furthermore, Wang, *et al* (2004) stated that risk management consists of three main stages which are risk identification, risk analysis and evaluation; and risk response. On the contrary, Debono (2016) stated that the risk management process is broken-down into six processes, namely planning, identifying risks, performing qualitative risk analysis, performing quantitative risk analysis, plan risk responses and monitor and control risks.

The six management processes were summarised as in Figure 2.6.



**Figure 2.6: Risk management processes. (Adapted from Debono,2016)**

Different scholars have defined and broken-down risk management processes using different terminologies. The process of risk management does not aim to remove completely all risks from the project but to develop an organised framework to assist decision makers to manage risks, especially critical ones, effectively and efficiently. For the purposes of this study, the definition of risk management by Debono (2016) was adopted. The stages as identified by Debono (2016) are explained as follows:

#### ❖ **Plan Risk Management**



This is the process of defining how to conduct risk management activities for a project. This plan is important because it communicates with and obtains agreement and support from all stakeholders.

### ❖ **Identify Risks**

This process determines which risk may affect the project and documents their characteristics. This stage is vital in that it provides documentation of existing risks and equips the project team to anticipate events.

### ❖ **Perform Qualitative Risk Analysis**

Perform qualitative risk analysis is the process of prioritising risks for further analysis or action by assessing and combining their probability of occurrence and impact. This is beneficial to project managers in that it reduces levels of uncertainty and makes them concentrate on high priority risks. Techniques used in qualitative risk analysis include:

- i. Risk probability and impact assessment; this technique investigates the likelihood of a risk occurring whilst an impact assessment investigates the potential effect on project objectives.
- ii. Probability and impact matrix; such a matrix specifies combinations of probability and impact that lead to rating the risks as low, moderate, or high. The rating is based on a risk's probability of occurrence and impact on an objective if it occurs.
- iii. Risk data quality assessment; this evaluates how useful the data about risks is for risk management. It examines the accuracy, quality, reliability and integrity of the data.
- iv. Risk categorisation; this technique categorises risks by source, the area of the project affected or other useful category. This categorisation helps to determine the areas of the project most exposed to effects of uncertainty.
- v. Risk urgency assessment attaches time to which risk should be done at a particular time; and
- vi. Expert judgement uses experts with experience in similar projects.

### ❖ Perform Quantitative Risk Analysis

This is the process of numerically analysing the effect of identified risks on overall project objectives. It is performed on risks that have been prioritised by the qualitative risk analysis process. It uses techniques such as Sensitivity analysis; Expected monetary value analysis; Decision tree analysis; Tornado diagrams; and Monte Carlo analysis among many others.

### ❖ Plan Risk Response

This helps in developing options and actions to enhance opportunities and reduce threats to project objectives. Furthermore, it addresses risks by their priority and helps develop strategies to handle risks, assign resources and budget to risks.

### ❖ Control Risks

This is the process of tracking identified risks, implementing risk response plans, monitoring residual risks, identifying new risks and evaluating risk process effectiveness throughout the project. This is done using: Risk audits; Reserve analysis; Meetings; Risk reassessments; and Variance and trend analysis (Newton, 2015); (Project Management Institute. Inc., 2013); (Naggar, 2013).

### ❖ Risk Response Strategies

Unmitigated risks lead to schedule delays, cost overruns, and in the worst-case scenarios, disputes and claims (Bernstein, et al., 2011). Once risks are planned, strategies have to be developed in order to reduce either the possibility or the impact of a risk or both. Risk mitigation produces a situation where risk items are eliminated or otherwise resolved. The Project Management Institute. Inc. (2013) summarised risk response strategies in Table 2.3.

**Table 2.3: Risk Response Strategies**

For Threats	For Opportunities
<b>Avoid:</b> A risk can be avoided by removing the cause of the risk or executing the project in a different way.	<b>Exploit:</b> This strategy is reserved for golden opportunities. It seeks to eliminate the uncertainty associated with a particular

	upside risk by making the opportunity happen.
<b>Transfer:</b> Transferring a risk involves finding another party who is willing to take responsibility for its management, and who will bear the liability of the risk should it occur. This usually involves payment of a premium.	<b>Share:</b> Allocate risk ownership of an opportunity to another party who is best able to maximise its probability of occurrence and increase the potential benefits if it occurs.
<b>Mitigate:</b> risk mitigation reduces the probability and/ or impact of an adverse risk event to an acceptable threshold.	<b>Enhance:</b> This response aims at modifying the size of the positive opportunity. This is done by increasing the probability and/ or impact.
<b>Acceptance:</b> This strategy is adopted when it is not possible or practical to respond to the risk by other strategies or a response is not warranted by the importance of the risk. A contingency plan, workaround and/ or contingency reserve may be developed for any eventuality.	

(Adapted from Project Management Institute. Inc., 2013)

### ❖ Risk Allocation

Whilst many researchers have stated that risks should be allocated to the party that is best placed to manage it and bear the risk at the lowest cost, Lam, *et al* (2007) as cited by Chan, *et al* (2011) on the contrary identified seven key risk allocation criteria: Whether the party *is able to foresee the risk; is able to assess the possible magnitude* of the consequences of the risk; *is able to control* the chance of the risk occurring; *is able to manage the risk* in case of occurring; *is able to sustain the consequences* if the risk occurs; *will benefit from bearing* the risk; and the premium charged by the risk receiving party is considered *reasonable and acceptable* for the owner.

Shretha, *et al.* (2013) further added to when risks should be allocated to the party by stating that risks should be allocated to a party when: the risk is within their control; they can transfer this risk in an economically beneficial way; the economic benefits of the risk rests with that party; it is more efficient to put the risk on that party; and if the risk eventuates, the loss fall on that party and there is no valid reason to try to transfer it.

One wonders what the benefits of risk management are to an organisation. A number of studies have been conducted in relation to the benefits that can be expected from an organisation that implements a structured approach to risk management. Oldfield and Ocock (1997) identified both tangible and intangible benefits of risk management. Table 2.4 summarises the identified tangible and intangible benefits of risk management.

**Table 2.4: Tangible and intangible benefits of risk management**

No.	Tangible Benefits	Intangible Benefits
1	Better informed and achievable project plans, schedules and budgets;	Improved communication;
2	Increased likelihood of project meeting targets;	Development of a common understanding of project objectives;
3	Project allocation of risk through the contract;	Enhancement of team spirit;
4	Ability to avoid taking on unsound projects;	Focussed management attention on genuine threats;
5	Better allocation of contingency to reflect risk;	Facilitates appropriate risk taking
6	Recording metrics to improve future projects;	Demonstrates professional approach to customers
7	Objective comparison of risk exposure of alternatives;	
8	Identification of best risk owner	

(Adapted from Oldfield and Ocock, 1997)

### **2.13 Public Private Partnerships in Zambia**

Zambia approved a PPP policy in 2007 and later enacted the PPP act in August 2009. The PPP agenda for Zambia was: to enhance economic development in the country through partnerships between government and the private sector and to support the national vision of making the country prosperous and a middle-income country by 2030 (Mwiinga, 2011).

By 2014, since the signing of the PPP act in 2009, there had been no PPP agreement that had been signed in Zambia (Zambia Development Agency, 2014). However, before the enactment several PPP arrangements were entered into and these included: The 20 year concession of Zambia Railways to Railway systems of Zambia; the 25 years concession of Mpulungu Harbour Corporation to Agro Fuel Zambia in 2000; the 65 years build- operate- transfer contract between Lusaka City Council and China Hinani for the financing, construction, operation and transfer of Luburma market in 2000/2001; and the 25 years build-operate-transfer contract of Kasumbalesa one stop border post with Baran Trade and Investment Ltd (Zambia Development Agency, 2014). The Concessioning of Mpulungu Harbour Corporation to Agro Fuel Zambia and that of Zambia Railways assets to Railway Systems of Zambia have since been cancelled and the reasons for the cancellations were that there was no legal and regulatory framework and no PPP institutional framework at the time the agreements were signed.

There are several PPP types used in Zambia and the choice of a particular PPP hinges upon government's policy in the related sector and on potential value for money to be generated under such an arrangement (Axis Consulting, 2013).

Table 2.5 shows the PPP projects that have either been proposed or signed in Zambia.

**Table 2.5: PPP projects in Zambia**

Sector/Subsector	Name of project	Cost(US\$)	PPP type	Status
Roads	Lusaka-Ndola	TBA*	BOT/Tolling	EOI advertised
Roads	Kitwe-Chingola	TBA	BOT/Tolling	EOI advertised/negotiation
Roads	Chingola-Jimbe border	TBA	BOT/Tolling	EOI advertised

Sector/subsector	Name of project	Cost(US\$)	PPP type	Status
Roads	Kafue-Chirundu	TBA	BOT/Tolling	EOI advertised
Rails	Zambia railways concession	750,000 plus concession fees	Concession	Concession entering seventh year of operation
Rails	Kazhungula-Livingstone railway spur	TBA	TBA	Approved for implementation
Rails	Tazara-Chipata	TBA	TBA	Approved for implementation
Rails	Solwezi via Kasempa to Kasama	TBA	TBA	Approved for implementation
Rails	Mongu-Katima Mulilo	TBA	TBA	Approved for implementation
Border post support infrastructure	Kasumbale	TBA	BOT	In operation phase

Sector/subsector	Name of project	Cost(US\$)	PPP type	Status
Border post support infrastructure	Kazhungula	TBA	BOT	EOI advertised
Border post support infrastructure	Nakonde	TBA	BOT	EOI advertised
Border post support infrastructure	Mwami	TBA	BOT	EOI advertised
Border post support infrastructure	Jimbe	TBA	BOT	EOI advertised
Border post support infrastructure	Kipushi	TBA	BOT	EOI advertised
Energy	Kafue Gorge Lower(600-700MW)	2 billion	Joint venture	Feasibility study completed and procurement of developer about to commence
Energy	Upgrade of Indeni refinery and	TBA	TBA	Feasibility study advertised

	TAZAMA pipeline			
Energy	Development of Kabompo mini hydro	TBA	TBA	Feasibility study commenced
Energy	Development of Kalungwis hi mini hydro	TBA	TBA	Feasibility study commenced
Energy	Development of Batoka Gorge hydro-electric scheme	TBA	BOT	EOI advertised
Estate and Housing	University of Zambia hostels	TBA	BOT	In operation phase
Estate and Housing	University of Zambia ultra-modern business park	TBA	BOT	Feasibility study commenced
Estate and Housing	4,000 housing units each in	TBA	BOT	Feasibility study commenced



	Livingstone, Lusaka and Ndola cities			
Estate and Housing	Mulungushi village complex	TBA	TBA	Advertised
Agriculture	Nansanga farm block	TBA	BOT	Advertised
Agriculture	Irrigation development project	TBA	TBATBA Feasibility study	Feasibility study commenced
Health	Lusaka ultra-modern centre of excellence hospital	TBA	TBA	Feasibility study commenced
Health	Development of three diagnostic health facilities in Lusaka, Livingstone and Ndola cities	TBA	TBA	Feasibility study commenced
Airports	Lusaka	TBA	BOT	Feasibility study not

				yet commissio ned
Airports	Livingston e	TBA	BOT	Feasibility study not yet commissio ned
Airports	Ndola	TBA	BOT	Feasibility study not yet commissio ned
Airports	Solwezi	TBA	BOT	Feasibility study not yet commissio ned

(Adapted from the Ministry of Finance and National Planning)

### 2.13.1 Risk Management in Zambia's Public Private Partnerships

Ngoma, *et al.* (2014) identified twenty-four risk factors by respondents from both the public and private sectors, from which the top five most prevalent were identified as stakeholder project approval; corruption; inflation; environmental considerations; and lack of experience in PPP arrangements. Chimuka (2012) cited appropriated risk allocation and risk sharing as one of the CSFs in the implementation of PPPs in Zambia.

Mweemba (2015) observed that Zambia does not have risk management strategies which outline how risks are identified, assessed, mitigated and allocated to all parties that have the best capacity to manage them and that government should develop a risk management mechanism to ensure that PPPs are fiscally affordable and economically sustainable.

From the three authors, it could be observed that most prevalent risks in infrastructure PPPs have been identified; risk allocation and sharing is important for PPPs to be successful; and risk management strategies do not exist.

## **2.14 Public Market Infrastructures in Zambia**

The term public market has evolved over time and is defined differently from different places. In the United States, a public market is defined as a municipally owned and operated building where vendors sell fresh food from open stalls (The Ford Foundation, 2003). Markets vary in size, range, geographic scale, location, types, human communities involved and the types of goods and services traded. The most striking and distinctive characteristic of markets is their centrality within a given community (Dennis, et al., 2002). Whilst some public markets suit the definition by the Ford Foundation (2003) public markets come in different settings, offer a wide range of different products, and are owned and operated by various types of organisations not just municipal and city governments. Public markets come with several benefits and Brooks (2014) cited some of the benefits as: creating additional tax base with minimal local cost; increasing consumption of local products and agriculture; increasing property values around the market for both commercial and housing uses; generating significant tourist traffic; creating a fantastic way to celebrate cultural diversity; and act as an access point for addressing public health and education issues. Furthermore, Econsult (2007) recognised public markets as tools to achieve a wide variety of goals. Some of the goals identified included: providing improved access to quality food; better marketing opportunities for family farmers; improving social interaction in urban neighbourhoods; increasing social cohesion; providing employment to local communities; creating entrepreneurial environment to increase small business formation; and enhancing community economic development.

Markets in Lusaka are under the jurisdiction of Lusaka City Council (Phiri, 2014). Scott (1985) identified two kinds of informal sector markets in Lusaka. The first one comprised the unauthorised markets that came up due to demand for processed and unprocessed food, cloth and crafts. These are common in the city centre and in high density squatter settlements. The other type is that one that sprang up at major thoroughfares, at large bus terminals, near large retail shops and adjacent to government buildings. The second type of informal sector markets as defined by Scott (1985) is called “authorised” markets. These types of markets in Lusaka are, according to Phiri (2014) under the jurisdiction of Lusaka City Council. By late 1990s, Lusaka had forty

designated city markets and fifty-four designated township markets. The rapid degradation of the existing legal markets due to inadequate funding and maintenance over the years, political and economic transitions in the early 1990s, led to the birth of the Urban Market Development Programme (UMDP) between the Government of Zambia and the European Union (Kalemba, 2011). The UMDP aimed to rehabilitate and rationalise urban markets in the cities of Lusaka, Kitwe and Ndola during a period 1996-1999 (TYPISA, 2010). The programme was to be implemented in two phases; Phase I and Phase II respectively. During Phase I, three markets were earmarked for rehabilitation in the city of Lusaka whilst phase II had eleven markets in the cities of Kitwe and Ndola but was reduced to eight due to increased cost and land acquisition problems. Upon completion of the three markets in Lusaka, monies that remained were used to construct two more markets, bringing the total to five markets in Lusaka alone. These markets were: New Soweto; Chilenje; Libala; Chelstone; and Nyumba Yanga (Kalemba, 2011).

In order to compliment government's effort, Lusaka city council developed two additional markets using the PPP procurement method. The two markets were Luburma and Chachacha markets between China Hinani and United Engineering Group Ltd respectively (Phiri, 2014).

Generally, markets can be in different forms such as money markets, stock markets, bond markets, commodity markets and currency markets. The interest of this research is a market as a physical place; i.e. an infrastructure where goods and services are traded.

### **2.15 Risk Management Frameworks**

Alberts and Dorofee (2010) stated that a risk management framework specifies accepted best practice for the discipline of risk management. It is implementation dependent, defines key risk management activities, helps provide a foundation for a comprehensive management methodology and provides a basis for evaluating and improving a programme's risk management. The Cambridge learner's dictionary defines a framework as a supporting structure around which something can be built. On the other hand, Cambridge learner's dictionary defines a guideline as information intended to advise people on how something should be done or what should be done. Chipulu (2016) asserted that the two are mostly used interchangeably though they don't mean the same.

Different scholars have developed risk management frameworks for different types of PPPs and for different countries. They show a step by step guide in dealing with risk management hence making it easy for stakeholders in making decisions that relate to risk management. Table 2.6 shows some risk management frameworks that have been developed and the purposes of the developed frameworks.

**Table 2.6: Risk Management Frameworks**

ITEM	TYPE OF RISK MANAGEMENT FRAMEWORK	PURPOSE OF FRAMEWORK	AUTHOR
1	Conceptual framework for managing risks in PPP projects in housing estate development in Nigeria	To guide project promoters investing in the housing estate development industry in Nigeria on how to manage risks.	Anigbogu, N-2016
2	Risk management framework for BOT power projects in China	To guide project promoters planning to invest in future BOT power projects in China.	Wang,S.Q;Tiong R.L.K; Ashley, D-1999
3	Proposed risk management framework for BOT infrastructure in India	To provide step by step guidelines for foreign companies intending to invest and in India's infrastructure.	Ashok,Y.A;Birajdar, B.V-2015
4	A life-cycle risk management framework for PPP infrastructure projects	To show the process of allocating and monitoring risks.	Zou,P.W.X; Wang, P; Fang, D-2008

ITEM	TYPE OF RISK MANAGEMENT FRAMEWORK	PURPOSE OF FRAMEWORK	AUTHOR
5	A risk identification framework and tool for large infrastructure PPP delivery	To improve risk management as it is applied in the delivery of large civil infrastructure with particular emphasis on the planning and Procurement phases.	Nelms, C- 2012
6	A best practice framework for implementing PPPs in Hong Kong	To help resolve the current economic crisis by encouraging more developments and business opportunities for the private sector.	Cheung, E- 2009
7	Risk management framework for BOT infrastructure project	To provide step by step guidelines for foreign companies intending to invest and in India's infrastructure.	Mane & Pimpilikar- 2013
8	Framework for PPP project risk analysis and allocation	To help identify risks that might arise throughout the life of a project.	Li,B;Akintoye,A; Hardcastle,C-2004
9	Risk framework for public-private partnerships in highway construction	To help encourage proactive thinking and help in clear visualisation of risks involved in PPP projects enabling better decision making	Shrestha,M-2011

10	Risk assessment framework for building construction projects in developing countries	To improve the performance of building construction projects in developing countries.	Odimabo,O.O & Oduoza C. F-2013
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(Source: Author (2017))

## 2.16 Chapter Summary

Chapter two delved into what different authors have written about PPPs in general and their different definitions for Public Private Partnerships. The different features; types and phases of PPPs were highlighted in this chapter. Because of the many types of PPPs that exist, it was necessary to find out how to choose a particular type of PPP and not the other. PPPs go through several phases and that several stakeholders have varying responsibilities at the different stages.

There are factors that are necessary for PPPs to be successful and these factors vary depending on the type of project and the country in which the project is being undertaken among other reasons. They are called CSFs. Because of their very nature viz a vie, long-term and huge capital investment, PPPs come with a lot of risks. How successful a PPP is will depend on how risks are managed.

Zambia has had PPPs of which some have been cancelled because Zambia did not have a legal and regulatory framework at the time the agreements were signed. Risks in Zambia's PPP have been identified but risk management strategies are non-existent. This makes it necessary to develop a risk management framework so as to address some of the concerns raised by authors on Zambia's PPP risk management.

Chapter three looks at how to achieve the process of developing a risk management framework among other set objectives and the methods to be used in collecting and analysing data and how the reliability and accuracy of data will be tested.

Table 2.7 summarises some of the literature used in this research.

**Table 2.7: Literature Review Summary**

SN	Author	Year	Title	Objectives	Methodology	Conclusions/Comments
1	Akerere & Gidado	2003	The risks and constraints in the implementation of PFI/PPP in Nigeria	The aim of the paper was to develop an implementation model for PFI and PPP in developing countries and to identify the constraints and risks in the implementation of PFI/PPP in Nigeria	Questionnaire	It is a good reference book for on the obstacles and risks faced in the implementation of PPPs
2	Alfen, Satyanarayana, Kalindindi	2009	Public-Private Partnerships in Infrastructure Development			
3	Aminu, A. B	2013	Risk Management in the Nigerian construction industry	The objectives of the study were to identify the areas or factors that will help to develop a risk management practice in Nigeria, identify the factors responsible for poor risk management practice in Nigeria among other objectives.	Questionnaire	It is a helpful reference on risk management



SN	AUTHOR	YEAR	TITLE	OBJECTIVES	METHOD OLOGY	CONCLUSION/REMARKS
4	Anigbogu, N. N	2016	A conceptual framework for managing risks in PPP projects in housing estate development in Nigeria	The paper sought to develop a framework that would provide a step by step approach to managing risks in PPP for the housing estate industry in Nigeria.	Questionnaire	Helpful literature on PPPs in the housing estate industry and in general
5	Ashok & Birajdar	2015	Risk analysis and management for the PPP infrastructure projects in India	The paper aimed to understand and study risks in PPP, evaluate the critical risks associated with India's BOT infrastructure projects and identify and examine the risks in BOT infrastructure projects.	Questionnaire	This is a good reference on the development of a risk management framework
6	Banaitiene & Banaitis	2012	Risk management in construction projects	The paper aimed at identifying contractor's opinions on the significance of construction project risks and to explore risk analysis and management practices in the Lithuanian construction sector.	Questionnaire	Relevant reference on risks and risk management

SN	AUTHOR	YEAR	TITLE	OBJECTIVES	METHOD OLOGY	CONCLUSION/REMARKS
7	Cheung, E	2009	Developing a best practice framework for implementing PPPs in Hong Kong	The aim of the paper was to develop a best practice framework for implementing PPPs in Hong Kong by looking at international practice.	Questionnaire and explanatory	A relevant reference for the development of risk management framework
8	Chimuka, B	2012	An evaluation of the performance of PPP projects in Zambia in respect of critical success factors	This research paper evaluated the critical success factors in the implementation of PPP projects in Zambia.	Questionnaire and explanatory	An ideal reference material for CSFs for Zambia's PPP projects
9	Dada, M.O & O ladokun, M. G	2008	Critical success factors for PPP projects in Nigeria. A perceptual survey	This research paper evaluated the critical success factors in the implementation of PPP projects in Nigeria.	Questionnaire	An ideal reference material for CSFs for Nigeria's PPP projects

<b>SN</b>	<b>AUTHOR</b>	<b>YEAR</b>	<b>TITLE</b>	<b>OBJECTIVES</b>	<b>METHOD OLOGY</b>	<b>CONCLUSION/REMAR KS</b>
10	Dantala, P. D	2014	Public-private partnerships: The answer to Nigeria's development challenges	The aim of this research was to critically look at PPPs as an alternative to financing development of infrastructure.	Questionnai re	A good reference for introductory information on PPPs
11	Dawson, C	2007	A practical guide to research methods	The book describes the different research methods used in research.	Explanatory /Descriptive	A relevant guide to different research methods
12	Dennick & Tavakol	2011	Making sense of Cronbach's alpha	The aim of the paper was to explain how and where to use Cronbach's alpha.	Descriptive	It's an important guide to use of Cronbach's alpha as a data analysis tool
13	Esty & Benjamin	1999	Petrozuata: A case study of the effective use of project finance	The paper aimed to explain the how project finance can be used to effectively finance a project.	Explanatory /Descriptive	It's a useful guide to understanding project finance

SN	AUTHOR	YEAR	TITLE	OBJECTIVES	METHOD OLOGY	CONCLUSION/REMARKS
14	Gatti, S	2007	Project finance in practice and theory	The book explained both the theoretical and application of project finance.	Explanatory /Descriptive	A useful reference material on the topic of project finance
15	Hillson, D	2006	Integrated risk management as a framework for organisational success	The book explained how risk management can contribute to organisational success.	Explanatory /Descriptive	A useful guide on the topic of risk management
16	Kalembe	2011	Assessing value for money in PPP infrastructure projects in Zambia	The research sought to establish whether or not the construction of the two markets by the Lusaka City Council through PPPs provided value for money.	Questionnaire and Interviews	Relevant reference for information on PPP on market construction
17	Karim Abd, N.A	2011	Risk allocation in PPP projects	The paper aimed at finding the most common risk factors and how they are allocated.	Questionnaire	Relevant literature on risk factors and how risks are allocated
18	Larson, G	2011	Project Management: The managerial process	The book explains the process of project management, from inception to the close of the contract.	Explanatory /Descriptive	Good reference for the understanding of the process of project management

SN	AUTHOR	YEAR	TITLE	OBJECTIVES	METHOD OLOGY	CONCLUSION/REMAR KS
19	Legendre, P	2005	Species Association: the Kendall coefficient of concordance revisited	The paper explains the use of Kendall coefficient of concordance.	Explanatory /Descriptive	Explains how and where to use Kendall coefficient of concordance
20	Levison, et al	2006	A framework for assessing public- private partnerships	The paper explains how a framework makes implementation and understanding PPPs easier.	Questionnai re	Simplifies the topic of PPPs
21	Li, et al	2004	Risk treatment preferences for PPP/PFI construction projects in the UK	The paper aimed at seeking participant's opinions on the preferred treatments for risks in PPPs/PFI.	Questionnai re	Explains how different risks are allocated

## CHAPTER THREE: RESEARCH METHODOLOGY

### 3.1 Introduction

The previous chapter explained existing literature on PPP in general and the risks that are associated with PPPs. It further explained the risk management processes that have been used for different types of PPP arrangements.

This chapter explains the research methodology and methods for the study. It breaks down the process used in achieving the objectives of the research. It details the research strategy, research method, research approach, data collection methods, selection of the sample, research process and data analysis tools used in the study.

### 3.2 Research Method

In order to satisfy the objectives of the dissertation, both qualitative and quantitative research methods were employed. This research used both interviews and a questionnaire to collect data. Table 3.1 summarises the features of both qualitative and quantitative research.

**Table 3.1: Features of Qualitative & Quantitative Research**

Qualitative research	Quantitative research
<ul style="list-style-type: none"><li>❖ The aim is a complete, detailed description;</li><li>❖ Researcher may only know roughly in advance what he/she is looking for;</li><li>❖ Recommended during earlier stages of research projects;</li><li>❖ The design emerges as the study unfolds;</li><li>❖ Researcher is the data gathering instrument;</li><li>❖ Data is in the form of words, pictures or objects;</li></ul>	<ul style="list-style-type: none"><li>❖ The aim is to classify features, count them, and construct statistical models in an attempt to explain what is observed;</li><li>❖ Researcher knows clearly in advance what she/he is looking for;</li><li>❖ Recommended during later stages of research projects;</li><li>❖ All aspects of the study are carefully designed before data is collected;</li><li>❖ Researcher uses tools, such as questionnaires or equipment to collect numerical data;</li></ul>

<ul style="list-style-type: none"> <li>❖ Subjective- individuals' interpretation of events is important, e.g. uses participant observation, in-depth interviews etc.;</li> <li>❖ Qualitative data is more 'rich', time consuming, and less able to be generalised; and</li> <li>❖ Researcher tends to become subjectively immersed in the subject matter.</li> </ul>	<ul style="list-style-type: none"> <li>❖ Data is in the form of numbers and statistics;</li> <li>❖ Objective: seeks precise measurement and analysis of target concepts, e.g., uses surveys, questionnaires etc.;</li> <li>❖ Quantitative data is more efficient, able to test hypotheses, but may miss contextual detail; and</li> <li>❖ Researcher tends to remain objectively separated from the subject matter.</li> </ul>
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Adapted from <http://wilderdom.com/research/qualitativeVersusquantitativeResearch.html>

Because of the advantages of qualitative research such as being recommended in the early stages of the research and the researcher being the data gathering instrument (in interviews), it was necessary that qualitative data be collected through interviews. A Questionnaire come with their own advantages such as data collected being in form of statistics. Quantitative data was therefore gathered through a questionnaire that were carefully developed and structured to provide numerical data that was explored statistically and yielded a result that was generalized to some larger population while qualitative data was gathered through interviews using semi-structured or unstructured topic guides. Table 3.2 below further summarizes the differences between quantitative and qualitative research

**Table 3.2: Summary of differences between qualitative and quantitative research**

	Quantitative research	Qualitative research
<b>Aim</b>	The aim is to count things in attempt to explain what is observed	The aim is a complete, detailed description of what is observed
<b>Purpose</b>	Generalizability, prediction, causal explanations	Contextualization, interpretation, understanding perspectives

	<b>Quantitative research</b>	<b>Qualitative research</b>
<b>Tools</b>	Researchers use tools such as surveys, to collect numerical data.	Researcher is the data gathering instrument
<b>Data collection</b>	Structured	Semi-structured or unstructured
<b>Output</b>	Data is in form of numbers and statistics	Data is in the form of words, pictures or objects
<b>Sample</b>	Usually a large number of cases representing the population of interest. Randomly selected respondents	Usually a small number of non-representative cases. Respondents selected on their experience.
<b>Objective/Subjective</b>	Objective-seeks precise measurement and analysis	Subjective- Individuals' interpretation of events is important
<b>Researcher role</b>	Researcher tends to remain objectively separated from the subject matter	Researcher tends to become subjectively immersed in the subject matter
<b>Analysis</b>	Statistical	Thematic/ interpretive

**Source: Adapted from MacDonald, and Headlan.**

This research employed both qualitative and quantitative research methods by using both interviews and questionnaires because of the qualities that suited this study.

### **3.2.1 Interviews**

Interviews are described as conversations with a purpose. There are three types of interviews namely: structured; unstructured and semi-structured interviews (Wellington, 2015). Interviews have advantages and disadvantages but the advantages were more applicable to this study. Table 3.3 shows the advantages and disadvantages of interviews.



**Table 3.3: Advantages and Disadvantages of Interviews**

Advantages	Disadvantages
<ul style="list-style-type: none"><li>❖ Useful for gaining insight and context into a topic;</li><li>❖ Allows respondents to describe what is important to them; and</li><li>❖ Useful for gathering quotes and stories.</li></ul>	<ul style="list-style-type: none"><li>❖ Susceptible to interview bias;</li><li>❖ Time consuming and expensive compared to other data collection methods; and</li><li>❖ May seem intrusive to respondent.</li></ul>

**Source: Finn & Jacobson, (2008)**

Individual interviews were used instead of group interviews because it was easy for individual officers to allocate time for an interview than a group of officers. Furthermore, a group discussion required a venue which was not only expensive but difficult to find.

Fifteen participants, both from the private and the public were targeted to be interviewed on risks that affect PPPs in Zambia. The officers had either been involved in a PPP project or had an influence on a project. The whole objective of the interviews was to come up with a list of risks that affect the different parties involved in a PPP. This list of risks together with that from literature formed what fed in section two of the questionnaire.

### **3.2.2 Questionnaire**

On the quantitative side of the research method, self-administered questionnaire was used to collect data. This method of data collection was used because a large number of participants were reached within cost and time and the fact that there is no evaluator bias. The questionnaire method further comes with additional advantages but has equally a number of disadvantages as shown in Table 3.4.

**Table 3.4: Advantages and disadvantages of using questionnaires**

Advantages	Disadvantages
<ul style="list-style-type: none"><li>❖ Administration is comparatively inexpensive and easy even when gathering data from large numbers of people spread over wide geographic area;</li></ul>	<ul style="list-style-type: none"><li>❖ Survey respondents may not complete and return the survey resulting in low response rates;</li></ul>

<ul style="list-style-type: none"> <li>❖ Reduces chance of evaluator bias because the same questions are asked to many respondents;</li> <li>❖ Many people are familiar with questionnaires;</li> <li>❖ Some people feel comfortable responding to a survey than to an interview; and</li> <li>❖ Tabulation of closed-ended responses is an easy and straight forward process.</li> </ul>	<ul style="list-style-type: none"> <li>❖ Items may not have the same meaning to all respondents;</li> <li>❖ Size and diversity of sample will be limited by people's ability to read;</li> <li>❖ Given lack of contact with respondent, one can never know who really completed the survey;</li> <li>❖ Unable to probe for additional details; and</li> <li>❖ Good survey questions are hard to write and take considerable time to develop and hone.</li> </ul>
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**Source: Finn & Jacobson, (2008)**

To ensure anonymity a letter accompanied the questionnaire so that honest responses could be obtained.

The questionnaire consisted of three sections. The first section elicited information about respondents' backgrounds, both academic and work experience. Section two dealt with risks identified during interviews and literature review, their probability of occurring and their impact on a project. It also had a question on the causes of the identified risks. Section three was about the risk management process of identification; assessment; allocation and monitoring. Questions in section two were based on a 5-point Likert scale.

### **3.2.3 Framework Development and Validation**

In developing the risk management framework, the research used both information from interviews and survey questionnaire. Validation was done using the scoring model approach where guidelines on the assessment of the framework were sent to already identified respondents. In summary Table 3.5 shows the criterion used when choosing the type of research strategy. Therefore the survey strategy was ideal for this particular study.

**Table 3.5: Choosing a research strategy**

Strategy	Form of research question
Experiment	How, why
Survey	Who, what, where, how many, how much
Archival analysis	Who, what, where, how many, how much
History	How, why
<i>Case study</i>	<i>How, why</i>

Source: (Rowley, 2002)

### 3.2.4 Sample Size

There is currently no database for institutions dealing with PPP projects in Zambia. As a result, random sampling was used. Respondents were identified using purposive and snowballing sampling techniques. A total of sixty questionnaires were sent out to both public and private institutions. Public institutions were government departments and parastatals whilst private institutions included contractors, consultants and financiers. The number 60 was arrived at after comparing this study with other studies both in Zambia and in other countries. Table 3.6 shows the various researches done and the number of questionnaires distributed.

**Table 3.6: Questionnaires Distributed in Research**

Author	Research Title	No. of questionnaires sent out	No. returned	Return rate
Chimuka 2012	An evaluation of the performance of Public-Private Partnership projects in Zambia in respect of Critical Success Factors	183	56	31%
Banaitiene & Banaitis 2012	Risk management in construction projects	40	38	95%

Author	Research Title	No. of questionnaires sent out	No. returned	Return rate
Aliyu Bashir Aminu 2013	Risk management in Nigerian Construction industry	50	38	76%
Odeyinka, Oladapa & Dada 2008	An assessment of risk in construction in the Nigerian construction industry	40	31	78%
Odeyinka 1999	An evaluation of the use of insurance in managing construction risks	100	32	32%
Ngoma, Muya & Kaliba 2014	Benefits, Constraints and Risks in Infrastructure development via Public-Private Partnerships in Zambia	50	36	72%

**Source: Author, 2017**

Therefore, the number sixty can be relied upon looking at the number of questionnaires that similar studies have used.

Questionnaires were either sent by mail or in some instances by post other than those that were self-administered.

### **3.3 Data Analysis**

Some of the data analysing tools include indices in addition to tables, pie charts and bar charts. Several indices for analysing data have been used before for different types of studies as shown in Table 3.7.

**Table 3.7: Data analysis indices**

No.	Name of the index	Formula	Where/when it is used	Reference/Ad opted
1	Frequency index	$(F.I.) (\%) = \sum a (n/N) * 100/4$	It is used to rank items based on frequency of occurrence. This ranked the frequency of occurrence of risks and sources of risks.	(Assaf & Hejji, 2006)
2	Cronbach's alpha	$\text{Alpha} = \frac{NC/V + (N-1)*C}{N}$ ; N= Number of items; V= the average variance= the average inter-item covariance	It measures the internal consistency and reliability of risk factors and sources of risks.	(Chipulu, 2016)
3	Severity index	$(S.I.) (\%) = \sum a (n/N) * 100/4$	Used to rank the severity of risks and causes of risks.	(Assaf & Hejji, 2006)
4	Coefficient of variation	$COV = S/X * 100$ ; S=variance; X= mean	It measures the level of agreement of the respondents on the sources of risks and risk factors	(Assaf & Hejji, 2006)

**Source: Author, 2017**

Each of the formulae was therefore used to test the results ranking in terms of frequency, severity, internal reliability among other qualities. To calculate the values of the various indices, Statistical Package Social Sciences (SPSS) software was used. Some of the indices used in the study were frequency index and severity index in addition to coefficient of variation and Cronbach's alpha.

### **3.3.1 Frequency Index**

To calculate the probability of a risk occurring, frequency indices were used. The frequency index was calculated using weighted averages and the number of participants in favour of that option (Chipulu, 2016).

Equation 3.1: Frequency Index

$$F.I. (\%) = \sum a (n/N) * 100/4$$

Source: (Megha & Rajiv 2013)

Where:

F.I= Frequency Index

a= the constant expressing weighting given to each response (ranges from 1 for rarely up to 4),

n= is the frequency of the responses

N= the total number of responses

### 3.3.2 Cronbach's Alpha ( $\alpha$ )

In order to measure reliability and validity of data, Cronbach's alpha was used. Validity is concerned with the extent to which an instrument measures what it is intended to measure whilst reliability is concerned with the ability of an instrument to measure consistently (Fellows & Liu, 2008). Cronbach's alpha is easier to use in comparison to other estimates because it only requires one test administration (Dennick & Tavakol, 2011). It ranges from 0 to 1. It reflects the extent to which the items are meaning the same thing. Items (variable under test) are said to be inter-correlated if the values of the Cronbach's alpha are greater than 0.7 and when the value is less than 0.7, the interpretation is that the variables are not sufficiently inter-correlated.

Equation 3.2: Cronbach's Alpha

$$\alpha = \frac{n * \bar{r}}{1 + (n - 1) \bar{r}}$$

$$1 + (n - 1) \bar{r}$$

Adopted: (Fellows & Liu, 2008)

Where:

n= number of variables

$\bar{r}$ = average inter- variable correlation of all the variables

### 3.3.3 Severity Index

Severity index was used to rank the effect or impact of risks on the PPP projects. It is calculated using the formula below.

Equation 3.3: Severity Index

Source: (Megha & Rajiv 2013)

$$\text{Severity Index (SI) \%} = \sum a (n/N) * 100/4$$

Where  $a$  is the constant expressing weighting given to each response (ranges from 1 to 4 for severe),  $n$  is the frequency of the responses, and  $N$  is the total number of responses (Megha & Rajiv, 2013).

### 3.3.4 Coefficient of Variation

The coefficient of variation is used to measure the level of agreement of respondents. It is equally useful in comparing the relative variability of the responses. It is (COV) calculated using the equation below.

$$\text{COV} = (S/X) * 100$$

Equation 3:4

Source: (Assaf & Hejji, 2006)

Where: COV= Factor Coefficient of Variation

S= Variance

X= Mean

## 3.4 Development of a Risk Management Framework

The risk management framework was developed using results obtained from interviews, questionnaires and the literature reviewed.

## 3.5 Limitations of the Research

This research had limitations and these included the following:

### 3.5.1 The Data Size and Location of Respondents

The survey's sample size was 60 and 80 percent were from Lusaka province and the other 20 percent from Copperbelt province. Markets being socio-economic infrastructures cannot be detached from peoples' cultures. It is therefore true that the risks and sources of risks identified in this study may not be exactly the same risks that might come out if the research had been done in any other province. Further, the number of respondents was equally a limitation. A bigger number might have produced different results in terms of risks and other factors that were being investigated.

### **3.5.2 PPPs as a New Phenomenon**

The fact that PPPs were a new phenomenon in Zambia was a limiting factor itself. The depth of knowledge about this new phenomenon was limited. Respondents had used most of the tools in the risk management process but very few had used the tools and techniques in relation to PPPs. Additionally, the number of prospective respondents was limited since very few were knowledgeable about PPP and risk management.

### **3.6 Ethical Considerations**

The research was subject to ethical consideration. Firstly, participants were written to or contacted by phone and asked if they would take part in the interview and questionnaire survey. Secondly, objectives of the study were explained to participants, at the same time reassuring them that their responses were confidential, were only for academic purposes and only for the purposes of this particular research. Furthermore, the participants were not abused nor harmed, both physically and psychologically during the process of the research.

### **3.7 Chapter Summary**

The chapter looked at several methods of data collection and analysis and established the best methods suitable for this particular research. The next chapter outlines the results of the interviews and questionnaire survey and the analysis of the data.



## **CHAPTER FOUR: RESULTS AND DATA ANALYSIS**

### **4.1 Introduction**

The previous chapter looked at the methodology used in collecting data for this` research. The chapter outlined the research design, research methods, sample size selection, the method of data analysis and ethical considerations.

This chapter presents results and analysis of the data collected. The chapter will equally look at the results from the interviews and questionnaires. Excel and statistical methods (SPSS) were used to analyse the data in order to help address the set objectives of this research.

### **4.2 Interviews**

A total of 15 interviewees were targeted but only ten were available for the interviews because marketeers felt they would be victimised by market authorities whilst technocrats were not just available for interviews. Interviews were targeted at three marketeers who are using a market built using PPP, two technocrats who had worked on a market PPP project, three technocrats with a minimum of 10 years' experience in the construction sector, two bankers or officers from financial institutions with an investment banking background, three officers from the city council market section and two technocrats working from contractors. Some of the issues discussed included the following:

#### **❖ Need to construct more public markets using PPP models**

There was need for more markets to be built using the PPP model as this would ease government resources for other developments. Additionally, six out of ten participants in the interview saw constructing markets through PPP as the best way to allocate risks to the most competent partner, results in shorter construction period, leads to reduced cost of implementing the project and gets away from the bureaucratic and political processes of government procured projects.

#### **❖ Suitable PPP models for Market Infrastructure**

There was almost a consensus among the interviewees that the Build-Operate-Transfer model as eight out of ten said BOT was the most suitable model. This was after presenting the most commonly used models that included: Build-own-operate; Build-own-operate-transfer; Lease; Build-lease-transfer; concession contracts among others. Interviewees observed that during the period of operation, there was little or no maintenance to the infrastructure. Additionally, the

periods of operation of between 30 and 65 years were too long. Technocrats advised that a monitoring and evaluation mechanism be in place for the operation of PPPs as that would help in making sure that PPP partners adhere to set conditions.

#### ❖ **Problems with markets already built using PPP**

Participants in the interview observed that fees charged for rentals to markets were high and that very few understand the PPP concept. Most marketeers think that the markets will forever belong to the investor. They further observed that the few that were aware of the PPP agreements complained that the period of the agreements were too long. Furthermore, the uncontrolled street vending had brought problems in that vendors were blocking most shops/stalls and shop owners had started asking for reduced rental fees.

Interviewees also observed that there was no party that was taking responsibility in case of a fire and any other maintenance to the infrastructure despite this being part of the contract. Shop owners rarely insured their merchandise.

#### ❖ **Risks mostly encountered in PPP projects**

Some of the risks interviewees saw to have an impact on a PPP market project start from planning to operations. These were political risks, legal risks, commercial risks (market, input, currency), environmental risks, technical (physical conditions, construction, design, and technology), operational, financial, demand risks, currency and interest rate risks. It was further observed that because of lack of understanding of PPP projects, there was no social acceptance of the projects; corruption; inflation; volatility in interest rates and foreign exchange and lack of PPP experience by public entity officials. Errors in estimating project revenue inflows and project financing costs and maintainability of the constructed facilities were also observed as risks likely to be faced in the life of a PPP project. It was also observed that there was no stakeholder involvement during the course of the projects.

#### ❖ **Causes/sources of these risks?**

Sources of risks identified included the following:

- i. Defect in tender specifications;
- ii. Insufficient work experience in PPPs;
- iii. Poorly defined roles and responsibilities in contracts;

- iv. Complex government bureaucracy;
- v. Unstable economy (fluctuating exchange rates and inflation);
- vi. Lack of understanding of PPPs by both government officials and local communities;
- vii. Lack of clear guidelines on PPPs; no monitoring mechanism on the performance of PPPs;
- viii. Corruption in the choice of concessionaire; and
- ix. Long concessions.

#### ❖ **Management of Risks**

Interviewees observed that risks could better be managed if negotiations were open and known to the public. In so doing stakeholders would know who they should hold accountable for any eventuality. They particularly gave an example of fires and maintenance of markets which they felt were poorly maintained in as far as painting and general surrounding maintenance was concerned. They further observed that the lack of understanding of PPPs by the local communities needed to be tackled through community sensitisation and meetings; and that technocrats should be trained in PPPs so as to avoid recurring of the problems in the future.

Politicians should also come in and address the issue of street vending because it was affecting the demand for the stalls whose entrances were blocked with merchandise for street vendors.

#### ❖ **Risk Mitigation Measures**

Risk mitigation reduces the probability and/or impact of an adverse risk to an acceptable level. Interviewees were asked about how mitigation measures from literature would affect PPP projects. They observed that mitigation measures would reduce the impact and probability of risks. The mitigation measures included;

- i. Measure and price bills of quantities correctly during bidding stages;
- ii. Obtain payment and performance bonds from local and international banks;
- iii. Include clauses for delays and additional works;
- iv. Develop a clear plan to control time and costs;
- v. Obtain expropriation insurance;
- vi. Minimize design and drawing disputes by adopting design and build option;
- vii. Obtain local government guarantee for adjusting tariffs or extending concession periods;
- viii. Engage a consultant to carry out forecast market demand;

- ix. Obtain insurance for political risks;
- x. Obtain information on competitive projects by carrying out market study
- xi. Provide dispute settlement clauses in the contract;
- xii. Adopt domestic products and labour, but only competent workforce in case of a JV; and
- xiii. Enter into fixed rate lending rates with banks for loans.

#### ❖ **Problems of not managing risks**

The interview participants observed that problems of not managing risks manifest in many forms. It could result in potential investors avoiding investing in PPP market infrastructures in future, shops may remain vacant if maintenance is not improved, rentals could become high and fire destruction may occur if measures are not put in place to avoid fires.

#### ❖ **Improvements on future PPP market projects**

For the future, interview participants observed that local people should be made aware of the PPP project that were to come through consultative meetings. Government should find a way of protecting the social needs of consumers by coming up with a way of regulating the rentals being charged. Risks of fires, thefts, cleanliness (which might lead to disease outbreaks) should be clearly spelt out so that users of the markets know the party to hold accountable. Government should come up with a monitoring and evaluation mechanism to look at the performance of PPP projects. Additionally, governments should protect the investors when it comes to demand risks by preventing vendors from trading from shop fronts among other measures.

### **4.3 Questionnaire Survey**

The survey was conducted from 5 May, 2017 to 20 June, 2017. Questionnaires were distributed via email and also in person. The total number of questionnaires distributed was 60 and were sent respondents from Lusaka province and a few (five) from Copperbelt province. Lusaka province was chosen because it was easy to contact the respondents in person in case other means of communication failed. From the 60 questionnaires distributed, 35 were returned representing a response rate of 58.3 percent. The data collected using the questionnaire survey was used to establish the frequency of occurrence of risks and also their impact on the projects using frequency and severity indices respectively. Furthermore, data from questionnaires was used to investigate the importance of the risks.

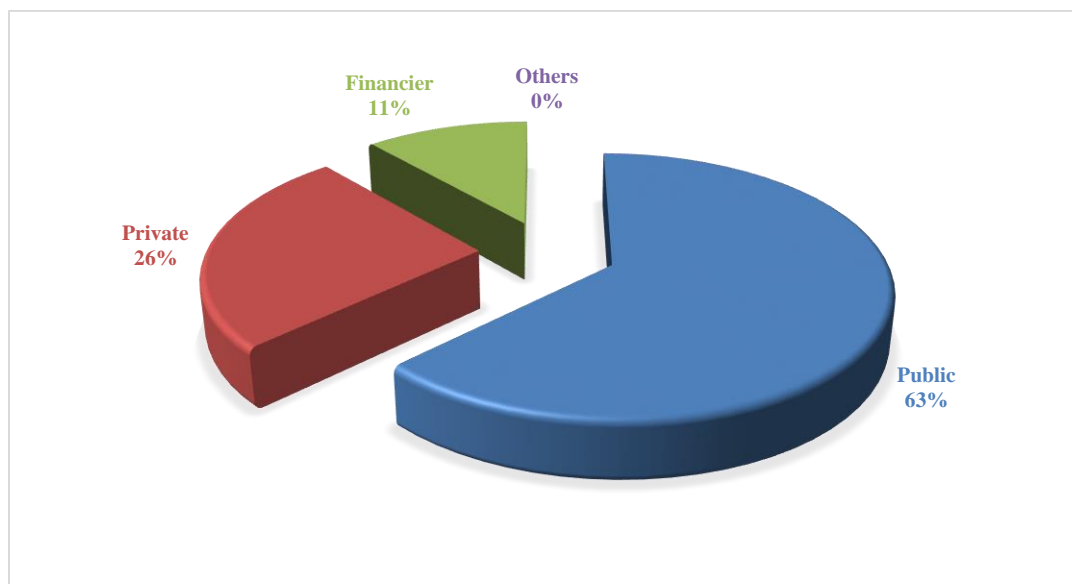
#### 4.3.1 Respondents' Background

The respondents in this questionnaire survey were contractors, consultants, clients and financiers as shown in Table 4.1.

**Table 4.1: Distribution of questionnaires**

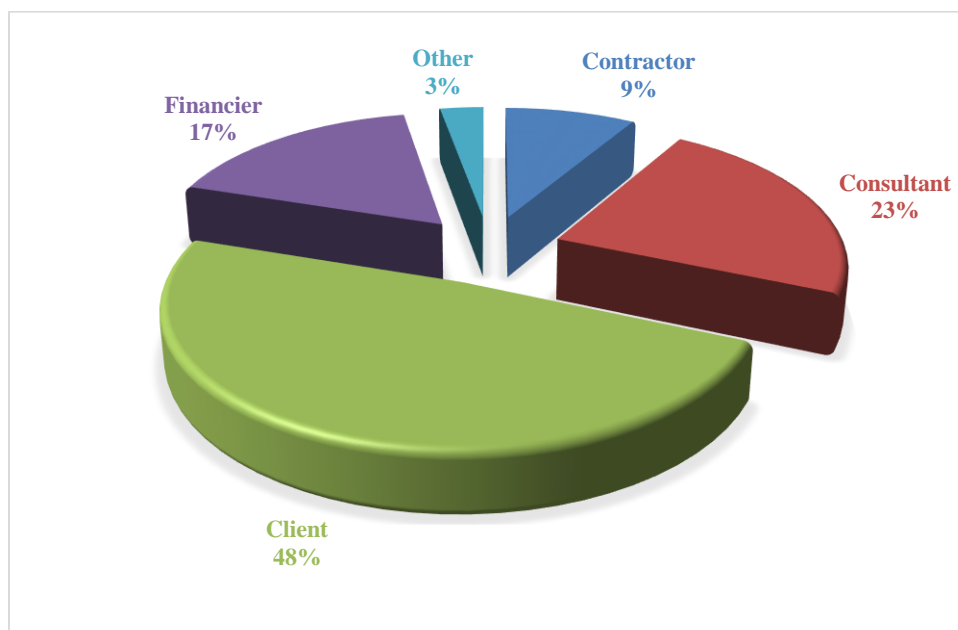
Stakeholder category	Questionnaires administered	Questionnaires returned	Percentage
Public sector authorities(Clients)	20	17	85%
Consultants	15	8	53%
Contractors	10	3	30%
Lenders/Banks(Financiers)	10	6	60%
Others	5	1	20%
<b>Total</b>	<b>60</b>	<b>35</b>	<b>58.3%</b>

Figure 4.1 shows the sectors of respondents. From Figure 4.1 it could be seen that 63 percent of participants were from the public sector, whilst 26 percent were from the private sectors (who were not financiers) and 11 percent were financiers.



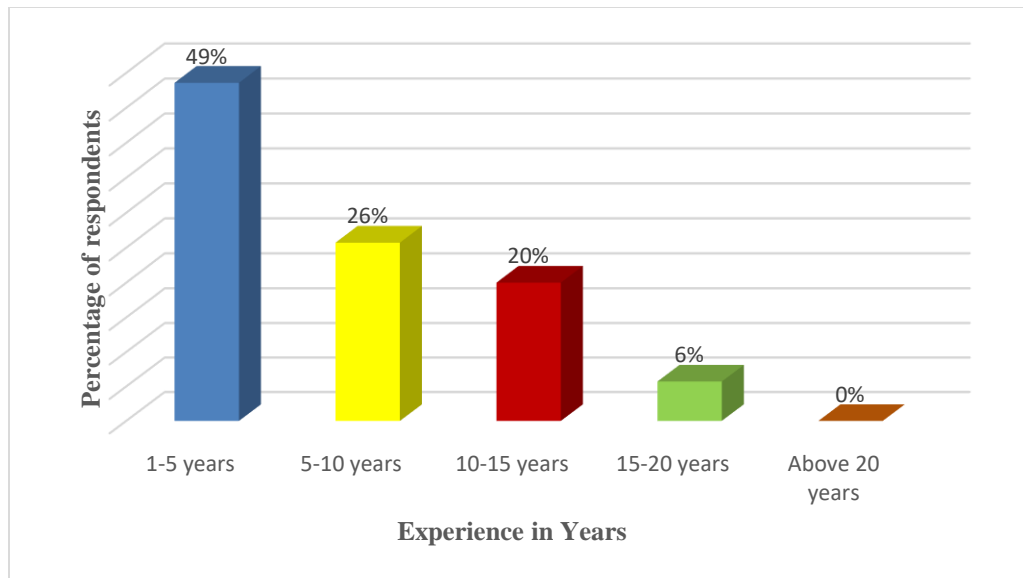
**Figure 4.1: Sector of Respondents**

To further refine the respondents' background, the roles they played in PPP projects were refined from Figure 4.2, 48 percent were clients, 23 percent were consultants, 17 percent were financiers, nine percent contractors and three percent of respondents fell in the category of others. The category of others included regulators such as Zambia Public Procurement Authority (ZPPA) and Zambia Environmental Management Agency (ZEMA).



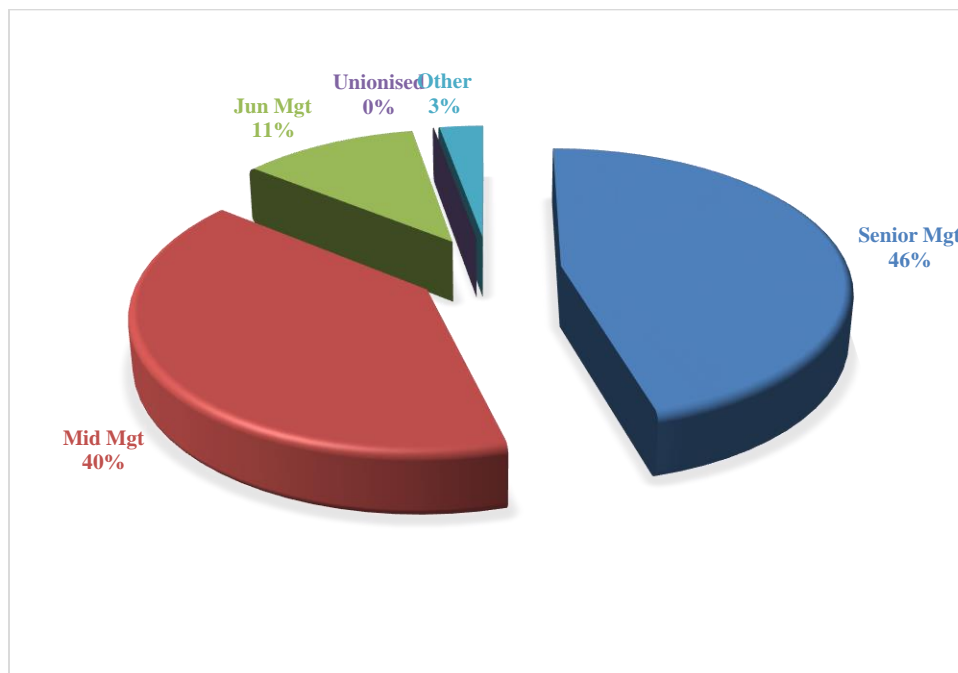
**Figure 4.2: Roles in PPPs**

Workers' experience in an organisation is shown in Figure 4.3. Of the respondents, 49 percent had worked for a maximum of five years, 26 percent had worked between five and ten years, 20 percent had worked for between ten and 15 years, six percent had worked for 15 to 20 years in their respective organisations. No respondent had worked for more than 20 years in their organisation.



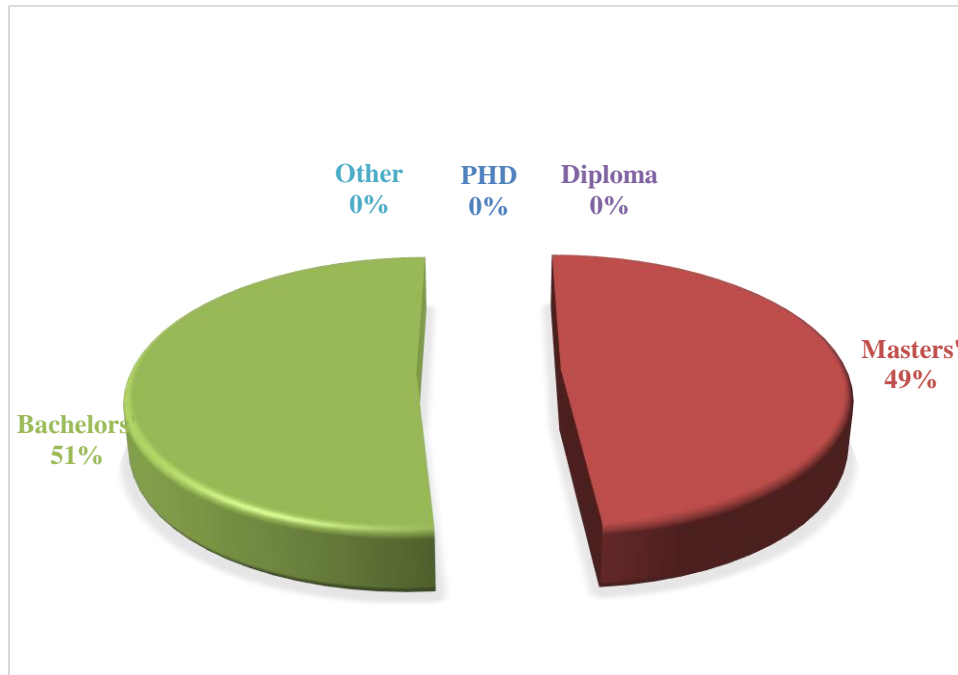
**Figure 4.3: Respondents' experience in an organisation**

Figure 4.4 shows the results of the respondents' position in an organisation. 46 percent were in senior management, 40 percent middle management, 11 percent were from junior management, three percent were from the other category and none from unionised category. The other category had respondents like company owners.



**Figure 4.4: Respondents' position in their organisation**

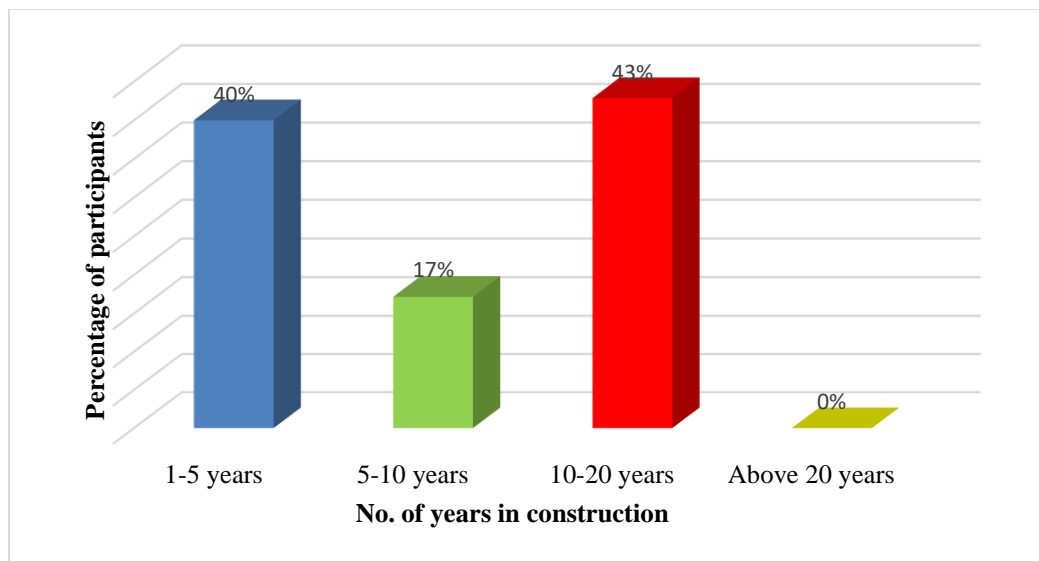
The level of education of respondents is as shown in Figure 4.5 that 51 percent had bachelors' degrees and 49 percent had masters' degrees. There no respondents with PHD.



**Figure 4.5: Qualification of respondents**

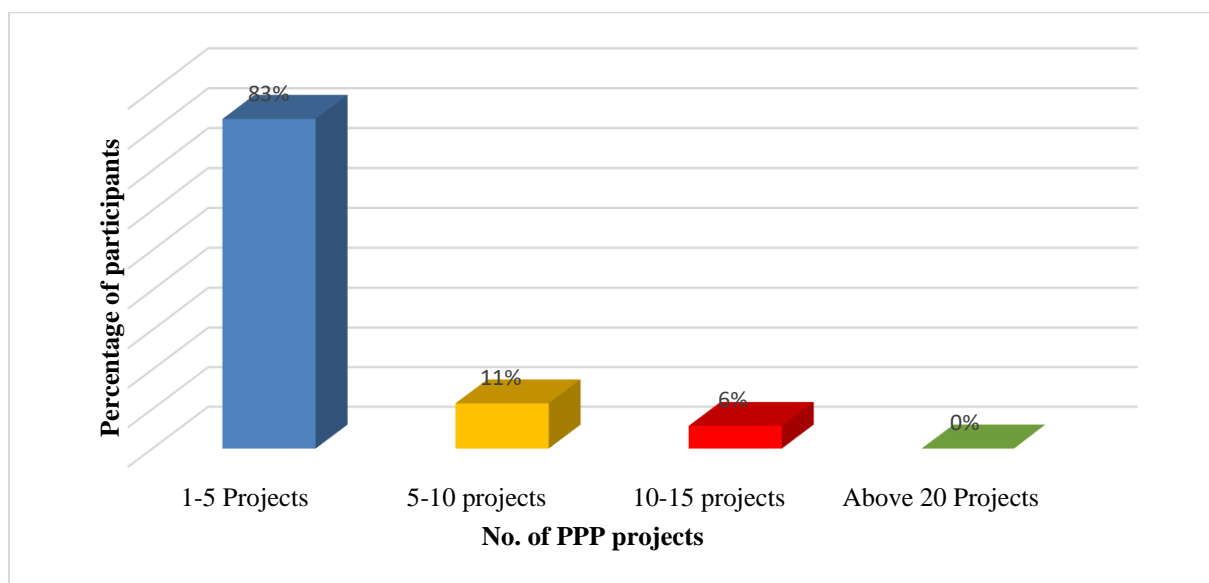
Respondents' experience in the construction sector was established as can be seen from Figure 4.6. Of the respondents, 40 percent had worked in the construction sector for up to five years, 17 percent had worked between five and ten years and 43 had worked between ten to 20 years. There were none with experience above 20 years.





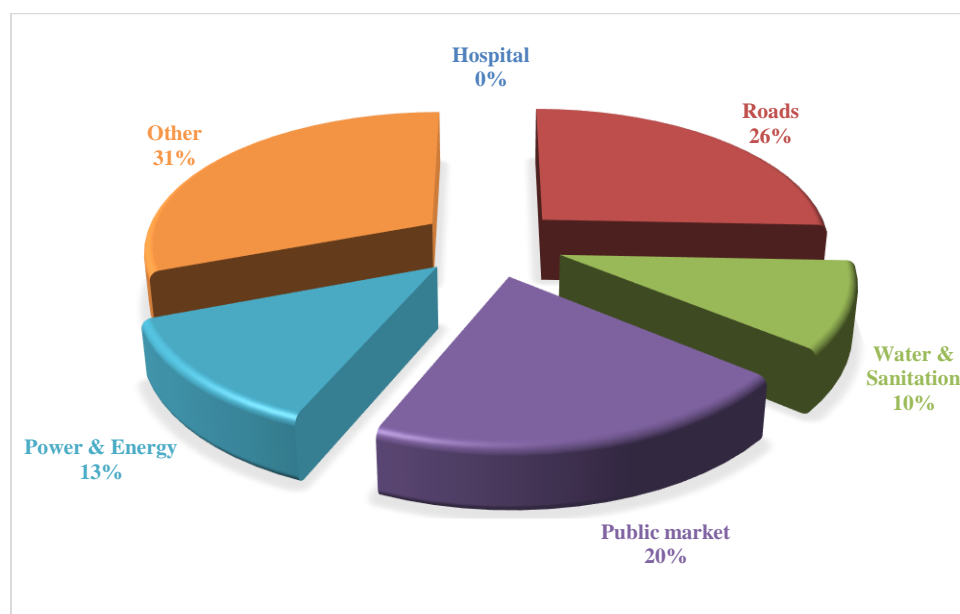
**Figure 4.6: Respondents' experience in the construction sector**

Respondents' participation in the construction sector showed that eight three percent had participated in up to 5 PPP projects, 11 percent in between five to ten projects and six percent in between ten to 15 projects. There were none who had participated in more than 15 PPP projects as shown in Figure 4.7.



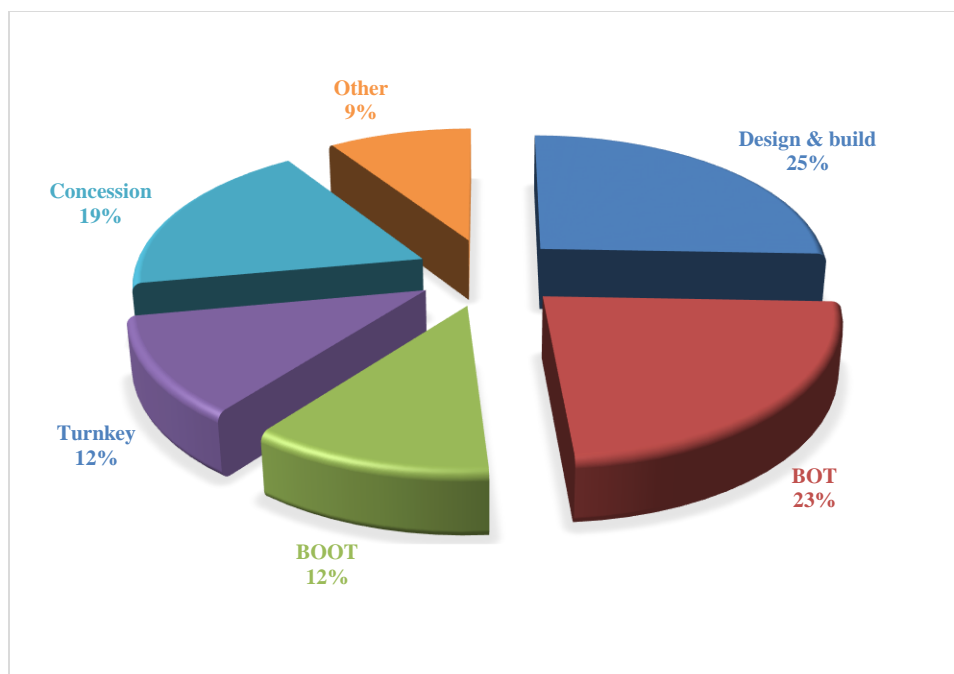
**Figure 4.7: Respondents' participation in PPP projects**

Investigations into the construction sector in which the PPP project was undertaken reviewed that there were none in the construction of hospitals, ten percent of the respondents had participated in water and sanitation PPPs, 13 percent in power and energy, 20 percent in the construction of public markets, 26 percent in roads and 31 percent in others as shown in Figure 4.8.



**Figure 4.8: Sector in which PPP project was undertaken**

Figure 4.9 narrows down to the type of PPP in which the respondent took part. The results showed that 25 percent had participated in design and build type of PPP project, 23 percent in build operate and transfer (BOT), 19 percent in concessions, 12 percent in turnkey and build-own-operate and transfer (BOOT) and nine percent in other types of PPPs.



**Figure 4.9: Type of PPP by respondent participation**

From the respondents' background information, it was observed that they all had a minimum qualification of a bachelors' degree; the majority were in senior management positions; majority had experience of between ten and 20 years in the construction industry; had between one and five years' experience in PPP and 20 percent had done PPP market projects. The information gathered can therefore be relied upon.

#### **4.3.2 Frequency of Risks and their Severity on PPP Public Market Infrastructure**

Risks that are common on PPP public market infrastructure were obtained from interviews and literature. These risks were further subjected to a survey to study the rate of occurrence and their impact on PPP projects.

The results of the survey in relation to the frequency of occurrence are shown in Table 4.2, starting with the most frequent and ending with the least frequent. Lack of PPP experience was ranked the most frequent risk, followed by volatility in foreign exchange (FOREX) and the least frequent risk was labour and material shortages and strikes.

**Table 4.2: Frequency of risk factors**

<b>No.</b>	<b>RISK FACTOR</b>	<b>FI</b>	<b>COV</b>
1	Lack of PPP experience	0.636	29%
2	Volatility in foreign exchange	0.588	22%
3	Quality issues	0.582	19%
4	Errors in estimating project revenue inflows and project financing costs	0.582	23%
5	Responsibility and risk distribution	0.558	17%
6	Interest rate volatility	0.558	20%
7	Environmental considerations	0.552	21%
8	Cost overrun	0.544	23%
9	Stakeholder project approval	0.540	13%
10	Time overrun	0.533	31%
11	Inflation	0.529	18%
12	Engineering and design failures	0.525	15%
13	Maintainability of the constructed facilities	0.516	38%
14	Social acceptance of the project	0.515	35%
15	Unresolved conflicts and disputes	0.509	19%
16	Difference in working techniques between parties	0.506	17%
17	Effective communication between parties	0.503	16%
18	Imposition of new taxes/Increase in taxes	0.497	20%
19	Corruption	0.484	23%
20	Political stability	0.481	9%
21	Lack of demand for PPP services	0.469	14%
22	Regulation/legal changes	0.469	20%
23	Problems with subcontractor management	0.467	21%
24	Land acquisition/Compensation	0.467	35%
25	Project sustainability	0.456	15%
26	Financial capability of the consortium	0.455	28%
27	Termination of agreement by government	0.448	32%
28	Attitude of government towards foreign investors	0.448	32%
29	Technological changes	0.436	38%
30	Force majeure (Wars and calamities)	0.436	19%
31	Labour and material shortage/strikes	0.424	28%

Table 4.3 shows the severity of different risk factors on PPP public market projects, with errors in estimating project revenues being the most severe and labour, inflation the least severe.

**Table 4.3: Severity of risk factors**

No.	RISK FACTOR	SI	COV
1	Errors in estimating project revenue inflows and project financing costs	0.688	37%
2	Lack of PPP experience	0.647	30%
3	Quality issues	0.641	33%
4	Time overrun	0.636	30%
5	Land acquisition/Compensation	0.636	30%
6	Environmental considerations	0.624	26%
7	Engineering and design failures	0.624	28%
8	Volatility in foreign exchange	0.618	28%
9	Political stability	0.606	28%
10	Cost overrun	0.600	22%
11	Force majeure (Wars and calamities)	0.600	35%
12	Social acceptance of the project	0.594	36%
13	Unresolved conflicts and disputes	0.588	24%
14	Responsibility and risk distribution	0.588	19%
15	Termination of agreement by government	0.582	26%
16	Corruption	0.577	40%
17	Interest rate volatility	0.558	18%
18	Project sustainability	0.553	18%
19	Lack of demand for PPP services	0.544	22%
20	Effective communication between parties	0.544	40%
21	Maintainability of the constructed facilities	0.542	37%
22	Problems with subcontractor management	0.541	24%
23	Imposition of new taxes/Increase in taxes	0.529	19%
24	Stakeholder project approval	0.519	9%
25	Financial capability of the consortium	0.518	11%
26	Labour and material shortage/strikes	0.493	23%
27	Technological changes	0.475	23%
28	Regulation/legal changes	0.471	27%
29	Attitude of government towards foreign investors	0.447	20%
30	Difference in working techniques between parties	0.418	43%
31	Inflation	0.410	45%

#### 4.3.3 Agreement among Respondents on Severity and Frequency of Risks

The level of agreement among respondents was established using the coefficient of variation (COV). The lower the value of the COV the higher the level of agreement among respondents (Cong, et al., 2014). The COV for the severity of risks is between nine percent and 45 percent, which shows a high level of agreement that stakeholder project approval had a higher impact on a market PPP project for instance. This is shown in Table 4.4.

**Table 4.4: COV for the Severity of Risk Factors**

No.	RISK FACTOR	SI	COV
1	Stakeholder project approval	0.519	9%
2	Financial capability of the consortium	0.518	11%
3	Project sustainability	0.553	18%
4	Interest rate volatility	0.558	18%
5	Imposition of new taxes/Increase in taxes	0.529	19%
6	Responsibility and risk distribution	0.588	19%
7	Attitude of government towards foreign investors	0.447	20%
8	Lack of demand for PPP services	0.544	22%
9	Cost overrun	0.600	22%
10	Labour and material shortage/strikes	0.493	23%
11	Technological changes	0.475	23%
12	Unresolved conflicts and disputes	0.588	24%
13	Problems with subcontractor management	0.541	24%
14	Termination of agreement by government	0.582	26%
15	Environmental considerations	0.624	26%
16	Regulation/legal changes	0.471	27%
17	Political stability	0.606	28%
18	Volatility in foreign exchange	0.618	28%
19	Engineering and design failures	0.624	28%
20	Time overrun	0.636	30%
21	Lack of PPP experience	0.647	30%

22	Land acquisition/Compensation	0.636	30%
23	Quality issues	0.641	33%
24	Force majeure (Wars and calamities)	0.600	35%
25	Social acceptance of the project	0.594	36%
26	Errors in estimating project revenue inflows and project financing costs	0.688	37%
27	Maintainability of the constructed facilities	0.542	37%
28	Effective communication between parties	0.544	40%
29	Corruption	0.577	40%
30	Difference in working techniques between parties	0.418	43%
31	Inflation	0.410	45%

Table 4.5 shows the COV for the frequency of risk factors. The COV ranged from nine percent to 38 percent. This equally shows a high level of agreement among respondents that political stability occurs frequently as a risk than any other risk factor. Again, respondents agreed more that stakeholder project approval is one of the most frequent risks when it comes to PPP market infrastructure projects.

**Table 4.5: COV for the Frequency of Risk Factors**

No.	RISK FACTOR	FI	COV
1	Political stability	0.481	9%
2	Stakeholder project approval	0.540	13%
3	Lack of demand for PPP services	0.469	14%
4	Project sustainability	0.456	15%
5	Engineering and design failures	0.525	15%
6	Effective communication between parties	0.503	16%
7	Difference in working techniques between parties	0.506	17%
8	Responsibility and risk distribution	0.558	17%
9	Inflation	0.529	18%
10	Unresolved conflicts and disputes	0.509	19%
11	Force majeure (Wars and calamities)	0.436	19%
12	Quality issues	0.582	19%
13	Interest rate volatility	0.558	20%

NO	RISK FACTOR	FI	COV
14	Regulation/legal changes	0.469	20%
15	Imposition of new taxes/Increase in taxes	0.497	20%
16	Environmental considerations	0.552	21%
17	Problems with subcontractor management	0.467	21%
18	Volatility in foreign exchange	0.588	22%
19	Cost overrun	0.544	23%
20	Corruption	0.484	23%
21	Errors in estimating project revenue inflows and project financing costs	0.582	23%
22	Labour and material shortage/strikes	0.424	28%
23	Financial capability of the consortium	0.455	28%
24	Lack of PPP experience	0.636	29%
25	Time overrun	0.533	31%
26	Termination of agreement by government	0.448	32%
27	Attitude of government towards foreign investors	0.448	32%
28	Social acceptance of the project	0.515	35%
29	Land acquisition/Compensation	0.467	35%
30	Technological changes	0.436	38%
31	Maintainability of the constructed facilities	0.516	38%

#### 4.3.4 Consistency Test for Frequency of Occurrence and Severity of Risks

Cronbach's alpha was used to assess the reliability of the data obtained using SPSS. Table 4.5 shows the Cronbach's alpha for the frequency of occurrence and severity of risks. Cronbach's alpha with a value higher than 0.7 signifies a higher degree of internal consistency reliability (Jonsson & Svingby, 2007). The results from Table 4.6 suggests that the data collected on risk factors is reliable and consistent since the two figures were all above 0.7.

**Table 4.6: Consistency Test for Frequency of Occurrence of Risks**

Item	Cronbach's Alpha	No. of Items
Frequency of risks	0.877	31
Severity of risks	0.861	31



#### 4.3.5 Causes/Sources of Risks on PPP Public Market Infrastructure Projects

An investigation on the causes of risks revealed that incorrect revenue projections is the most common cause or source of risks with a frequency index of 0.78 and riots and strikes as the least common cause of risks with a frequency index of 0.43. Figure 4.10 shows the frequency indices and the sources of risks.

##### a) Level of agreement on the sources of risks

To establish the level of agreement among respondents on the frequency of the sources of risks, the COV was used. According to Cong, et al., (2014) the lower the value of the COV the higher the level of agreement of respondents. The COV for the causes of risks was ranging from 17% to 33%. This shows a high level of agreement among respondents that incorrect revenue projection is indeed the most frequent risk among others.

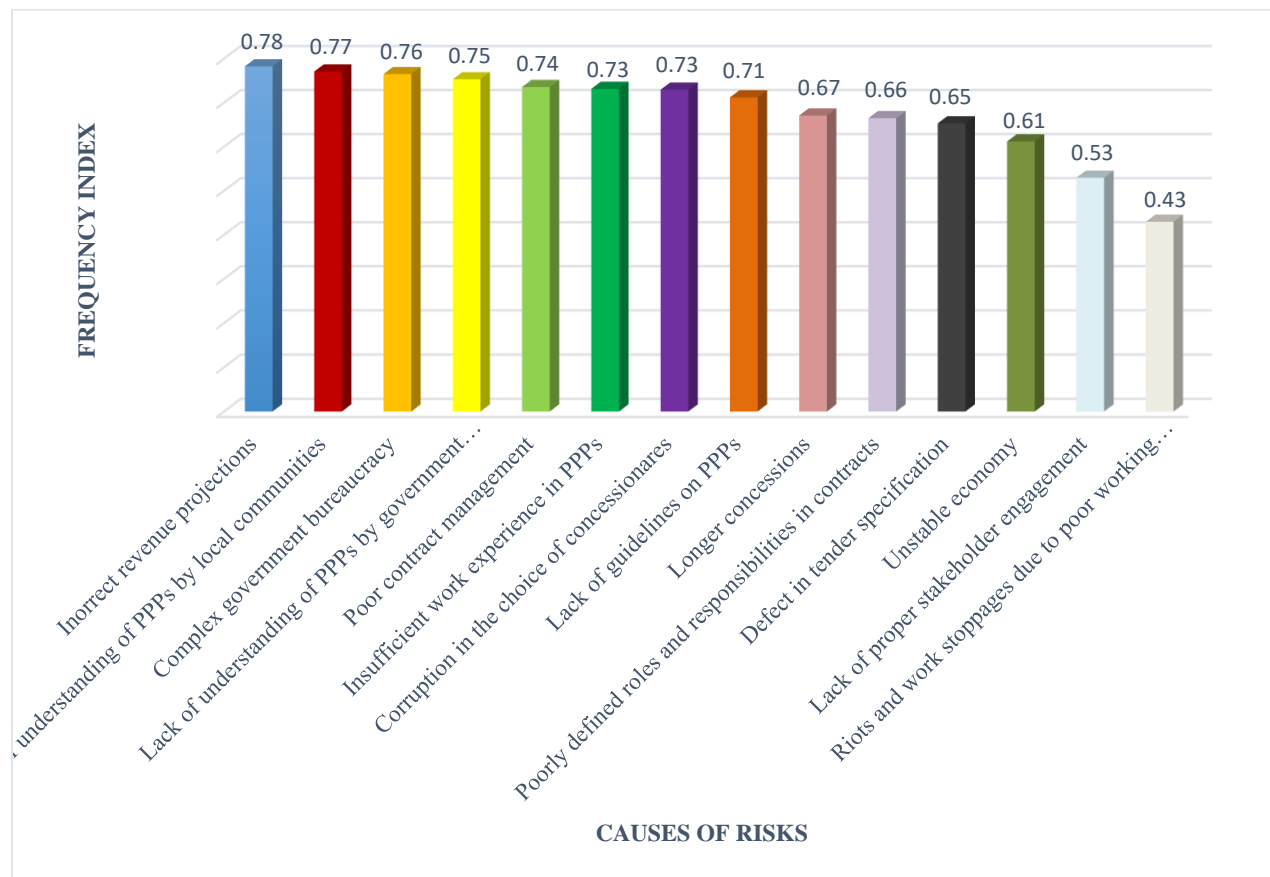


Figure 4.10: Causes/Sources of risks

**Table 4.7: FI, COV and Mean for Sources of Risks**

No.	RISK SOURCE	FI	COV	MEAN
1	Defect in tender specification	0.65	27%	3.26
2	Unstable economy	0.61	28%	3.06
3	Lack of proper stakeholder engagement	0.53	17%	2.64
4	Riots and work stoppages due to poor working conditions by PPP partners	0.43	33%	2.15
5	Incorrect revenue projections	0.78	19%	3.91
6	Lack of understanding of PPPs by local communities	0.77	20%	3.85
7	Complex government bureaucracy	0.76	21%	3.82
8	Lack of understanding of PPPs by government officials	0.75	21%	3.76
9	Poor contract management	0.74	21%	3.68
10	Insufficient work experience in PPPs	0.73	17%	3.61
11	Corruption in the choice of concessionaires	0.73	22%	3.65
12	Lack of guidelines on PPPs	0.71	20%	3.56
13	Longer concessions	0.67	23%	3.35
14	Poorly defined roles and responsibilities in contracts	0.66	18%	3.32

**b) Consistency test for Frequency of Sources of Risks**

To test the internal consistency, Cronbach's alpha was calculated using SPSS. Gliem & Gliem, (2003) noted that Cronbach's alpha ranges between zero and one, and that the closer the figure to one the higher the internal consistency. The higher the number of items being investigated, the more likely that Cronbach's alpha will be higher. Therefore Cronbach's alpha of 0.616 is acceptable looking at the number (14) of items being investigated. Table 4.8 summarises the results of the calculation for Cronbach's alpha.

**Table 4.8: Internal Consistency Test for Frequency of Sources of Risks**

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha based on standardised items	No. of Items
0.616	0.642	14

#### c) Relative significance of risk sources

To determine the relative significance of risk sources, mean ranking score was calculated using SPSS. The mean score ranking ranged between 2.15 and 3.91. Incorrect revenue projection was the most significant source of risk and work stoppages and riots due to poor working conditions as the least significant source of risks.

The findings from the questionnaire survey that lack of PPP experience is the most frequent risk agrees with literature that Zambia is new to PPPs. It is also true that material shortages and strikes is not common on Zambia's construction projects. Incorrect revenue projection was established to be the most severe risk. This could attribute to high rental fees for the stalls at the two markets built using PPP i.e. Luburma and Chachacha markets. Incorrect revenue projections were also the most significant risk because of the many effects that it comes with. It leads to high rentals as earlier established which leads to many Zambians not being able to afford the stalls in the two markets. This further leads to street vending and social discontent as these stalls are mostly being rented by foreigners.

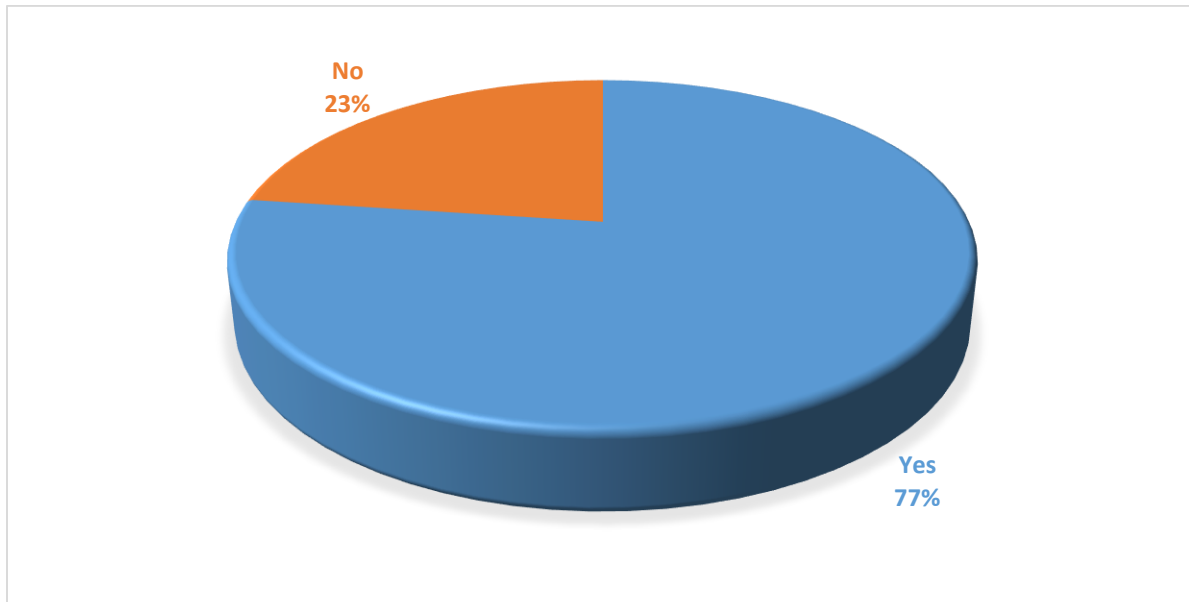
### 4.4 Risk Management Practices in Zambia's PPP Market Infrastructures

In order to understand the risk management practices in Zambia, risk management was broken-down into its various steps such as risk planning; risk identification; risk analysis; risk response; and risk allocation.

#### 4.4.1 Risk Planning

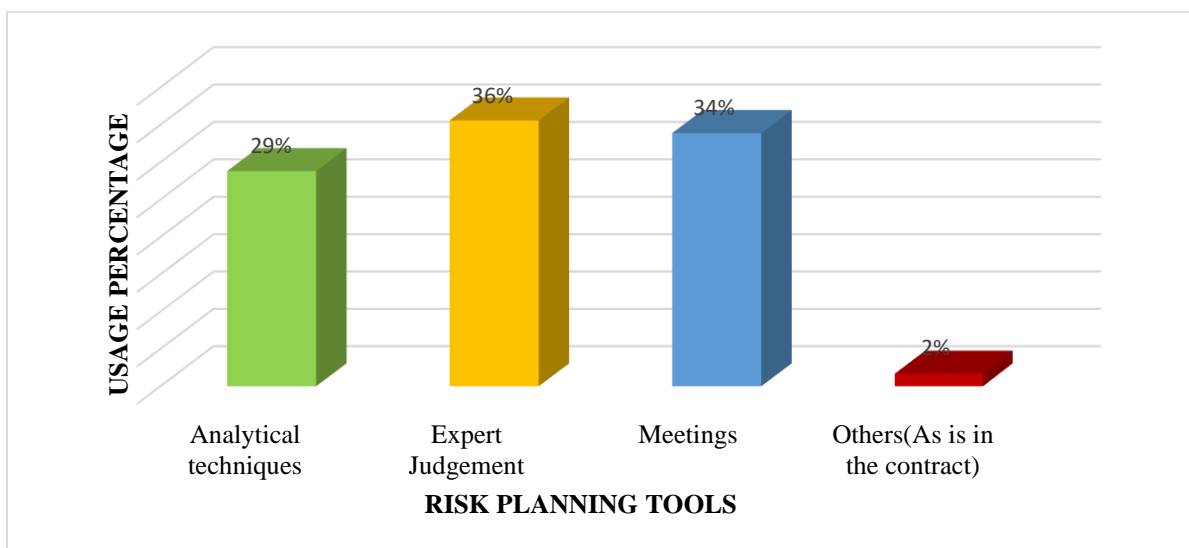
Of the respondents, 77 percent were found to have used risk planning tools and 23 percent had not used risk planning tools. Figure 4.11 shows the results in form of a pie chart. Of the 77 percent that answered yes to using risk planning tools, it came out that expert judgement was the most

frequently used risk planning tool and in rare circumstances the contract conditions were used to guide the risk planning process



**Figure 4.11: Use of risk planning tools in PPP**

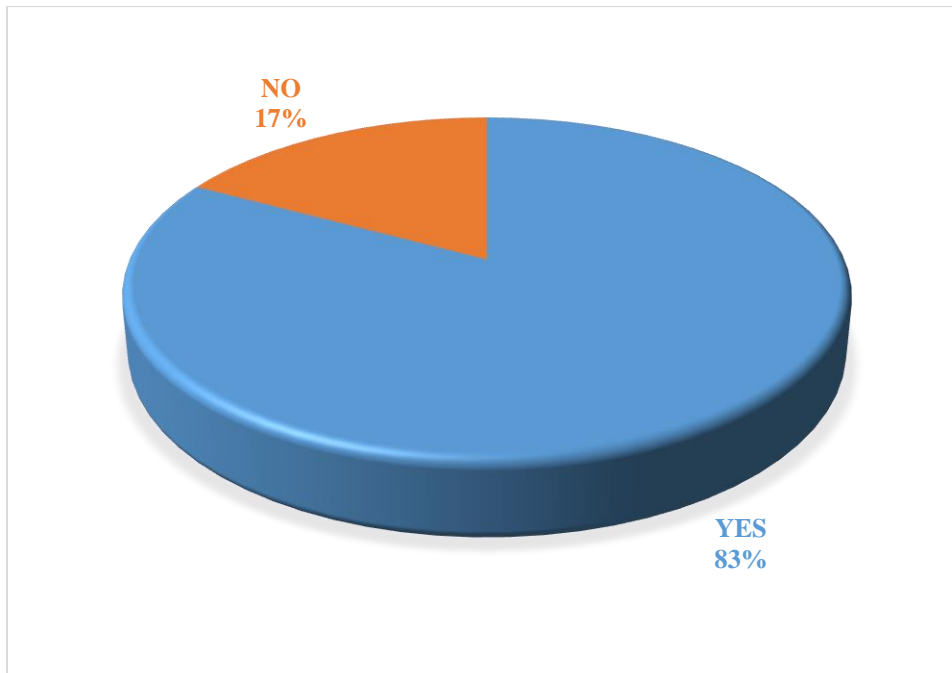
Figure 4.12 shows the usage percentage of the different types of risk planning tools.



**Figure 4.12: Risk Planning Tools**

#### 4.4.2 Risk Identification

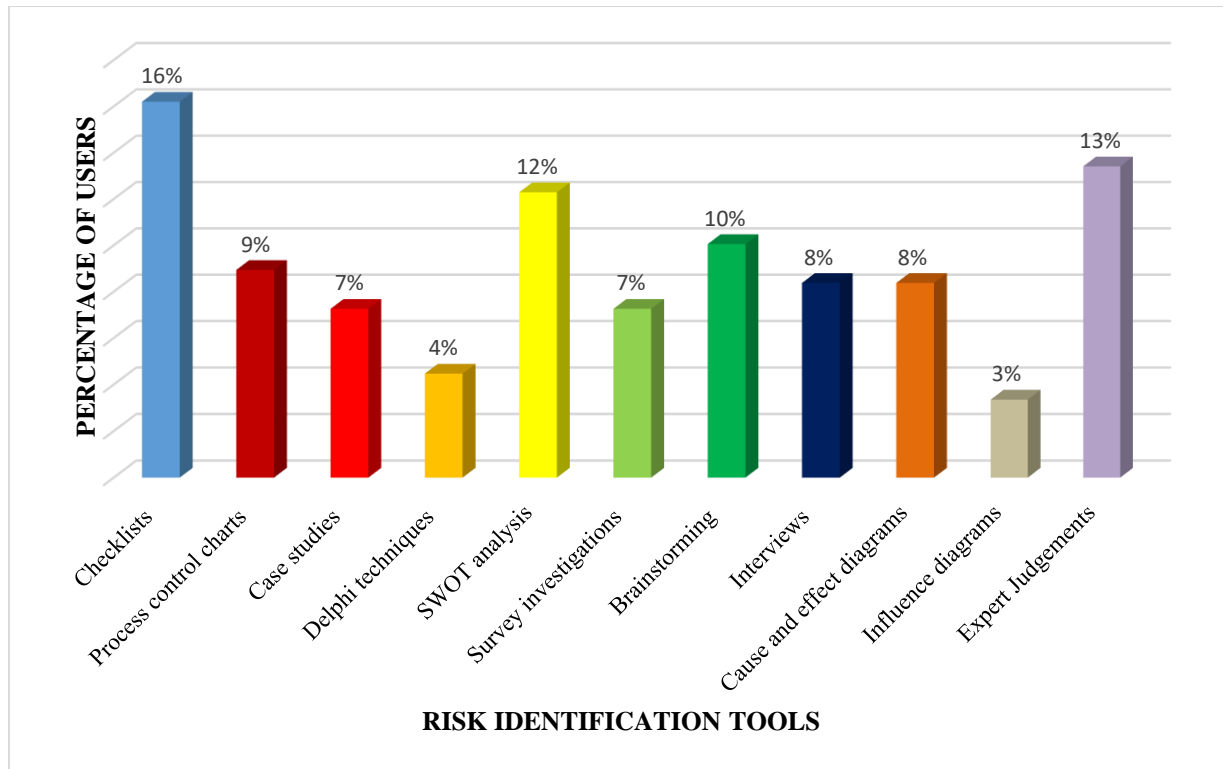
83 percent of the respondents used risk identification tools and only 17 percent had not used risk identification tools. Figure 4.13 shows the results on the usage of risk identification tools.



**Figure 4.13: Use of Risk Identification Tools**

Of the eight three percent that had used risk identification tools, checklists were the most frequently used and influence diagrams the least frequently used tools. Figure 4.14 shows how often risk identification tools were used.

Expert judgement had come out to be the most frequently used tool in most of the stages in risk management. This tool will not however yield desired expected results because it contradicts both the findings from the questionnaire survey and literature that Zambia does not have many experts in PPP projects. Meetings emerged as one of the most used risk identification tools. The extent of these meetings and with what type of stakeholders the meetings are held, is not clear because it contradicts another finding from questionnaire survey that social acceptance of the project is not only a frequent risk but also a severe one.



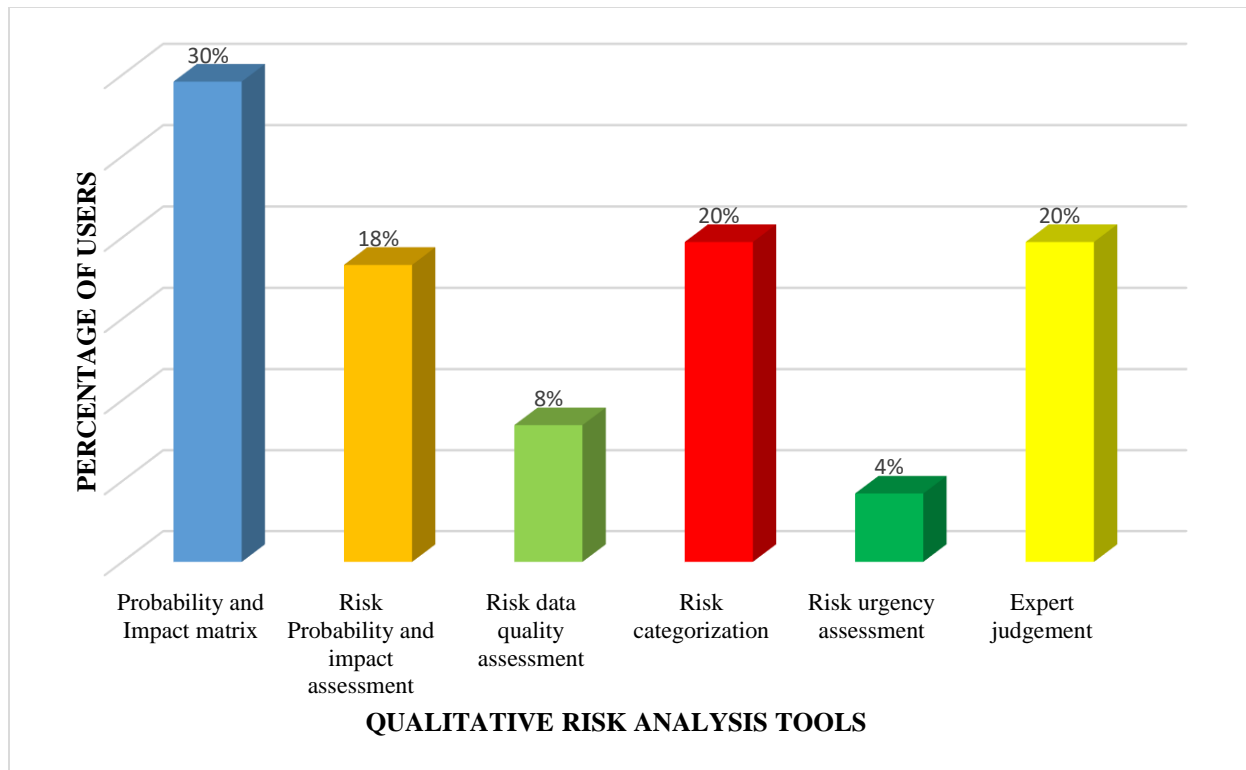
**Figure 4.14: Risk identification tools usage**

### 4.4.3 Risk Analysis

Risk analysis is done in two phases; firstly, a qualitative analysis is done and then a quantitative analysis. The results for the two steps of risk analysis are as shown below.

#### 4.4.3.1 Qualitative Risk Analysis

The different tools and techniques of qualitative risk analysis are shown in Figure 4.15. Results of the questionnaire survey showed that 30 percent of respondents used probability and impact matrix techniques in their qualitative risk analysis, 20 percent used risk categorisation and expert judgement and risk data quality assessment was the least used technique at eight percent.

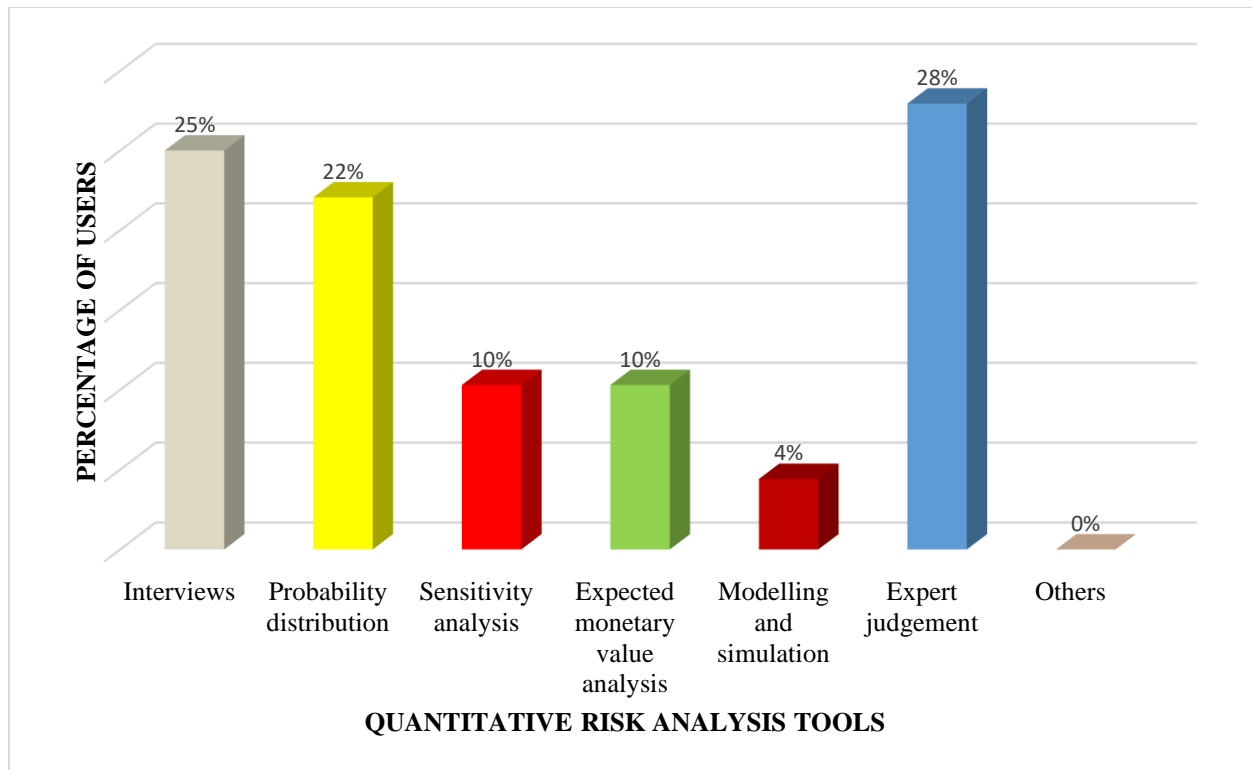


**Figure 4.15: Qualitative Risk Analysis Techniques**

#### ***4.4.3.2 Quantitative Risk Analysis***

Respondents ranked expert judgement as the frequently used quantitative risk analysis technique at 28 percent and interviews at 25 percent. Modelling and simulation was rarely use at four percent and no other techniques were used other than the ones in Figure 4.16.

Sensitivity analysis and expected monetary value analysis were equally used but only ten percent of the respondents had used either of the two techniques.



**Figure 4.16: Quantitative Risk Analysis Techniques**

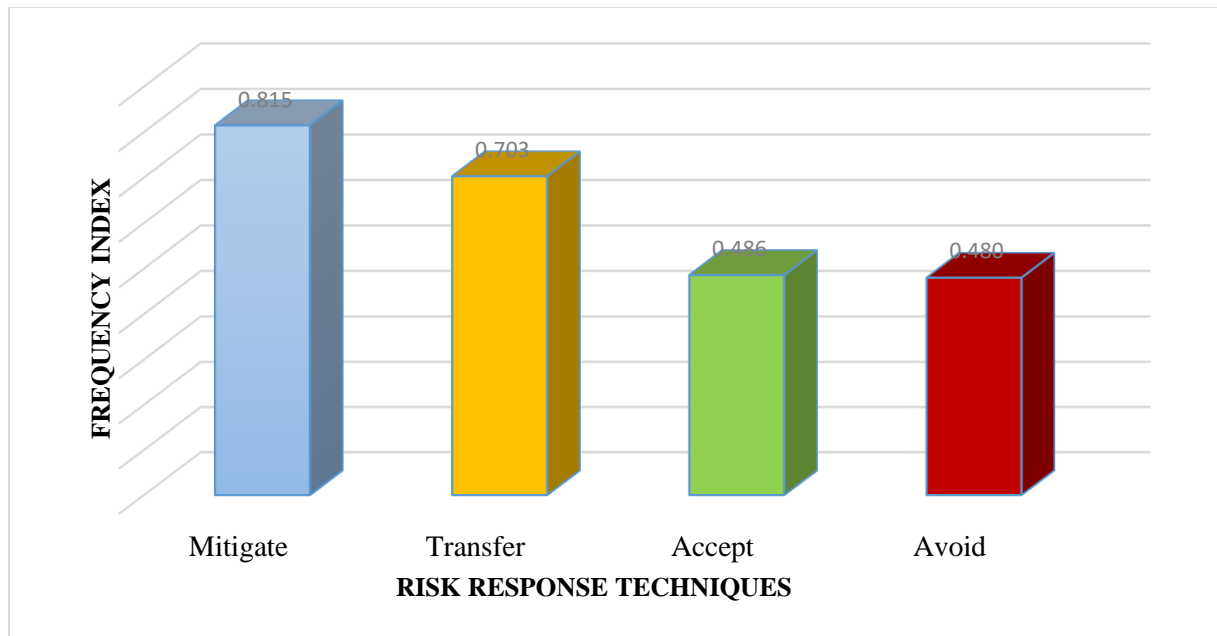
#### **4.4.4 Risk Response**

Risk response was investigated in two ways: by looking at risk response strategies for positive risks and strategies for negative risks.

##### **4.4.4.1 Negative Risks/Threats Strategies**

Of the four negative risk response strategies, mitigation was seen to be the most frequently used strategy at 0.815 frequency index and avoidance the least frequently used at 0.480 frequency. Transferring and acceptance were second at 0.703 and third 0.486 frequency index respectively. Figure 4.17 shows the frequency indices of the respective response strategies.



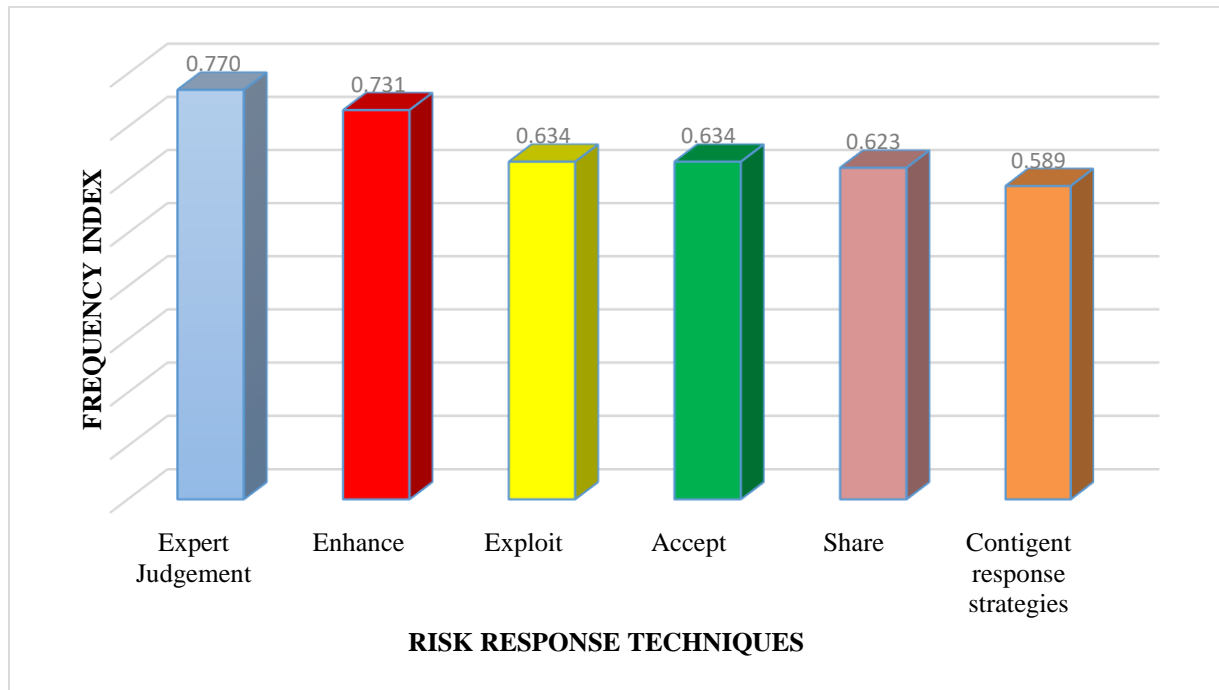


**Figure 4.17: Negative Response Strategies**

#### ***4.4.4.2 Positive risks/opportunities strategies***

Expert judgement, Enhancing, exploiting, accepting, sharing and contingent response strategies were subjected to a questionnaire survey. Results reviewed that expert judgement was the most frequently used strategy with a frequency index of 0.77, followed by enhancing at 0.731 and the least frequently used was contingent response strategies with a frequency index of 0.589.

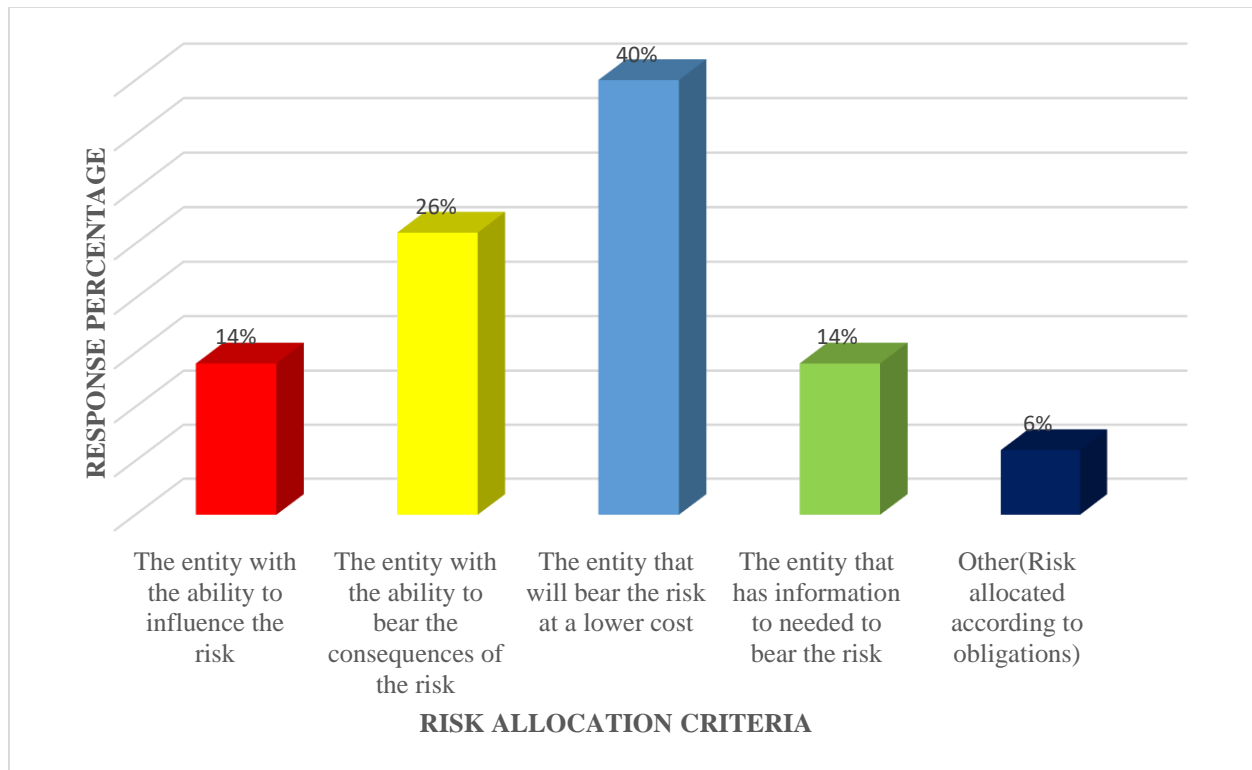
Figure 4.18 shows the strategies with their respective frequency indices.



**Figure 4.18: Positive Response Strategies**

#### **4.4.5 Risk Allocation**

A survey on the criteria for risk allocation revealed that 40 percent of respondents allocated risk to the entity that will bear the risk at a lower cost, 26 percent to the entity that will bear the consequences of the risk, 14 percent to both the entity that has the ability to influence the risk and also the entity that has information to bear the consequences of the risk and six percent according to obligations. Figure 4.19 shows the risk and the percentage of users.



**Figure 4.19: Risk Allocation**

Most risks are expensive and it is therefore relieving for governments to find a cheaper way of dealing with risks. The finding from the questionnaire survey that allocating risks to the entity that will bear the risk at the cheaper cost agrees with this.

#### **4.5 Chapter Summary**

The chapter presented the results of interviews, questionnaire surveys and data analysis. The next chapter discusses the analysed data and relates to the objectives that were set out.

## **CHAPTER FIVE: DISCUSSION OF RESULTS**

### **5.1 Introduction**

The previous chapter analysed the results from interviews and the questionnaire survey. This chapter discusses the results that were presented in the previous chapter. The discussion of results chapter starts by looking at the most common risks likely to be encountered in a PPP market infrastructure project; their likelihood of occurrence and their impact on the project. It then presents the sources of these risks before considering their management, improvements on future PPP market infrastructure projects and need for a PPP risks management framework for PPP market infrastructure projects.

### **5.2 Risk Factors**

The study established that there were 31 most common risk factors in PPP market infrastructure projects. This was out of the many risks that were identified from literature. The top five starting with the most frequent being lack of PPP experience; volatility in foreign exchange; quality issues; errors in estimating project revenues and project financing costs; and responsibility and risk distribution. The finding further agrees with the results from the questionnaire survey which showed that most respondents had only done between one to five PPP projects as shown in Figure 4.7. This finding again agreed with the Zambia Development Agency, (2014) assertions that there is a lack of capacity in government to undertake PPP projects. The study also established that errors in estimating project revenue inflows and project financing costs had the severity index higher than any other risk factor at 0.688. This finding is illustrated in Table 4.3. This is in agreement with the finding that stalls at the two markets are not affordable to the ordinary Zambian marketeer because they are expensive. This has led to lack of social acceptance of the project by the locals as most stalls are occupied by foreigners. The case of Chachacha market agrees with this finding. The United Engineering Group Ltd, which is the private partner in the Chachacha market project is claiming compensation from Lusaka City Council because of loss of revenue brought about by street vending as most of them cannot afford to rent the stalls (Kalembe, 2011).

### **5.3 Sources of Risks**

Sources of risks were established from literature from which it was established that there were fourteen major sources of risks for PPP market infrastructure projects. The first five most frequent sources shown in Table 4.2 being incorrect revenue projections and project financing costs, lack of understanding of PPPs by local communities, complex government bureaucracy, lack of

understanding of PPPs by government officials and poor contract management. The Zambia Development Agency (2014) asserted that there were no political champions for PPPs and that Zambia lacks experience in PPPs. Kalembe, (2011) added that a dispute had arisen between the private investor and the Lusaka City Council over loss of business brought about by street vending. The private investor is claiming that revenue had lost because stalls were no longer attracting many to rent them. This conflict over street vending can be attributed to incorrect revenue projections that have led to high rentals for stalls. Furthermore, the contract stated that there would be reviews every 10 years. However, it did not state exactly what was to be reviewed. The reviews therefore would have no impact. The two authors agree with the findings on the sources of risks.

#### **5.4 Risk Management Practices in Public Private Partnership Market Infrastructure Projects**

Risk management is broken down in the stages of risk planning, risk identification, risk analysis, risk response and risk allocation.

##### **5.4.1 Risk Planning**

The research as shown in Figure 4.11 established that 77 percent of the respondents from the questionnaire survey had used risk planning tools. Figure 4.12 showed that the most widely used tools were expert judgement, meetings and analytical tools at 36%, 34% and 29% respectively. However, there is no detailed risk planning in most of these PPP projects because of insufficient capacity (Kalembe, 2011). This literature agrees with the findings that there is lack of capacity when it comes to dealing with PPP projects. Therefore, expert judgement as a planning tool cannot be used to the satisfaction of stakeholders. The finding that meetings are one of the common tools used in risk planning was an interesting one because on the other hand social acceptance was one of the risks. From this finding, it can be deduced that either the stakeholders that were in these meetings during risk planning were not all inclusive or because of lack of capacity in PPPs, the details of projects were not clearly explained and understood by all stakeholders.

##### **5.4.2 Risk Identification**

Figure 4.13 showed that 83% of the respondents used risk identification tools and 17% had not used risk identification tools. Checklists, expert judgements and SWOT analysis were the most commonly used techniques at 16%, 13% and 12% respectively whilst influence diagrams and Delphi techniques were rarely used at three percent and four percent respectively. These were shown in Figure 4.14 on risk identification tools. Expert judgement as a risk identification tool

contradicts literature and the other finding that there was lack of PPP experience in Zambia from literature and questionnaire survey. Checklists and SWOT analysis can be used without requiring too much PPP experience. On the other hand, Delphi techniques and influence diagrams need a deep understanding of the subject of risk management and PPP. It was therefore not surprising that they were rarely used as risk identification tools following the revelation from literature and survey that there was lack of PPP experience in Zambia.

### **5.4.3 Risk Analysis**

Risk analysis was divided into two phases as qualitative risk analysis and quantitative risk analysis.

#### ***5.4.3.1 Qualitative Risk Analysis and Quantitative Risk Analysis***

The study as represented in Figure 4.15 established six possible qualitative risk analysis tools and techniques as the most frequently used. These included probability and impact matrices; risk probability and impact assessment; risk data quality assessment; risk categorisation; risk urgency assessment; and expert judgements. Of these six techniques, Probability and impact matrix method was the mostly used technique at 30% percent usage; followed by risk categorisation and expert judgement both at 20% usage whilst the least frequently used was the risk urgency assessment at four percent. Six techniques were established in Figure 4.16 to be the most commonly used in quantitative risk analysis. These were interviews; probability distribution; sensitivity analysis; expected monetary value analysis; modelling and simulation; and expert judgement. From Figure 4.16, expert judgements were the mostly used with 28% of the respondents having used it, followed by interviews with 22% of respondents using them. Modelling and simulation was the least frequently used tool at four percent. For one to perform any of the two risk analysis steps, they needed to first understand risk management in the general context and risks in relation to PPPs. Zambia having very few experts in PPPs, therefore means that the understanding of these risk analysis tools was from a general perspective and not that of PPPs. In times when interviews were used, it would not be wrong to deduce that they were not in-depth interviews about the PPP subject. This is so because Kalemba, (2011) observed that there were no in depth evaluation of risks during the construction of the two markets using PPPs.

#### **5.4.4 Risk Response**

In looking at risk response, the study looked at the strategies used in responding to negative risks or threats and positive risks or opportunities.

##### ***5.4.4.1 Negative Risks/Threats Response Strategies***

The four negative risk response strategies were mitigation; transferring; acceptance and avoidance. This study established that mitigation was the most frequently used strategy at 0.815 followed by transferring at 0.703 frequency indices. This was illustrated in Figure 4.17. It further established that avoidance and acceptance were rarely used at 0.486 and 0.481 frequency indices. This finding was in line with Mane & Pimpilikar (2013) argument's on how to deal with risks especially those that came through the public partner such as delays in approvals etc. He preferred mitigation and transferring as the appropriate method for dealing with risks from the public partner.

##### ***5.4.4.2 Positive Risks/Opportunities Response Strategy***

In responding to opportunities, the study established that there were six strategies that were mostly in use as shown in Figure 4.18. These were expert judgement; enhancements; exploiting; acceptance; sharing; and contingent response strategies. Expert judgment was the most frequently used followed by enhancing at 0.77 and 0.731 frequency indices respectively. Contingent response strategies were the least frequently used strategy at 0.589. As long as there are still few experts with a detailed understanding of PPP, it is very difficult to make use of these strategies. Competition is for example a positive risk that was not exploited in the construction of the Luburma market project and only to a very small extent in the Chachacha market under PPP.

#### **5.4.5 Risk Allocation**

Figure 4.18 illustrates the findings that risks should be allocated to the entity with the ability to influence the risk, the entity with the ability to bear the consequences of the risk, the entity that will bear the risk at a lower cost, the entity that has information needed to bear the risk and /or the risk allocated according to obligations. Of all these allocation criteria, the study revealed that risks in PPP market infrastructure projects were mostly allocated to the entity that will bear the risk at a lower cost at 40% of respondents and in very rare circumstances allocated according to obligations at six percent of respondents. These forms of risk allocation criteria agree with Shretha, *et al.*, (2013) forms of risk allocation criteria. Loosemore, *et al.*, (2006) added that risk should be allocated to a party that had full awareness of the risk, greater capacity to manage the risk, has the capacity and resources to cope with the risk eventuating, has the possibility to charge the respective

risk premium and has the preference to undertake the specific risk. However, these findings contradict with Kalemba, (2011) findings on the markets done under PPP that there was no risk identification, evaluation and optimal risk allocation put in place during the project period.

### **5.5 Improvements on Future Public Private Partnerships Market Infrastructure Projects**

Having established the problems so far being faced in the projects built using the PPP model, the study considered the improvements necessary for future PPP market projects. The study established that there was need to increase awareness and understanding by the local people and politicians of the PPP projects. Furthermore, it was established that risks as a result of fires needed to be allocated properly and clearly. The study also revealed that there was need for a clear monitoring and evaluation mechanism to be put in place that will have clear benchmarks and a proper legal framework to be in place apart from equally building capacity in the legal teams.

### **5.6 Need for a Risk Management Framework**

All the participants interviewed agreed that there was need to have a risk management framework as this would help in identifying and allocating risks that may be faced during the PPP project lifecycle and that it leads to improvements in PPP construction projects (Li, et al., 2004;Ceric, 2003). The risk management framework also provided steps on how to deal with risks by different parties.

### **5.7 Chapter Summary**

This chapter looked at the analysed and collected data and compared it with findings from other literature. The next chapter outlines the development of a risk management framework for PPP market infrastructure.



## **CHAPTER SIX: DEVELOPMENT OF A RISK MANAGEMENT FRAMEWORK FOR PPP MARKET INFRASTRUCTURE PROJECTS**

### **6.1 Introduction**

The chapter seeks to develop a risk management framework suitable for all stakeholders in a PPP market project with a view of managing risks and getting the benefits that come with adequately managing risks. This chapter presents the risk management in line with objective number four: to develop a risk management framework for PPPs on Zambia's market infrastructure projects.

The chapter will equally validate and evaluate the developed risk management framework. Framework or model validation and evaluation is an important component of framework development and it makes the framework acceptable and usable for decision making (Macal, 2005).

### **6.2 Framework Development**

In developing a framework for risk management in PPP market projects in Zambia, the study used the results from both survey questionnaires and interviews. The results obtained in chapter four revealed the most common risks that are likely to be encountered and the impact on a PPP project; the causes of the identified risks and their frequency of occurrence; risk planning, risk identification, risk response tools; and risk allocation criteria. Expert interviews also revealed some of the risk mitigation measures.

Using the findings of the research and theoretical analysis, a risk management framework was developed comprising of two components. The first part presents the systematic process in any PPP project in Zambia. The information that fed into this first part was obtained from expert interviews and literature review on Zambia's PPP projects. The PPP process is divided into five stages namely; (i) Project identification stage (ii) Feasibility and due diligence stage (iii) Tendering/Procurement stage (iv) Contract award and (v) Contract Management

#### **6.2.1 Identification Stage**

At this stage, information is gathered without considering the type of procurement that is going to be used. The focus is on identifying specific project objectives, public service objectives and that of other stakeholders.

### **6.2.2 Feasibility and Due Diligence stage**

This stage includes studies and activities to see if the project is well designed, if it is ready for tendering and if at all it can be implemented. It involves developing a business case. The business case justifies a project based on the costs of development and the expected benefits among other things. It also involves identifying the best suited contractual arrangement.

### **6.2.3 Tendering/Procurement stage**

At this stage, the market is informed about the impending project and interested bidders are invited through an expression of interest (EOI) or a request for quotations (RFQ). It includes stages like prequalification of bidders, bidding and bid evaluation process

### **6.2.4 Contract Award**

This stage deals with evaluation of tenders, communication to bidders on the intention to award and the actual award including site possession.

### **6.2.5 Contract Management**

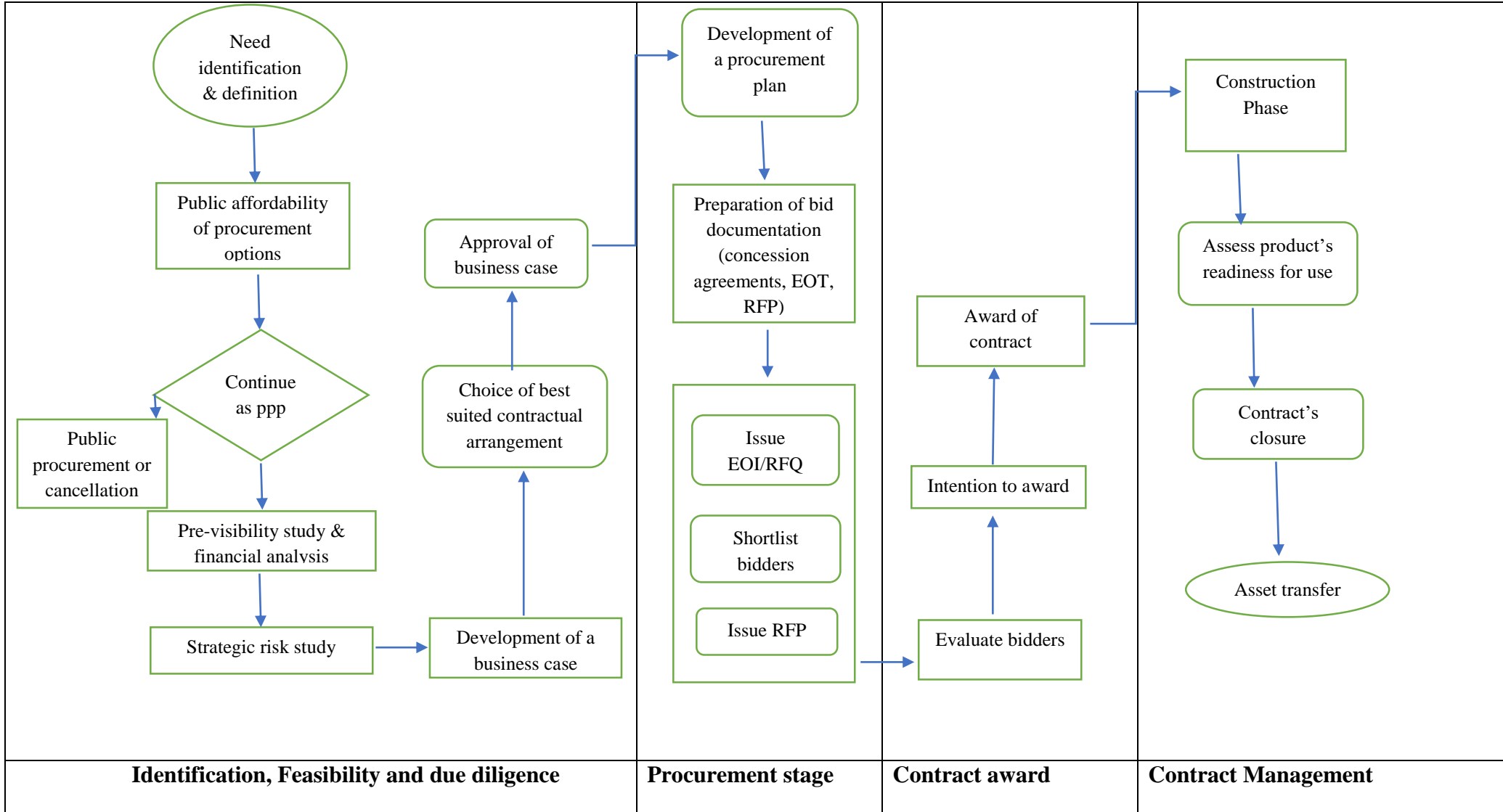
This is the stage of construction and operation periods of the contract and transfer back to the public entity, if needed. This stage involves management of contacts and relationships, management of public finance implications, monitoring and measuring performance, risk management, managing and resolving disputes and process of asset transfer.

Stage one of the framework showing the processes from identification is shown in Figure 6.1.

The second part shows how the different parties in a PPP interact with each other in managing risks from planning to risk allocation. It represents the cyclic and iterative process of risk management characterised by continuous communication between parties. The stages of the second part of the framework are summarised below:

### **6.2.6 Risk Planning**

The first component in this part of the framework is the risk planning stage. In this stage, meetings with all stakeholders are held. It involves the explanation of the intended objectives of the project. Notable stakeholders include but not limited to marketeers, politicians and other prospective traders. Other planning tools or techniques like analytical techniques, expert judgement may be employed in undertaking risk planning.



**Figure 6.1: PPP implementation process. Source: Author 2017**

### **6.2.7 Risk Identification**

In determining which risks may affect the project, checklists, SWOT analysis and expert judgement are some of the most commonly used tools. This process is known as risk identification and follows immediately after risk planning.

### **6.2.8 Risk Analysis**

Risk analysis is performed in two stages. The first one (primary risk identification) is done immediately after risk identification and the second one (secondary risk identification) is done after allocating risks to the different parties. This is shown in stage two of Figure 6.2.

Risks are first analysed using qualitative analysis with the use of qualitative risk analysis tools or techniques (T-3) and then quantitatively using quantitative risk analysis techniques (T-4) in stage two of Figure 6.2.

### **6.2.9 Risk Allocation**

From risk analysis, it is established whether risks will be shared among the parties concerned, whether the risk will be borne by the private party or by the public entity. The allocation is done using RAC, as identified in the survey questionnaire. Once risks are allocated, a secondary risk analysis is undertaken. If the risk is borne by the private entity, secondary risk analysis involves calculating risk value/cost and consequently proposing compensation for the risk cost. If the cost of compensation is accepted by the public partner, then the risk undergoes mitigation and goes into monitoring as is illustrated in stages (b) and (c) of Figure 6.2. During risk monitoring, new risks could be identified or there could be changes to the already identified risks. If new risks occur, they go back to the cycle from primary analysis and through to reallocation. If and when there are changes to the risks, they go to a severity test, if they are not very severe, then the allocation is completed otherwise they will go through the reallocation process.

If and when risks are shared by all parties, secondary analysis will involve negotiation (which party will bear what part of the risk) and the allocation of the part of the risk to party in the best position to handle the risk. After which risks undergo mitigation through to monitoring and to the process of identifying new or changes to risks like for the private entity and shown in stages (ii) and (iii) of Figure 6.2.

On the other hand, when and if risks are borne by the public entity, they undergo a secondary risk analysis during which an appropriate risk response strategy is identified. After this analysis is done, risks undergo mitigation and on to monitoring and goes to the cycle like other private risks or as if risks are shared.

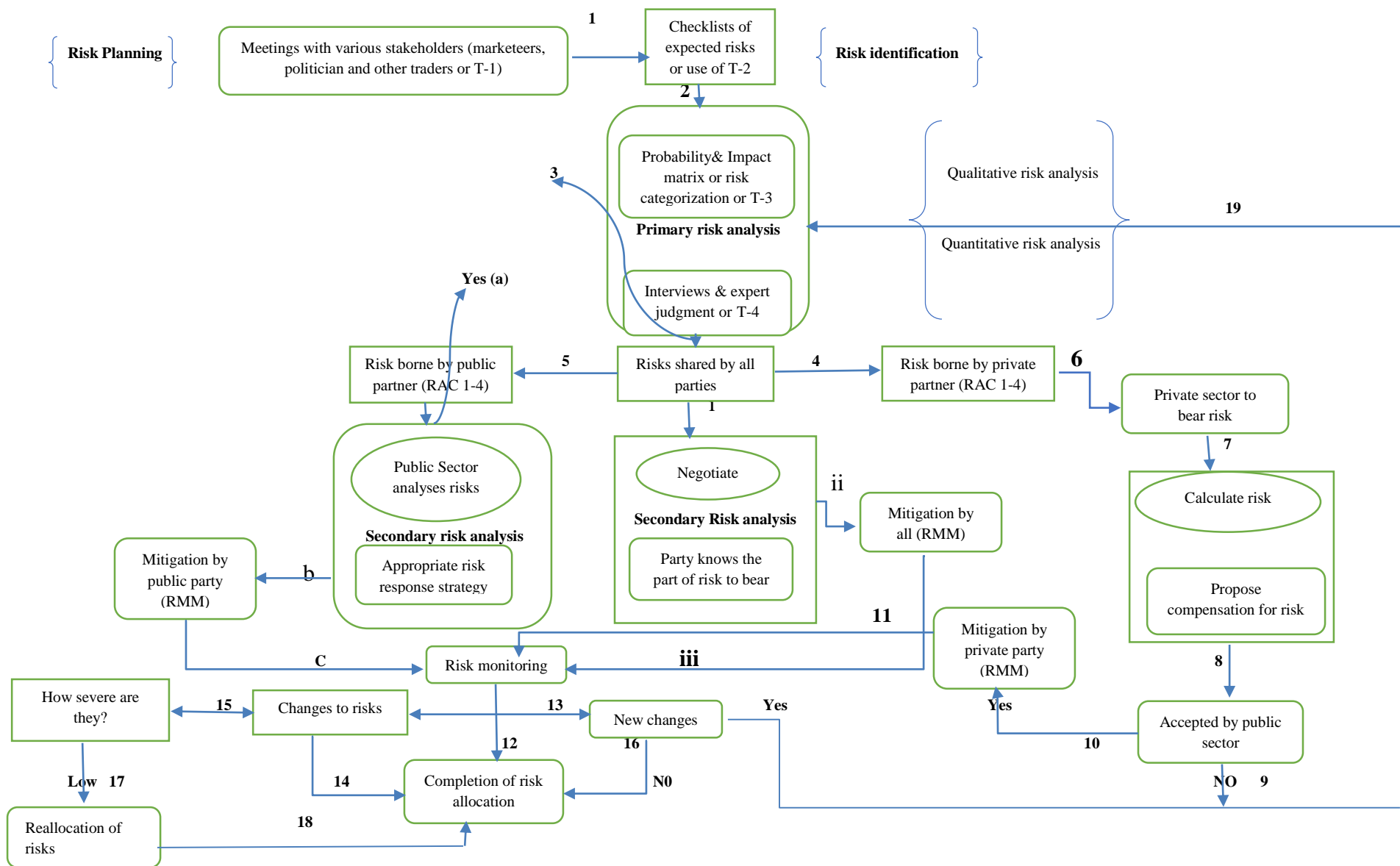
### **Key**

T-1 Risk planning	T-3 Qualitative risk analysis tools	RAC- Risk allocation criteria
T-2 Risk Identification tools	T-4 Quantitative risk analysis tools	RMM- Risk mitigation measures

### **6.3 Framework Validation**

Framework validation and evaluation are necessary to prove the reliability and validity of a given risk management framework. It is carried out to ensure the framework is structured correctly and the specifications are very clear and complete. Framework or model validation is the process of determining the degree to which the developed framework or model and its associated data are an accurate representation of the real world from the perspective of its intended use (Navy Modeling and Simulation Management Office, 2004). There is no one formalised procedure approach to validating a framework/model because each developed framework or model has its own set of challenges (Sargent, 2009). Martis, (2006) further argues that validation cannot be carried out by the researcher alone but that it should be communicated with the users. Therefore the first step in the validation process was to identify potential users. These included contractors, consultants, ministry of local government officials, officials from city and municipal councils, property developers, academia, banks and finance houses. Rating guidelines were sent to the potential users of the framework to rate it in terms of its logical structure; clarity; comprehensiveness; practical relevance to risk management; and applicability in construction management.

A total of 22 potential users were contacted over the framework validation. The distribution of the assessment guidelines for the framework was broken down in Table 6.1. From Table 6.1, it could be seen that twenty three percent were consultants and nine percent were city or municipal workers and property developers of which 55 percent had masters' degrees, 36 percent had bachelors' degrees and nine percent had diplomas. In terms of experience in the construction industry, 27 percent of the potential users of the framework had between 15 and 20 years' experience, 41 percent with between 10 and 15 years' experience, 18 percent had 5 to 10 years' experience and 15 percent had 1 to 5 years' experience.



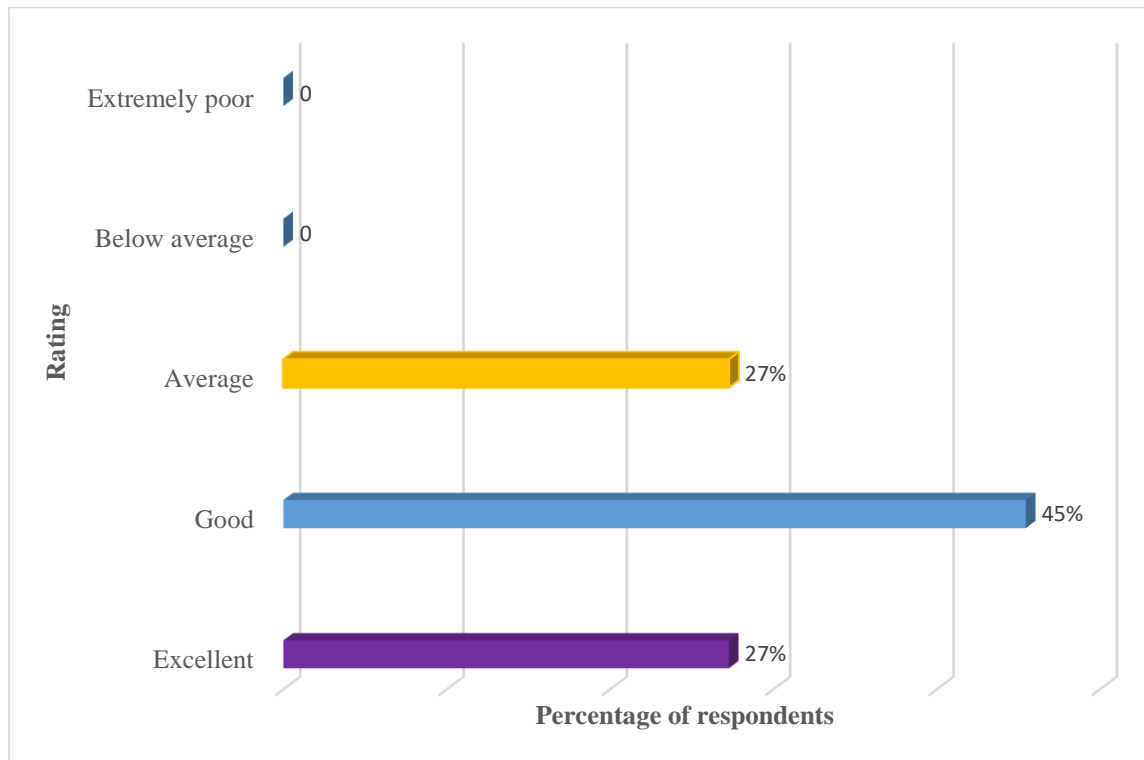
**Figure 6.2: Risk management framework**

**Table 6.1: Respondents background**

<b>Respondents' Background</b>	<b>Classification</b>	<b>No. Contacted</b>	<b>Percentage</b>
Type of organisation	Consultants	5	23%
	Contractors	4	18%
	Banks/Financial houses	2	9%
	Local Govt Officers	3	14%
	Property developers	2	9%
	City/municipal council officers	2	9%
	Academia	4	18%
Academic qualification	PhD	0	
	Master's degree	12	55%
	Bachelor's degree	8	36%
	Higher National Diploma	2	9%
Experience in the construction industry	1-5 years	3	14%
	5-10 years	4	18%
	10-15 years	9	41%
	15-20 years	6	27%
Experience in PPP projects	1-5 years	13	59%
	5-10 years	9	41%
	10-15 years	0	0%
	15-20 years	0	0%

Generally, the majority (41 percent) of potential users had between 10 and 15 years' experience. Therefore, from the above background information, the evaluation and validation given by the respondents can be relied upon.

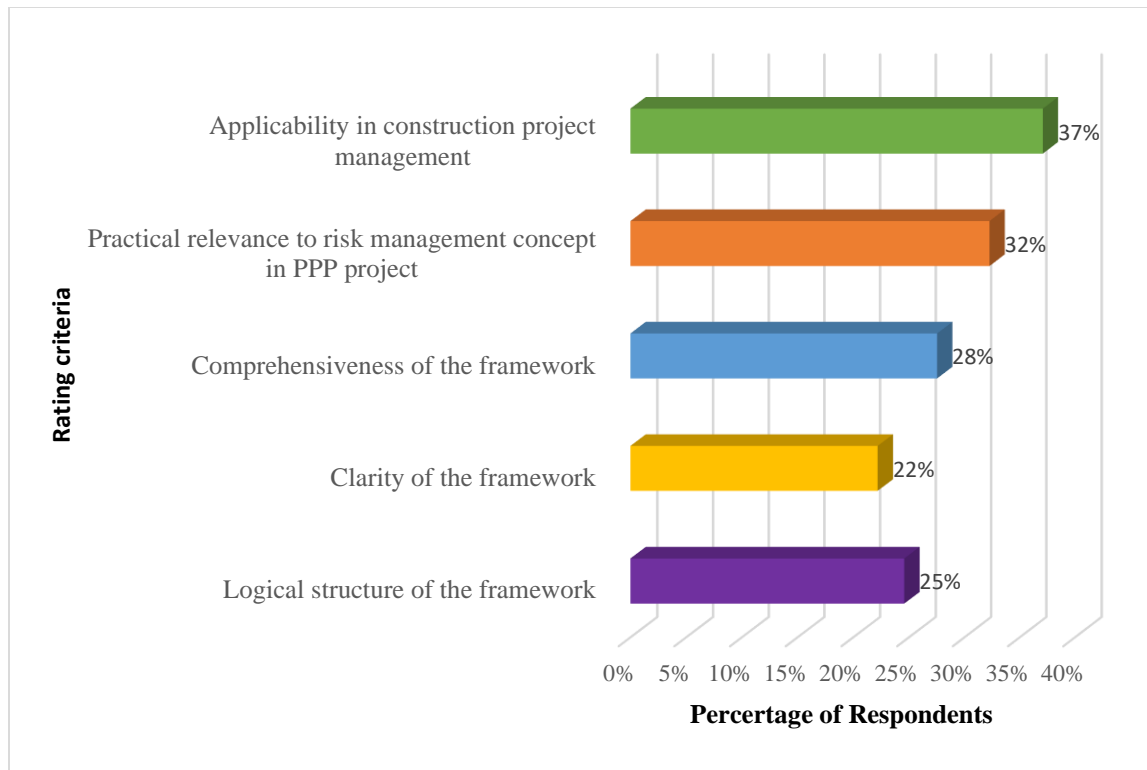
On overall rating of the framework, 45 percent rated it as good while 27 percent rated it average and excellent. None of the respondents rated it below average or poor. Form this rating it could be deduced that the framework was good enough to be as a guide in the process of risk management. The results of the overall rating are shown in Figure 6.3.



**Figure 6.3: Overall rating of the Risk Management Framework**

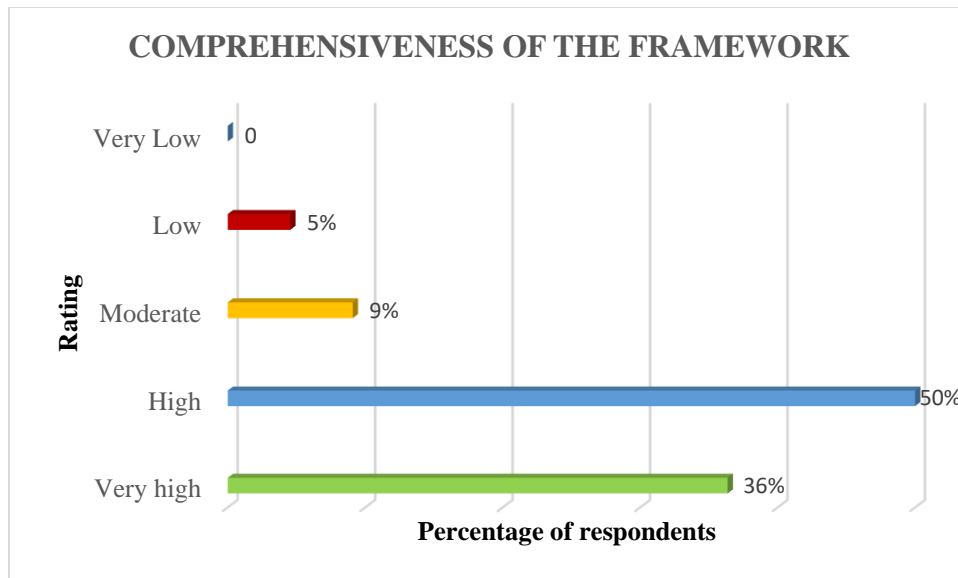
To test the level of agreement among respondents on the logical structure; clarity; comprehensiveness; practical relevance to risk management in PPP projects; and applicability in the construction industry, the coefficient of variation was used. The results ranged from 22 percent to 37 percent. The results agreed with *Cong, et al., (2014)* assertion that the lower the value of COV, the higher the level of agreement among respondents. There was therefore a higher level of agreement among respondents that the risk framework developed was clear and had a logical structure. Figure 6.4 shows the rating on the five particular criteria.





**Figure 6.4: Rating of the risk management framework**

In order to understand the comprehensiveness of the framework, comprehensiveness assessment results were isolated and Figure 6.5 shows the results. It can be observed that 50 percent of the respondents said that the framework was highly comprehensive whilst five percent rated it low in terms of comprehensiveness.



**Figure 6.5: Comprehensiveness assessment of the Risk management framework**

#### **6.4 Chapter Summary**

The chapter outlined the development of a risk management framework and its validation. It presented the framework itself; the results and analysis of the validation process. The results included the overall rating of the framework and particular assessment. The next chapter looks at the summary of findings, recommendations and conclusions.

## **CHAPTER SEVEN: SUMMARY OF FINDINGS, RECOMMENDATIONS AND CONCLUSIONS**

### **1.9 Introduction**

The previous chapter presented the development of a risk management framework for PPP market projects. This chapter presents the summary of findings; recommendations and conclusion.

### **7.2 Summary of Findings**

The findings on the objectives are shown below.

#### **7.2.1 Major Risks in PPP Market Infrastructure Projects**

Through the review of extant literature, use of in-depth interviews from stakeholders and questionnaire surveys, it was established that although there are many risks that affect PPP projects for market infrastructure, 34 risks were the most common. In terms of frequency of occurrence; lack of PPP experience was the most frequent followed by volatility in foreign exchange; quality issues; errors in estimating project revenues inflows and responsibility and risk distribution as the top five out of the 34. When these risks were subjected to a severity index survey, it was established that errors in estimating project revenue inflows was the most severe in terms of impact on the project, followed by lack of PPP experience; quality issues; time overrun; and land acquisition and compensation as the top five most severe.

#### **7.2.2 Causes of Risks on PPP Market Projects**

The study further revealed that there were many causes or sources of risks but the most common were 14. Incorrect revenue projection was the most frequent source of risk at 0.78 frequency index, then lack of PPP understanding by the local communities at 0.77, complex government bureaucracy at 0.76, lack of understanding of PPPs by government officials at 0.75 and poor contract management at 0.74 frequency index as the top five most frequent sources of risks.

#### **7.2.3 Risk Management Practices on PPP Market Projects and Risk Management Framework**

Though there was some understanding of the subject of risk management, it was not well understood in relation to PPP projects. Respondents of the questionnaire survey understood the steps of risk planning; identification, analysis, mitigation and allocation. The study further revealed that there was no optimal risk transfer and there were no processes to evaluate the risks. What was relied upon were checklists and an indication of who was likely to bear them with no risk

mitigation being done. It was also established that there was no risk management framework or any established mechanism of dealing with risks.

Other than fulfilling the objectives, there was no value for money being realised particularly by the Lusaka City Council from the two markets built so far using the PPP model and there was little to no competition during the award of the contracts

### **7.3 Recommendations**

Based on the findings of this research, the following recommendations are proposed aimed at eliminating the identified problems on PPP projects in the future:

#### **7.3.1 Increase the Number of Experts in PPPs**

Lack of experts in PPPs was not only frequent in terms of occurrence but also severe in terms of impact on the project. Moving forward, public institutions intending to undertake projects using PPP model should train its staff in PPPs by way of embarking on exchange programs or study tours. South Africa, Nigeria and China are some of the countries that have implemented PPPs in various sectors and these public institutions can learn from them.

#### **7.3.2 Improving Stakeholder Involvement**

The study established that lack of understanding of PPPs by both the local people and politicians is one of the major sources of risk standing at 0.77 and 0.75 frequency indices. In order to achieve public support, it is recommended that there be timely and adequate involvement of all project stakeholders. This can be done by identifying key stakeholders, assessing their influences on the project and involving them from the onset. Local people and governments do not need to be experts in PPP but it is necessary that they are explained to the basics of PPP through public meetings. The expected basic information could be expected outcomes of the project and period during which the market or particular infrastructure will be in the hands of the private entity. Incorrect revenue projections was the most frequent risk at 0.78 frequency index. This risk source leads to incorrect lease periods and in some cases high rental charges for the stalls. High rental charges leads to local marketeers not affording trading in the markets. Much as the market may not built for the sole benefit of the local people alone, it is always necessary that local people benefit from it. Hence the need to study the cultures and income levels of the local people.

### **7.3.3 Capacity Building**

With the establishment of the fact that there is lack of capacity in the country when it comes to PPPs, it is necessary that capacity is built in professionals when it comes to PPPs. This was so because lack of PPP experience was the most frequent risk factor at 0.636 frequency index. Capacity can be built by introducing risk management and PPPs as a part of the curriculum in tertiary institutions. It is further recommended that professional bodies like Engineering Institution of Zambia (EIZ), Zambia Institute of Architects (ZIA), Surveyors Institute of Zambia (SIA), Law Association of Zambia (LAZ) and many others embark on seminars aimed at disseminating and educating professionals on PPPs. Furthermore, there should be a deliberate knowledge transfer system put in place for every PPP project.

### **7.3.4 Performance Measures and Incentives**

The markets that have been built using PPP lack clear performance measures and no incentive mechanism for the private sector. It is therefore recommended that in order to enhance the performance of the private sector, future contracts should consider embedding clear performance measures and incentives.

## **7.4 Conclusions**

Zambia's economy is growing and this has led to the high demand for infrastructure. The demand for infrastructure has not been met with an equal supply of financial resources. In order to reduce the difference between supply and demand, government embarked on a program to build roads, schools, hospitals among other infrastructures. Lusaka's streets are now trading areas and this has made the campaign to keep Lusaka clean very difficult. This situation has been attributed to fewer stalls in the already existing markets, high cost of stall rentals and that some markets' locations are too far away from where people can easily access them.

### **7.4.1 Major Risks in PPP Market Infrastructure Projects**

From the sample of 35 respondents, it could be seen that the respondents' involvement in PPP projects was minimal. Again this research did not gather information on where the respondents got involved in PPP projects. Lack of PPP experience was the most frequent risk factor at 0.636 frequency index. It was also high in terms of its impact on the projects with severity index of 0.647. It is therefore correct to conclude that Zambia lacks experience in PPP projects. The problems that have characterised most projects that have been implemented using PPP models are merely due to lack of experience. Errors in estimating project revenue inflows and project financing costs had a

severest impact on projects with a severity index of 0.688. It is therefore correct to conclude that the periods (35-65 years) during which the markets will be private hands may have been lower than the existing ones. Furthermore, the rentals being charged may have been lower than the existing ones. With experience in PPPs, these risks can be mitigated successfully.

#### **7.4.2 Causes of Risks on PPP Market Infrastructure Projects**

The most frequent sources or causes of risks were incorrect revenue projections, lack of PPP understanding by the local communities, complex government bureaucracy, lack of understanding of PPPs by government officials and poor contract management as shown in Figure 4.10. With relevant experience in PPPs, these sources of risks can be mitigated. Incorrect revenue projections has the effect of prolonging the lease periods and increasing the cost of stalls in the markets. Experience in PPPs will entail stakeholder engagement at all levels and by so doing mitigating the lack of PPP understanding by both local communities and government officials and projecting correctly revenue inflows and financing costs. It further entails enabling policies that will reduce government complex bureaucracies and good contract management skills.

#### **7.4.3 Risk Allocation**

Risks in this study were allocated to the entity that would bear the risk at a lower cost (40% of respondents) followed by the entity with the ability to bear the consequences at 26% of the respondents. Understanding of PPPs is essential in order for one to allocate risks appropriately. Appropriate risk allocation leads to proper risk management. It is therefore important to improve understanding of PPPs among all the stakeholders involved in PPPs.

#### **7.4.4 Management of Risks on PPP Market Projects in Zambia**

The results revealed that risk management in general was understood by many respondents. But risk management in relation to PPP market projects was not well understood. This is because of lack of experience in PPP projects by professionals. The lack of understanding of PPP projects is exacerbated by the lack of understanding of PPP projects by government officials and many ordinary Zambians. This is therefore the cause or source of not risks but also the management of risks. Expert judgement was the commonest risk management tool. With limited understanding of PPPs by majority professionals, it was therefore difficult to manage these risks. It was further established that there existed no risk management framework for a PPP market project and that there was need to develop one. The framework that was developed provides planning,

identification and analysis techniques which can serve as a checklist for future PPP market projects.

It was therefore hoped that this framework will be used as a useful tool in planning, identifying, analysing, mitigating and allocating risks for future PPP market projects. This will help the public sector to prepare a well-defined risk allocation mechanism to use in bidding documents and the private sector will be able to balance distribution of responsibilities and risks. The will in turn reduce the negotiation periods and the cost associated with these long negotiations. Additionally, the framework will give confidence to will-be investors to invest in PPP projects since the whole processes will be clearly mapped out.

Finally, it is hoped that the if the recommendations are considered in future PPP market projects, the performance of projects can be improved, the public sector can start realising value for money from these projects and benefits start accruing to the ordinary marketeers for whom these markets are intended.

#### **7.4 Areas for Future Research**

Some of the findings point to possible areas for future research in the following areas:

**i. Study was limited to the market infrastructure PPP project.**

This study and the consequent development of a risk management framework can be done for other studies in other fields like energy, roads, railway construction, hospitals and prisons just to mention a few. Much as some of the identified risks are universal, it is necessary that a study particular to a sector is conducted.

**ii. Framework for solicited bids.**

The study was limited to solicited bids. Therefore, a study aimed at risk management for unsolicited bids can be carried out in a market PPP and even other sectors. This will further broaden the understanding of risks.

**iii. PPPs in other parts of the country**

The fact that markets are socio economical makes it difficult to generalise this study. It is therefore necessary that studies are conducted for different parts of the country.

**iv. Study to develop performance measures and incentives to improve performance**

The study revealed that much as monitoring of these projects were planned, there were no clear performance measures. Furthermore, there were no incentives to the private sector to improve performance. If a study is conducted outlining clear performance measures and incentives, PPP market projects will create value for money for the public sector and bring with it many other benefits.



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## APPENDICES

### Appendix A: Questionnaire Survey

#### Cover letter for the Questionnaire



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5<sup>th</sup> May, 2017

Dear Sir or Madam,

#### **QUESTIONNAIRE SURVEY ON RISK MANAGEMENT FRAMEWORK FOR PUBLIC MARKET INFRASTRUCTURE PROJECTS IN ZAMBIA**

I am currently undertaking a Master of Engineering degree in Construction Management at the University of Zambia. My topic of research is “**Development of a risk management framework for PPP public market infrastructure projects in Zambia**”.

This study endeavors to examine the causes of major risks on most PPP public market projects in Zambia; investigate how risks are currently being managed on Zambia’s PPP public market projects; and determine whether risks on public market projects change with time. The information obtained will be used to develop a risk a management framework.

Attached is a questionnaire, and based on your experience in risk management and PPPs, kindly take part in this survey by completing it. Please answer all questions where possible. All the information gathered will be treated as confidential and will be used only for the purpose of this research.

Should there be queries, please get in touch with the undersigned using the address provided.

Thank you in advance for your time and assistance.

**Yours Faithfully,**

**Michael Chileshe** (*Master of Engineering Student at the University of Zambia*)

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## QUESTIONNAIRE

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### DEVELOPMENT OF A RISK MANAGEMENT FRAMEWORK FOR PPP MARKET INFRASTRUCTURE PROJECTS IN ZAMBIA

Thank you for having taken time to participate in this survey. The purpose of this questionnaire is to examine the causes of major risks and investigate how risks are currently being managed on Zambia's PPP market infrastructure projects among other objectives

Please respond to the questions in section one by either ticking in the box provided, by shading, ticking or writing in the space provided.

***All the information provided will be treated with the highest level of confidentiality.***

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### SECTION 1: GENERAL INFORMATION ON RESPONDENTS' BACKGROUND

1.0 In which sector is your organization?

- A. Public ☐
- B. Private ☐
- C. Financier ☐
- D. Other, please state.....

2.0 What role in construction does your organization play?

- A. Contractor ☐
- B. Consultant ☐
- C. Client ☐
- D. Financier ☐
- E. Other (please specify).....

3.0 How many years have you worked for your organization?

- A. 1- 5 years ☐
- B. 5- 10 years ☐
- C. 10- 15 years ☐
- D. 15- 20 years ☐
- E. Above 20 years ☐

4.0 What is your position in your organization?

- A. Senior Management ☐
- B. Middle Management ☐
- C. Junior Management ☐
- D. Unionized employee ☐
- E. Other, please state.....

5.0 What is your highest level of education?

- A. PHD ☐
- B. Master's degree ☐
- C. Bachelor's degree ☐
- D. Diploma ☐
- E. Other, please state.....

6.0 How many years of experience do you have in the construction sector?

- A. 1-5 years ☐
- B. 5-10 years ☐
- C. 10-20 years ☐
- D. More than 20 years ☐

7.0 How many PPP projects have you been involved in?

- A. 1- 5 projects ☐
- B. 5- 10 projects ☐
- C. 10- 15 projects ☐
- D. Above 15 projects ☐

8.0 What type of PPP projects has your organization been involved in?

- A. Hospital ☐
- B. Road infrastructure ☐
- C. Water & Sanitation ☐
- D. Market Infrastructure ☐
- E. Power & Energy ☐
- F. Others (please specify) .....

9.0 Which PPP procurement arrangements has your organization been involved in?

- A. Design & Build ☐
- B. Build, operate & transfer ☐
- C. Build, own, operate & transfer ☐
- D. Turnkey ☐
- E. Concession ☐
- F. Others (please specify) .....

**Section 2: Common risks that affect PPP market infrastructure projects**

Note: Risks are threats and challenges on one hand and opportunities on the other. Risks are uncertainties inherent to any project and are associated with (at least) a cause, a consequence (if it occurs), and the probability or likelihood of the event occurring.

2.1 RATE THE FOLLOWING RISKS IN TERMS OF CHANCES OF OCCURRENCE AND IMPACT ON A PPP MARKET INFRASTRUCTURE PROJECT USING A FOUR POINT LIKERT SCALE BELOW.

How likely it is that the risk will occur or will be encountered in the project:

(1= Not likely, 2= moderately likely, 3= Likely, 4= Very Likely)

For the impact or severity of the risks when they occur

(1= Not severe, 2= Weak effect, 3= Severe, 4= Very severe)

No .	Risks	Likelihood				Impact/Severity			
		1	2	3	4	1	2	3	4
1	Stakeholder project approval								
2	Corruption								
3	Inflation								
4	Environmental considerations								
5	Lack of PPP experience								
6	Difference in working techniques between parties								
7	Social acceptance of the project								
8	Problems with subcontractor management								
9	Lack of demand for PPP services								
10	Cost overrun								
11	Quality issues								
12	Time overrun								
13	Labour and material shortage/strikes								
14	Financial capability of the consortium								
15	Technological changes								
16	Regulation/legal changes								
17	Maintainability of the constructed facilities								
18	Project sustainability								
19	Unresolved conflicts and disputes								
20	Responsibility and risk distribution								
21	Political stability								
22	Effective communication between parties								
23	Errors in estimating project revenue inflows and project financing costs								
24	Engineering and design failures								

25	Volatility in foreign exchange								
26	Force majeure( Wars and calamities)								
27	Interest rate volatility								
28	Imposition of new taxes/Increase in taxes								
29	Land acquisition/Compensation								
30	Termination of agreement by government								
31	Attitude of government towards foreign investors								
<b>Others, please specify</b>									
32									
33									

## 2.2 WHAT ARE THE CAUSES TO MOST OF THESE RISKS

Rate the extent to which risks are affected by the sources/ causes of risks below by the four point Likert scale

(1=very low, 2= Low, 3= Medium, 4= High, 5= Very high

No .	Cause/source of risks	Effect				
		1	2	3	4	5
1	Defect in tender specifications					
2	Insufficient work experience in PPPs					
3	Poorly defined roles and responsibilities in contracts					
4	Complex government bureaucracy					
5	Unstable economy					
6	Lack of understanding of PPPs by government officials					
7	Lack of understanding of PPPs by local communities					
8	Lack of guidelines on PPPs					
9	Corruption in the choice of concessionaires					
10	Poor contract management					
11	Riots and work stoppages due to poor working conditions by PPP partners					
12	Longer concessions					

Others, please specify						
13						
14						

### Section 3: Risk management practices in Zambia's PPP market infrastructures

Risk management is a continual cycle of identification, analyzing, reduction and control, transfer and review. This process can apply to all types of projects. The benefits of risk management process include identifying and analyzing risks, and improvement of construction project management processes and effective use of resources.

3.1 HAVE YOU USED ANY RISK PLANNING TOOLS/ METHODS BEFORE? YES/NO

3.2 IF YOUR ANSWER IS YES TO QUESTION 3.1, PROCEED TO QUESTION 3.3, IF NOT STATE WHAT YOU USED FOR RISK PLANNING.....

3.3 WHAT RISK PLANNING METHODS HAVE YOU USED ON PPP PROJECTS

- A. Analytical techniques ☐
- B. Expert judgment ☐
- C. Meetings ☐
- D. Other, specify.....

3.4 HAVE YOU USED ANY RISK IDENTIFICATION TOOLS OR METHODS BEFORE? YES/NO

3.5 IF YOUR ANSWER IS YES TO QUESTION 3.4, PROCEED TO QUESTION 3.6, IF NOT STATE WHAT YOU USED FOR RISK PLANNING.....

3.6 WHAT RISK IDENTIFICATION TOOLS/TECHNIQUES HAVE YOU USED ON PPP PROJECTS? (You can choose more than one option)

- A. Checklists ☐
- B. Process flow charts ☐
- C. Case studies ☐
- D. Delphi technique ☐
- E. SWOT analysis ☐
- F. Survey investigations ☐
- G. Brainstorming ☐
- H. Interviews ☐
- I. Cause and effect diagrams ☐
- J. Influence diagrams ☐
- K. Expert judgment ☐

3.7 WHAT TOOLS HAVE YOU USED BEFORE FOR QUALITATIVE RISK ANALYSIS?



- A. Probability and impact matrix ☐
- B. Risk probability and impact assessment ☐
- C. Risk data quality assessment ☐
- D. Risk categorization ☐
- E. Risk urgency assessment ☐
- F. Expert judgment ☐
- G. Other, specify.....

### 3.8 WHAT TOOLS HAVE YOU USED BEFORE FOR QUANTITATIVE RISK ANALYSIS?

- A. Interviews ☐
- B. Probability distribution ☐
- C. Sensitivity analysis ☐
- D. Expected monetary value analysis ☐
- E. Modeling and simulation ☐
- F. Expert judgment ☐
- G. Others, specify.....

### 3.9 WHAT RISK RESPONSE TOOLS HAVE YOU USED BEFORE ON NEGATIVE RISKS OR THREATS?

Rate the frequency of use by using the five point Likert scale where; 1= Not used, 2= Not frequent, 3= Average, 4= Frequent, 5= very frequent

No.	Qualitative risk analysis tools and techniques	Frequency				
		1	2	3	4	5
1	Avoid					
2	Transfer					
3	Mitigate					
4	Accept					
Others, please specify						
5						
6						

### 4.0 WHAT RISK RESPONSE TOOLS HAVE YOU USED BEFORE ON POSITIVE RISKS OR OPPORTUNITIES?

Rate the frequency of use by using the five-point Likert scale where; 1= Not used, 2= Not frequent, 3= Average, 4= Frequent, 5= very frequent

No.	Qualitative risk analysis tools and techniques	Frequency				
		1	2	3	4	5

1	Exploit					
2	Share					
3	Enhance					
4	Accept					
6	Contingent response strategies					
7	Expert judgment					
<b>Others, please specify</b>						
8						
9						

#### 4.1 WHEN ALLOCATING RISKS, WHICH CRITERIA DO YOU USE?

- A. The entity with the ability to influence the risk ☐
- B. The entity with the ability to bear the consequences of the risk ☐
- C. The entity that will bear the risk at a lower cost ☐
- D. The entity that has information needed to bear the risk ☐
- E. Others, please specify.....

## APPENDIX B: INTERVIEW QUESTIONS

### INTERVIEW GUIDE ON THE DEVELOPMENT OF A RISK MANAGEMENT FRAMEWORK FOR PPP MARKET INFRASTRUCTURE

This interview is solely meant for academic purposes and will not be used for any other purposes. The identity of the interviewees will not at any given time be disclosed to anyone.

- 1.0 What is your position in this organization?
- 2.0 What PPP project have you been involved in?
- 3.0 Have you at any time been involved in a PPP that relates to construction or running of a market?
- 4.0 How do you define a public market?
- 5.0 Is there need to construct more public markets using a PPP model? Whichever the answer, Why?
- 6.0 Which PPP model is best suitable for construction and management of public markets and why?

- 7.0 Which PPP model was used for Luburma, Chilenje and town Centre markets?
- 8.0 Was there anything wrong with the PPP model used for the above markets? What is wrong and why do you think so.
- 9.0 What went wrong with the PPP project you worked on if at all there was anything wrong
- 1.0 How can the above mistakes/wrongs be avoided in future?
- 11.0 What are the most common risks in PPP market projects?
- 12.0 What are the causes of these risks?
- 13.0 How can these risks be managed?
- 14.0 How can these risks be mitigated?
- 15.0 What are some of the problems of not managing risks?
- 16.0 What stage of a PPP contract do you think has more risks
- 17.0 What would you want done in most of the PPP that are to come?
- 18.0 Will risk management framework benefit stakeholders and how?

## APPENDIX C: FRAMEWORK VALIDATION



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### RISK MANAGEMENT FRAMEWORK VALIDATION

I am currently undertaking a Master of Engineering degree in Construction Management at the University of Zambia. My research topic is “Development of a risk management framework for PPP public market infrastructure projects in Zambia”. I have since developed a framework and am now at the stage of validating it. This framework validation process is for academic purposes only and it shall not be used for any other purpose other than the one stated above.

### RISK FRAMEWORKS VALIDATION GUIDELINES

1.0 What type of organisation do you represent?

- A. Consultants
- B. Contractors
- C. Banks/Financial institutions
- D. Academia
- E. Concessionaire
- F. Local govt officers
- G. Property developers
- H. City/ Municipal council officers

2.0 What is your academic qualification?

- A. Higher National Diploma(HND)
- B. Bachelor's degree
- C. Master's degree
- D. PHD

3.0 How long have you been in the construction industry?

- A. 1-5 years
- B. 5-10 years
- C. 10-15 years
- D. 15-20 years
- E. Over 20 years

4.0 What is your experience in PPP projects?

- A. 1-5 years
- B. 5-10 years
- C. 10-15 years
- D. 15-20 years

5.0 Please give your overall assessment of the framework in terms of the following specific statement using the scale.

Excellent	Good	Average	Below Average	Extremely Poor
5	4	3	2	1

6.0 RATE THE FRAMEWORK ATTACHED (BY TICKING) ON A FIVE POINT LIKERT SCALE BELOW. Where 1= very low, 2= Low, 3= Moderate, 4= High, 5= Very high

DIMENSION	SCORE				
	1	2	3	4	5
Logical structure of the framework					
Clarity of the framework					
Comprehensiveness of the framework					
Practical relevance to risk management concept in PPP project					

Applicability in construction Project management					
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7.0 Are there any limitations, please state any limitations of the framework that you could have observed?

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8.0 Give any general comments that you could have on this framework

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