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RISK MANAGEMENT IN TOLL ROAD PROJECTS AT PROJECT DEVELOPMENT  
STAGE - LUSAKA PROVINCE

BY

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## DECLARATION

I **Bwalya C. Lungu** do hereby declare that this submission is my own work towards the **MSc Project Management** and that, to the best of my understanding, it contains no material earlier published by any other person, nor material which has been accepted for the award of any other Master degree of the University, except where due acknowledgement has been made in the text. I further declare, to the best of my knowledge, that this work has not been presented in part or in whole for any academic purposes.

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## **DEDICATION**

This research work is dedicated to my dearest mum (Rosemary Lungu Mulubwa), my family and all my friends and most importantly to the Almighty God.

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## **ACRONYMS/ABBREVIATIONS**

GFIP – Gauteng Freeway Improvement Project

MOF – Ministry of Finance

NRFA – National Road Fund Agency

PPPs – Public Private Partnerships

RDA – Road Development Agency

RM – Risk Management

RMP – Risk Management Process

RTSA – Road Transport and Safety Agency

WBP – West Bank Palestine

ZPPA - Zambia Public Procurement Authority

## **ABSTRACT**

The research aimed at identifying the risks associated with Toll road projects at the development stage. It also sought to determine the probability and effects of the identified risks and their effects in toll road projects at the development stage. The research ultimately aimed at proposing a risk management framework for Toll roads projects by developing technical inputs particularly at the development stage. Literature reviewed indicated that in other parts of the world, such projects have been done successfully and contributed to national development. It also revealed why such infrastructure projects in general have been poorly delivered. From the literature reviewed, it was clear that just like other social infrastructure, Toll roads are not free from risks at the development stage and if not mitigated, they pose threats to the success of the projects. With regards to data collection, the research adopted a mixed methods approach. In view of this, in view of this, key informant interviews were conducted and questionnaires were administered to practitioners with experience working on such projects. Descriptive statistics were employed to analyze data for the study.

The research findings revealed that, at development stage, Toll road projects are prone to a number of risks which include among others; environmental clearance, lack of feasibility study, land acquisition and contract variations. In addition the findings showed that the identified risks have a moderate chance of occurrence and effect on Toll road projects at development stage. This is shown through an overall mean effect score of 9.97 and a significance of 3.15. Furthermore, the research also verified that despite the establishment of key infrastructure development institutions, the regulatory framework in Zambia is still weak. The findings matched with the existing reality at the national, regional and global level and this gave the researcher confidence regarding the reliability of the findings. Recommendations were given, two of which included the need for key Toll road government agencies such as NRFA, RTSA, MOF and RDA to review their efforts towards management and control of Toll road projects. Ultimately, a Risk Management framework was developed and recommended by the researcher for adoption in Zambia for Toll road projects particularly at development stage.

**Key Words: Toll Roads, Risk Management, project development stage**

## **CHAPTER ONE**

### **INTRODUCTION AND BACKGROUND**

#### **1.1 INTRODUCTION**

Road tolling continues to be adopted as a revenue-generating method and traffic management tool world over. A toll road is a public or private road for which a fee is assessed for passage. It is a form of road pricing typically implemented to help recoup the cost of road construction and maintenance (Khan, 2009). The benefit of tolling high traffic road networks as a means of traffic management helps in restricting motorists from using the tolled route or riding low-occupancy vehicles. Because of this, motorists will be left with almost no other option but to use high occupancy transport modes such as buses or Taxi (public transport and pool cars). Yang and Qui (2005) recognized that Singapore's adoption and implementation of road tolling had helped in decreasing high traffic capacities from about 40 000 to 15 000 vehicles along-highways. In spite of the road tolling achievements in countries like Singapore, experience has continued to indicate that challenges regarding-traffic is as a result of complex relations among infrastructure, surrounding environment, and motor vehicles. Based on this, traffic management plans need to be diverse and not just rely on a single method such as road tolling, therefore there is need for a detailed problem analysis to come up a combination of measures to act as mitigation measures regarding traffic challenges (Mbara, 2010).

The growth of improved roads has hardly been an easy path for a number of countries (Silungwe, 2015). Fishbein and Babbar (1996) studied the experiences of about eight road toll projects in industrialized and emerging nations. The study looked at the funding of toll roads concerning public-private partnerships. The researchers concluded that the successful completion of toll projects is dependent on the resourceful allocation of duties between the key stakeholder's public and private sectors. Out of the targeted countries like Colombia, Chile, the United Kingdom, America, and Hungary scored high in terms of concession atmosphere. On the other hand, Mexico, Malaysia, and China were characterized by their projects (Ibid). Thereby, this research develops a functional risk management framework for which can be used to eradicate risks at various stages of project development. A well-made Risk Management Framework will be able to identify the risks, analyze the probability of occurrence and effects with relevant mitigation

measures. It is envisaged that the framework may be used by the relevant authorities during the project development stage of toll roads.

The practice of planning and managing projects follows a consistent, continuous cycle where each phase of the project leads to the next. This research is focused on the first three stages (feasibility, planning and procurement stages) of the cycle which are uniformly referred to as the development stage of the project. The feasibility analysis is used to establish the viability of an idea, such as ensuring a project is legally and technically feasible as well as economically justifiable, it tells us whether a project is worth the investment in some cases, a project may not be doable (Firmansyah, Veronika, & Trigunarsyah, 2006). There can be many reasons for this, including demanding too many resources, which not only averts those resources from performing other tasks but also may cost beyond what an organization would earn back by taking on a project that is not profitable. Largely, such studies are undertaken before technical development and project implementation. Juan (2006), states that a feasibility study might uncover risks that could preclude a project from outgrowing its scope or failing its intended purpose. Carrying out feasibility study is always valuable to the project as it gives project owners and other stakeholders a clear picture of the proposed project and makes it easy to identify and manage occurrences that would be potential harm to the project.

It should be noted that planning stage is at the heart of the project life cycle, and informs everyone involved the direction of the project and how to get there. The planning phase is when the project plans are documented, the project deliverables and requirements are defined, and the project schedule is created. It involves creating a set of plans to help guide through the implementation and closure phases of the project (Chileshe & Kikwasi 2014). The planning phase focuses on outside vendors, subcontracting and planning for possible risks, consideration of optional contingency plans and mitigation strategies. It is at this stage that a risk management and procurement plans are developed. The plans created during this phase seek to help with regards to time, cost, quality, changes, risk, and related project issues. In addition, it endeavors to help control staff and external suppliers to ensure delivering the project on time, within budget, and within schedule. This phase helps in documenting mitigation measures for the project risks

that may have been identified at the feasibility stage. This helps in significantly reducing the negative impact of risk on the project during and after implementation (Elhismawi, 2012).

After feasibility studies and consecutive planning of projects, there is need to purchase and put in place all the needed requirements for the project to kick off. The procurement process is the other phase of the development stage of projects. Mostly, procurements arrangements are first identified during the planning phase of the project. It can be argued that at development stage, this involves the creation of the official procurement management plan. The decisions made involve which items need to be internally procured and which items need to be externally outsourced. This information, in turn, heavily impacts the project's budget and financial scope. Sample procurement documents are prepared and criteria frameworks are developed to create a selection of potential vendors. This selection matrix is based on the project's scope, schedule, and requirements. Risk factors, project schedule and budgetary constraints are also considered (Zou & Zhang, 2009). The other key part of the procurement phase involves comparing and contrasting vendors' advantages, disadvantages, and contractual offerings. Standard tools and techniques are used to select procurements, such as video conferences with bidders that allow them to understand the project requirements and ask questions. Procurement contracts are decided and awarded through collaborations between managers. Resource calendars are then created that detail when, where and how resources will be used and managed. The corresponding project management plan is adjusted according to resource calendar updates and proposals are carefully evaluated and if no satisfactory bids are available, the project management team may have to solicit new bidders. This phase helps in mitigating potential procurement risks such as budget constraints, low quality supplies or unreliable vendors towards the implementation of the project (Fabozzi, Henry & Nahlik, 2012).

It can be maintained that the development stage constitutes a key stage of the project cycle as far as risk management is concerned. This is so because the risks are identified and analyzed early, mitigation measures are easily put in place to ensure significant reduction of their impact on the project life cycle. Risk management at the development stage presents an effective cost measure that helps to overcome project overruns, budget deficit and delays. In other words, effective risk

management at the development stage of a project guarantees successful completion and viability of the project (Kwan & Leung, 2011).

The managing risks in construction projects, mainly road projects, has been recognized as a very important management process to achieve the project objectives in terms of time, cost, quality, safety, and environmental sustainability (Frimpong et al. 2003). A risk is argued to be an uncertain event or condition that, if it occurs, affects at least one project objective (Wibowo, 2018). In comparison with other industries, the construction industry is prone to more risks as a result of its unique construction activity features which include delays, complex processes, environmental concerns, financial intensity, and dynamic organizational structures (Mudenda, 2017). The track record of the construction industry is very poor in terms of coping with risks; many projects fail to meet time schedules, targets of budget and sometimes even the scope of work. As a result, a lot of suffering is inflicted on the clients and contractors of such projects and also to the general public (Zou & Zhang, 2009).

As a consequence of the poor track record among construction projects failing to meet set timeframes and budgets, this research seeks to develop effective risk management in toll road projects at the development stage. This is to be done by way of identifying toll road risks, assessing their impact and developing a risk management framework for the successful operation of toll road projects. Just like other projects, toll road projects are among those that are faced with a lot of risks which if not handled or mitigated early can lead to the unsuccessful operation of a project. Meredith & Mantel (2006), maintain that in order to successfully implement a project, there is need for a thorough risk management approach through which possible project risks are identified and mitigation measures put in place. This seeks not only to ensure effective project implementation but also propel the overall success or project completion. The purpose of the risk management is to identify problems before they occur (Suseno, Wibowo, & Setiadji, 2015).

Risk management in projects is understood as an aspect part of risk management which aims at recognizing probable risks connected with a project and the response hereto. Also, it includes activities that intend to maximize the costs associated with positive events and to minimize the impact of negative events (Baker, 2005). It is believed generally that risk in an environment is

more of a choice than fate, and the inherent uncertainty in the plans can affect the desired outcome of achieving project and business goals. In all projects, the risk is present and it is only the amount which varies from one activity to another (Suseno et al., 2015) . It is must be noted that road projects, are by their nature dynamic, risk-oriented and new risks, unidentified in the early stages, often emerge over time. Therefore, the project manager has to regularly review the Risk Management Plan (RMP) and ultimately undertake necessary changes or additions (Karaulova, Kramarenko, & Shevtshenko, 2008).

Regarded as an indispensable management tool, risk management aims at identifying risk sources, determining their impact, and developing suitable controlling responses (Zou, Zhang & Wang, 2014).

Notably, a project that is poorly planned and estimated is difficult to implement as it is prone to more risks increasing the chances of failure (Kohlmeyer& Visser, 2004). Where a proper project plan is not in place, resources cannot be managed and organized, risks cannot be mitigated, dates and budgets cannot be forecasted, effective reporting cannot take place, and the measures of success will be flawed from the outset (Mkuni, 2016). Project planning is a discipline for stating how to complete a project within a certain timeframe, usually with defined stages, and with designated resources (Silungwe, 2015). Lack of adequate planning and proper project definition is more likely to cause many serious problems later along the path of implementation which among others include:

Lack of support- Whenever the major project characteristics and deliverables are not defined in advance, differences in expectations amongst stakeholders emerge. This is despite taking the initial direction from sponsor the reason being that as the project gets larger even the sponsor may lose hold of a complete picture of what needs to happen to have a successful project (Hendrickson, 2000). Sometimes the sponsor might have a vision but there could be other better visions from the stakeholders and these conflicting situations may cause confusion on a project resulting in some parties withdrawing their support. This is quite common with government projects where politicians develop visions and make pronouncements without engaging experts (Kishk et al., 2003).



The Lesotho government in 2006, for instance, propelled a project to build a national hospital (Queen Mamohato Memorial Hospital) to replace the old and outdated main public hospital. The consortium was responsible for designing, building and operating the hospital and clinics for 18 years (Eurodad, 2018). Oxfam and the Lesotho Consumer Protection Authority revealed that in 2013/2014, the annual cost of the new hospital was as much as 51 per cent of the total health budget and approximately 3 to 4.6 times what the old public hospital would have cost that year (Vian et. al. 2013). The IFC's own commissioned study revealed that the project had cost the government '41 per cent of its health budget and 2 to 3 times the cost of the old hospital. Clearly, cost escalation risk was not well taken care of. Eurodad (2018) reports that some causes of this was; changes in the output specifications, flawed indexation of annual fee paid by government to the consortium, poor forecasting and costly patient referrals to South Africa. These issues point to the fact that public interest was not at the centre of the decision-making prior to signing the public private partnership contract on the Queen Mamohato Memorial Hospital (Lindunda, 2019).

It must be noted that inclusive stakeholder involvement in the project life cycle, especially at development stage, is an important practice as it allows for effective participation and acceptance of the project (Suseno et al., 2015). In this regard, this research aims at highlighting the different project risks, their impact and how different key stakeholders can contribute significantly to the reduction or mitigation of such risks. This is to be achieved through the development of an effective risk management framework for Toll road projects.

Poor estimates – It is always good practice to have project budgets and deadlines stated before the commencement of works. Usually, if project definition and planning are not done in advance, the project kicks off with inadequate resources and this is mostly not realized until at advanced stages of implementation. Many failed projects are categorized as such based their overrun on budgets and time (Silungwe, 2015). Frimpong et al. (2003) studied factors that cause cost overruns in construction of ground water projects in Ghana. Frimpong explained that the contractors and consultants mentioned monthly payments difficulties as the most important cost overruns factor, while owners ranked poor contractor management as the most important factor. Frimpong added that despite some difference in viewpoints among the three groups surveyed,

there is a high degree of agreement among them with respect to their ranking of the factors. The three groups felt that the major factors that can cause excessive groundwater project cost overruns in developing countries are poor contractor management, monthly payment difficulties, material procurement, poor technical performances, and escalation of material prices (Frimpong et al. 2003).

It can be argued that Toll road projects are not an exception when it comes to being susceptible to budget overruns or poor estimates especially if not handled well at the planning stage. It is important that during the planning and procurement phase, practical solutions or approaches are established particularly with the active participation of the project funders (Larson and Gray, 2011). It is only when this happens that Toll road project are assured to be successful through the accompaniment of a well-defined contract, regular supply of required goods/materials and constant flow of funding.

Poor scope control – Any successful project ensures that the team sticks to the scope and operates within the terms of reference. If the scope of the project is defined at the planning stage of the project and communicated for agreement, then the project team should anticipate problems at the implementation stage which are likely to recipe failure (Kerzner, 2009). An example of poor scope control can be traced from the Sydney Opera House which is one of the best-known iconic buildings, recognized as a global symbol of Australia. The project could probably be seen as one of the most disastrous construction projects in history not only from the financial point of view but also for the whole management plan (Woolley, 2010). Firstly, at the beginning of any project goals and objectives have to be clearly defined by the client to provide a guideline for what the project must complete (Iqbal, 2015). There are three main factors to this effect that include; time, cost, and quality. In the case of the Sydney Opera House the quality was the only aspect considered important, as it was an almost unrestricted goal of the project and the reason why it was launched. However, no indications regarding time or cost limits were provided for the project completion and competition. Therefore, the architects had to enjoy total freedom in their designs which made the project to be officially inaugurated after 17 years of redesigns, underestimates and cost overruns. Larson and Gray (2011) determine several steps within the project definition stage; the first step comprises the definition of the project scope. In the Sydney

Opera House project, the project scope was not clearly defined. The original project objective was not to build an opera house in the first place, but a major concert hall with a dual function as an opera (Woolley, 2010).

Lartey's (2011) evaluation of donor-funded infrastructure projects in Zambia argues that there were serious problems with planning processes that led to projects not being completed on schedule or budget. Lartey stated that planning had not been very efficient and effective resulting in implementation bottlenecks. This shows that for some time now, Zambia has been struggling with issues of ineffective planning in infrastructure project developments. To this effect, several infrastructure developments such as roads have been characterized by budget overruns and delays due to inadequate resources which are mostly realized at an advanced stage of implementation (Becker & Reid 2005). This calls for urgent consideration of putting in place a well-founded risk management framework especially at the development stage of toll road infrastructure. A risk management framework is argued to be a structured process used to identify potential threats to a project and to define the strategy for eliminating or minimizing the impact of these risks, as well as the mechanisms to effectively monitor and evaluate this strategy (Hubbard, 2009). In view of this, this research strives to develop a sound risk management framework which can be used to ensure the success and viability of a project through established risk management mechanisms to counter potential risks. This is to be achieved through establishing technical inputs into the risk management framework for Zambia's development projects such as the Toll road projects.

Darvish et al. (2006) argue that it is difficult to get rid of all potential risks in a construction project. As a result of this, an appropriate allocation of risks through an effective risk management model among project actors is very important. The risk allocation strategy in construction projects is defined through the contractual arrangements involving a written agreement between a client and a contractor where the liabilities and responsibilities of each party are assigned. The objective of clients just like contractor is to choose the strategy that ensures the achievement of the project objectives in the most efficient way (Osipova, 2008). It can be argued that ultimately risk allocation influences the behavior of project actors and,

therefore, has a significant impact on project performance in terms of the total cost (Sandhyavitri, 2017).

It can be argued that stakeholder involvement at the development stage of a project is key in the management of risks (Berry 2004). The stakeholder prototype is based on the proposition that mostly people are not rational when thinking about risk but are influenced by cultural and social networks in which they are imbedded. In other words, people form their own subjective perceptions of risk which often differ from the objective assessments made by managers and experts; and their behavior reflects these perceptions (Zou & Zhang, 2009). From a risk management perspective the benefits of consulting with project stakeholders is that they have a better understanding of their risk and a greater collective responsibility in managing risks. Therefore, engaging various project stakeholders at the early stage of a road project for example brings about effective planning and capturing of possible risks that might affect the later stages of project implementation. The problem definition occurs at the state, regional or local levels depending on the scale of the proposed improvement. Whatever problems are identified, all parties must affirm the existence of the problem and agree to either fix them or maintain the status quo. Sometimes road access can be a problem but the community may go against the idea of increasing access for reasons such as increased accidents. During problem definition, key decisions are made that will affect and limit the design options in subsequent phases (El-Amm, 2003).

The construction (Kerzner, 2009) as reported by RDA, road construction projects in 2015 had suffered cost and schedule overrun due to inadequate project preparation at the planning stage. The report revealed that for the period 2011 to 2015 the road sector had incurred overrun costs above K 1.9 billion representing 9% of the total project value administered in this period. It was identified that the road sector implemented works based on government directives with pressure thereby resulting in tendering and procuring works without proper planning, scope definition, cost estimates, and designs. Most of the projects were initiated expeditiously outside the road sector work plan (Mkuni, 2016). In view of this ineffective procurement planning practice, this research seeks to establish a sound basis on which to value risk management at the development stage in Zambia's public development projects. This is to be done by way of identifying potential

risks at the procurement, feasibility and planning stages; and their effect on the overall toll road project. It is worth noting that effective risk mitigation measures can only be established once all possible risks are identified and analyzed at the development stage of the project.

## **1.2 BACKGROUND OF THE STUDY**

Road transport structure asset is anticipated to increase at a regular annual rate of about 5% across the globe over the period ranging from 2014 to 2025. In nations such as Mexico and Indonesia, many sections for the current toll road program were considered in seclusion and not resultant from a long-term strategic interregional network development plan, and accordingly, they were not well coordinated with plans for capacity expansion of non-toll highways. It can be argued that a strategic planning outline combining network analysis is central to augment benefits and minimize costs of toll road improvement. Key elements of such design ought to include; refining the strategic road network and the most suitable configurations of the key links; firming up the appropriate timing of construction of individual links based on corridor studies, and establishing clear economic and financial viability” (United Nations, 2013).

With rapidly increasing urbanization, Africa is also developing a substantial network of intra-urban roads. However, urban road density lags far behind what is in other developing cities, particularly to paved roads. It can be argued that viewed against the population and income of Sub-Saharan African countries and hence its ability to pay for maintenance, road density begins to look rather high. In several countries, for example, Malawi and Mozambique, the asset value of the road network exceeds 30 percent of gross domestic product (GDP), an indication of the magnitude of the maintenance problem. Overall, road conditions already lag behind those found in other developing regions, although the network of main trunk roads has been maintained in reasonably good condition (Byakika, 2012).

Worth noting is that sub-Saharan Africa is the front runner of the pack with the fastest average annual growth rate of over 11% (Aigbavboa, Thwala & Mukuka, 2014). However, with regards to international ratings, toll roads have been subject to moderately low evasion rates, however, some toll projects have been subject to times of distress, basically owing to poor projecting of preliminary traffic and income performance. In more established and developed economies,

improper forecasts and project externalities caused downgrades, debt reorganization, workouts, and payment defaults. In developing economies especially in sub-Saharan Africa, the added risk of economic cyclicalities has similarly caused downgrades and defaults (Byakika, 2012). In countries without a history of toll roads, affordability and the willingness to pay have affected project viability (Sandhyavitri, 2017). Therefore, this research aims at coming up with a risk management model which Zambia can adopt in managing public projects risks and increase project viability. This will be achieved through sound analysis of the impact of potential risks on the project coupled with the identification of the required technical inputs for an effective risk management model.

The author notes that developing countries like Zambia have been characterized by ineffective strategic planning frameworks with regards to developing self-financing public infrastructures such as toll roads. Sato et al. (2005) argued that the presence of such weak strategic frameworks has the potential to create an environment where risks are not well managed thereby affecting the effectiveness of the toll road system. It should be noted that a well-established toll road strategic planning framework outlines solidifying the suitable timing of construction and establishing clear economic and financial feasibility (Meredith & Mantel, 2006).

A number of African governments pay their contractors late; therefore, the project management approach adopted in the continent requires pre-financing. The study notes that bidders deliberately quote low prices with a prepared strategy of how escalations will be employed which results in claims and disputes. The RDA has a vendor rating system that is aimed at tracking contractor and consultant performance in being awarded contracts but as to whether it works efficiently it is not known (Byakika, 2012). RDA has a complete Annual Work Plan (AWP) along with the Budget at every beginning of the year. Nevertheless, a study by Raballand et al. (2013) revealed a growing trend in the procurement of unplanned projects in the RDA. The research concluded that once a project procurement work plan is drafted, it should not be easy to make any adjustments unless approved by the relevant authority. This would deter external influence on the procurement as well as the implementation of public projects. It is upon the procuring entity to ensure that before and after tendering the documents have all the necessary clauses and details that will enable the success of the project. Aigbavboa, Thwala & Mukuka

(2014) observed insufficient preparation of documents and designs as part of the causes for construction project delays in Lusaka.

This author indicates that having a sound procurement plan is key to ensuring that existing resources are effectively channeled towards acquisition of the needed project materials with the right quality to sustain the project. Mukumbwa (2008) maintains that sound public procurement practices also helps to ensure that the rightful bidders or vendors are selected to supply cost effective and quality materials for the success of the project. That is why part of this research’s aim is to give an analysis of risks associated with the procurement phase of the project development stage. In doing so, it will help in understanding and providing the procurement technical inputs for the development of a risk management model which Zambia can use in implementing public projects of this nature.

To ensure sustainable financing in the road sector, the Government embarked on the National Road Tolling program. Under this program, the Government constructed toll sites across the country to boost the revenue generation capacity of the road sector. The Government commenced the construction of four toll gates at Shimabala costing K220 million and also another three new toll gates were proposed. Revenues from the tolling program in 2017 stood at K667, million from toll fees, recording a 98 percent achievement against a projected annual budget of K682 Million. The Permanent Secretary says this figure presents a 44 percent increase from the K464.779 Million toll fees collected in 2016 (PWC, 2018). The following constitutes of a tentative five year summary of toll collections under the National tolling program:

**Table 1. Five (5) year Toll collection Summary**

<b>Period</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	
<b>Collection Point</b>	<b>ZMK ,000</b>	<b>ZMK ,000</b>	<b>ZMK ,000</b>	<b>ZMK ,000</b>	<b>ZMK ,000</b>	<b>Total</b>
Inland tolling	3,967	43,277	44,691	67,571	236, 319	<b>91,935</b>

Port of entry collections	40,464	253,577	383,474	397,208	431, 338	<b>677,495</b>
<b>Total</b>	<b>44,`431</b>	<b>296,834</b>	<b>428,165</b>	<b>464,779</b>	<b>667,657</b>	<b>1901,866</b>

**Source: NRFA 2017**

Table 1. Indicates a summary of the toll collections over Five years from 2013 to 2017. The point of the collection together with a total collection in the summary include inland tolling (K91, 935 million) and port of entry (K677 million). The total revenue collected from all collection points in five years as of 2017 amounted to K1901 million.

The existence of a proper legal and governing framework according to United Nations Commission on International Trade Law (2001) is a requirement to establishing a sustainable environment that will foster private investment in infrastructure and preservation (Mudi 2016). The lawful issues inherent in Private-Public Partnership (PPP) transaction in road infrastructure development revolve around two basic concepts which include;

- i. the special purpose vehicle or the project company and its economic and legal obligations,
- ii. The network of the procurement agreement which regulates the relationship between the different stakeholders in the PPP concession for road development. In a related development.

BPD (2009) acknowledged that public-private partnership legal adjusting framework is aimed at scheming, implementing and monitoring these transactions in infrastructure development by providing legitimate backing and addressing the philosophies which oversee the selection of concessionaires in any PPP concession for road infrastructure development (Mudi, 2016).

Notably, toll road projects are not excluded from environmental impact assessments as transport projects are expected to meet environmental standards. For example, leaks of oil are a common matter in all areas with obstructions that stop the traffic flow because the continued buildup of oil



overflow affects the bio-systems in the locations of the toll gates. It can also be maintained that air effluence from idling traffic at the toll gates is another environmental threat. This disturbs mostly the officials manning the toll stations and nearby publics. Over time pollution may negatively impact land values and aesthetics of the areas near toll gates. Therefore, when appraised against the measures above, the tolling system does not fare well with regards to environmental terms (Mbara, 2010).

This author observes that for a country like Zambia to positively continue pursuing economic growth, there is a need to have a very good road network to facilitate the exchange of goods and services. However, a good road network requires constant or regular road maintenance and this calls for increased funding as the country continues to expand the road network. In this quest, an effective toll road system supplements the much-needed financial resources to develop and maintain a good road network. This valuable developmental role of toll roads can only be realized effectively once proper risk management techniques are considered at the development stage. As a result, this research aims at establishing effective risk management techniques through risk identification and impact analysis at development stage in toll road project (s). In addition, the research seeks to develop a risk management model which will effectively guide in the management of risks at the feasibility, planning and procurement phase of the project development stage.

### **1.3 STATEMENT OF THE PROBLEM**

Gilliam (2008) argued that South Africa has a successful toll road system whose project design risks were managed through Tolplan engineering consultancy. The Attica Toll project in Athens is also quite successful project characterised by effective land expropriations and relocation of public utilities (Liyanage, 2015). Costa et al. (2014) indicates that Portugal's A-23 toll project has also been a successful story as it was characterised by an inclusive approved design, financing and construction requirements. Unsuccessful toll project can be traced from delays and suspension of Nigeria's Lekki Toll Road Concession Project (Nigeria, 2012). Lyons, T. & Skitmore (2004) argued that the success of a project is highly dependent on the existence of an effective risk management plan at the development stage. Identifying risks and engaging key

stakeholders at the project development stage enhances the project's risk management system (Del Cano, & De La Cruz, 2002).

Despite the effective legal framework, existence of Zambia Public Procurement (ZPPA) guidelines and World Bank procurement strategy, there are still some loopholes in the way Toll roads are developed in Zambia, particularly at development stage (Ngoma, 2009). Government has continued to single source AVIC international despite the company's high cost projections on similar projects (Transparency International Zambia, 2019). This clearly indicates a potential project risk management gap created by the not having an effective risk management framework in place.

An effective risk management framework ensures that all possible risks are identified and mitigated throughout the project life cycle (Kähkönen, 2001). Therefore, this research intends to develop a functional risk management framework for which can be used to reduce risks at various stages of project development.

## **1.4 RESEARCH OBJECTIVES**

### **1.4.1 Main objective**

The main objective is to develop a risk management framework for Toll roads at Project Development stage

### **1.4.2 Specific objectives**

1. To identify the risks associated with Toll road projects at the development stage
2. To establish the probability and effects of risk in toll road projects at the development stage
3. To develop technical inputs into the risk management framework for Toll road projects at the development stage

### **1.4.3. Research questions**

1. What type of risks are associated with Toll road projects at the development stage
2. What is the probability and impact of risk in Toll road projects at the development stage

3. What technical inputs are required in establishing an effective risk management framework for toll road projects at the development stage?

### **1.5 SCOPE OF THE STUDY**

This research is limited to Toll roads construction, rehabilitation, and maintenance projects being executed in Lusaka. The research focuses on the project feasibility, planning and procurement stage for Toll roads from the implementing agencies' point of view. The research covers; Motorists, the Road Development Agency, the National Road Fund Agency, the Road Transport, and Safety Agency and the Ministry of Finance. These are the key players in the Zambian road network development and maintenance.

### **1.6 SIGNIFICANCE OF THE STUDY**

The research findings are intended to be of great benefit to the following audiences;

**Government.** The research findings intended to assist government and relevant agencies like RTSA, NRFA, and Ministry of Finance, to understand/appreciate the indispensable role of risk management at the development stage of toll road project (s) and be able to make informed decisions in managing public resources. In addition, the government through its relevant agencies is going to be able to value and prioritize effective risk management is not only toll road systems but also other public infrastructure projects.

**General Public.** The research results are going to help expand public understanding of the value effective risk management in the toll road system. They are going to be able to appreciate the developmental value of an effective toll road system in road network development.

### **1.7 DISSERTATION OUTLINE**

The dissertation comprises of seven (7) and is organized as follows;

**Chapters one** provides introduction, background to the study. In addition, the statement of the problem, research objectives, research questions, scope as well as significance of the study is given.

**Chapter two** reviews the literature on risk management in Toll road projects at the development stage, giving various experiences in Africa and other continents before narrowing down to Zambia. This includes literature from international, regional and local publications.

**Chapter three** gives the theoretical and Conceptual framework supporting the research.

**Chapter four** provides the research methodology (Research philosophy, approach, and procedure and data analysis) to be used and justification.

**Chapter five** comprises of data findings and presentation. This is where the data collected through the questionnaire is going to be analyzed and tested against the research questions.

**Chapter six** presents an analysis of the research findings with more insights on the research topic.

**Chapter seven** gives the conclusions, limitations and recommendations of the study.

## **1.8 CONCLUSION**

This chapter looked at the general introduction and background of the research topic. It gives a sense of direction to the research with regards to the established research problem through the objectives, scope, and significance. The chapter further gives an outline flow of the entire thesis.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.0 INTRODUCTION**

This Chapter focuses on the review of existing works by other researchers (globally & locally) in relation to risk management in toll road projects. The emphasis of the review is on risk management at the development stage (feasibility, planning & procurement phase) in toll road project (s). In addition, the Chapter highlights the fundamentals of a risk management framework and its effect on the success of a project. Furthermore, a knowledge gap in the literature reviewed will be highlighted, followed by a conclusion of the Chapter.

#### **2.1 OVERVIEW OF LITERATURE**

Globally, road tolling has become a common development trend or practice, often aimed at generating funds for road maintenance and also repayment of toll revenue bonds used to finance constructions and/or operation (Mbara, 2010). It is worth noting that there has been a growing realization among governments that road development cannot be brought about only through budgetary support or private investment support. The consensus being that a combination of different sources of funding would be the best way forward for the road development (Kwan & Leung, 2011).

In recent times, it has been observed that many developed countries which once depended on tax financing have also turned to toll system due to erosion of the purchasing power of government taxes resulting from inflation (Juan 2006). Over the years the demand for high-standard highways in China, Indonesia, Malaysia, Philippines, and Thailand for example, has increased substantially-a reflection of rapid economic growth and increasing levels of vehicle ownership and use. Because of the limited resources available to the public sector for financing infrastructure development, many countries have turned to tolling as a promising method for funding highway development. For example, each of the five countries above has adopted private sector concessions as their dominant mode for designing, building, financing, and operating toll roads (Kwan & Leung, 2011).

A number of countries across Africa including Tanzania and Zambia are embracing the road tolling system. The Zambian government through the Toll Act appointed the Road Development Agency (RDA) as the Tolls Authority. The principal objective of RDA was to introduce the road user-pay principle as an innovative and self-financing mechanism for sustainable road rehabilitation and maintenance. It can be argued that as in 2015 Zambia had 26 Toll roads in number with Lusaka having Shimabala Toll, Chongwe Toll and Katuba Toll (RDA, 2019). However, South Africa is considered a leader in the road tolls strategy with the launch of the Gauteng Freeway Improvement Project (GFIP) by the South African National Roads Agency (SANRAL), a state-run firm mandated to manage, maintain and develop the country's national road network (Nieuwoudt 2009). Nigeria also charges levies on some highways and there are plans to toll federal roads in Lagos and Ogun state as part of efforts to ensure successful implementation of the road management policy in the country (Ola 2015).

The author notes from the above toll road development trends that toll projects are becoming a key driver of economic development for both developed and developing countries. This is so in that a number of countries with successful toll systems have been able to raise enough revenue to develop and maintain the road network for easy transportation of goods and services. Therefore, it is important to note that effective risk management at development stage is key in ensuring the viability of toll projects. If risks are not well handled or mitigated at the early stages, it surely will compromise the financial and economic viability of the toll projects.

The impacts of toll roads are, in many instances, similar to other highway facilities. However, the impacts of toll roads are differentiated by ongoing toll facility operations, more limited access points in most toll facility designs, and the pace of facility development. The nature and magnitude of any impacts are also affected by the location of the toll facility in urban, suburban, or rural settings. DeCorla-Souza and Kane (1992) discussed the economic reason for road pricing and impacts of peak period tolls on congestion, air quality, and economic development". Many urban areas face the problem of highway congestion that represents an obstacle to economic development. Although commercial traffic and business travelers will bear an extra production cost by paying for tolls, businesses will experience production efficiency and competitiveness through shorter travel time.

Parasibu (2005) also discussed the impact of toll roads on regional development in the case study of Jabotabek, the largest urban area in Indonesia. The study emphasized the importance of private capital in developing toll roads in Jabotabek. Since government fiscal capacity is limited, private capital increased the opportunity for the area to invest in road development. The author found that the development of industry, creation and expansion of residential areas, and environmental improvements were especially noticeable in toll road areas. Significant improvements in the transportation system led to increased land values. Further, the toll road system has increased private investment and stimulated socio-economic and regional development.

The author indicates that a number of highway infrastructure traditionally has been funded through general government budgets and dedicated taxes and fees rather than tolls. In most industrial countries 90 percent or more of highway kilometers are publicly funded; in developing countries governments often bear the entire cost. However, the limited resources available through traditional government funding sources has led to increasing interest in private toll roads as an alternative way of meeting highway needs. Szymański (2017) argued that several additional factors have contributed to the renewed interest in private tolling, including a worldwide trend toward commercialization and privatization of state-owned enterprises; the success of public toll roads in raising capital; and advances in tolling technology, making tolling more efficient and convenient.

Zou, Wang & Fang (2008) maintained that in most countries toll roads, toll bridges and toll tunnels are often used primarily for revenue generation to pay repay for long term debt issued to finance the toll facility, or to finance capacity expansion, operation and maintenance of the facility itself, or simply as general tax funds . Valerie (2016) observed that the public and private sectors play complementary roles in improving the infrastructure network. Therefore, it is critical to strengthen public investment management processes as well as the regulatory framework, including to ensure an appropriate mix of financing and funding for projects and to address environmental concerns (Szymański 2017). Toll Road Projects have specific economic objectives like expansion of roadway network, increasing mobility, quality of service and other socio-economic development in the region etc. as well as reducing traffic congestion and rate of

accidents (Khali, 2005). In other words, from a Toll Road, travelers derive a whole lot of benefits in terms of savings of time and cost than that of with the use of non-toll road. These benefits are measured in terms of the decrease in road user costs and the increase in road user services. Road user services are nothing but the advantages accruing to the passengers through features such as, safety, comfort, and convenience (Szymański, 2017).

### **2.1.1 Risk Management in construction projects**

Construction projects can be extremely complex and fraught with uncertainty (Mills 2001). Risk and uncertainty can potentially have damaging consequences for the construction projects (Grimsey 2002). Therefore nowadays, the risk analysis and management continue to be a major feature of the project management of construction projects in an attempt to deal effectively with uncertainty and unexpected events and to achieve project success (Kaliba 2010).

Risk management in the construction project management context is the extensive and well-organized way of planning, identifying, analyzing, and reacting to risks that may positively or negatively affect project success (Adams 2008). The purpose of risk management is to recognize uncertain situations that might jeopardize the success of construction projects and to develop strategies to decrease the probability of their occurrence. Understanding the risk inherent in each of the phases of a construction project is important to improve project performance. Risk management is most effective when first implemented at the early phase of the lifecycle of a project and then extended to the remaining phases of the project's life cycle (Choudhry et al., 2014).

Managing risks in construction projects has been recognized as a very important process in order to achieve project objectives in terms of time, cost, quality, safety and environmental sustainability. Project risk management is an iterative process: the process is beneficial when is implemented in a systematic manner throughout the lifecycle of a construction project, from the planning stage to completion. A systematic approach to risk management in construction industry consists of three main stages: a) risk identification; b) risk analysis and evaluation; and c) risk response (Mills 2001). The risk management process begins with the initial identification of the relevant and potential risks associated with the construction project. It is of considerable



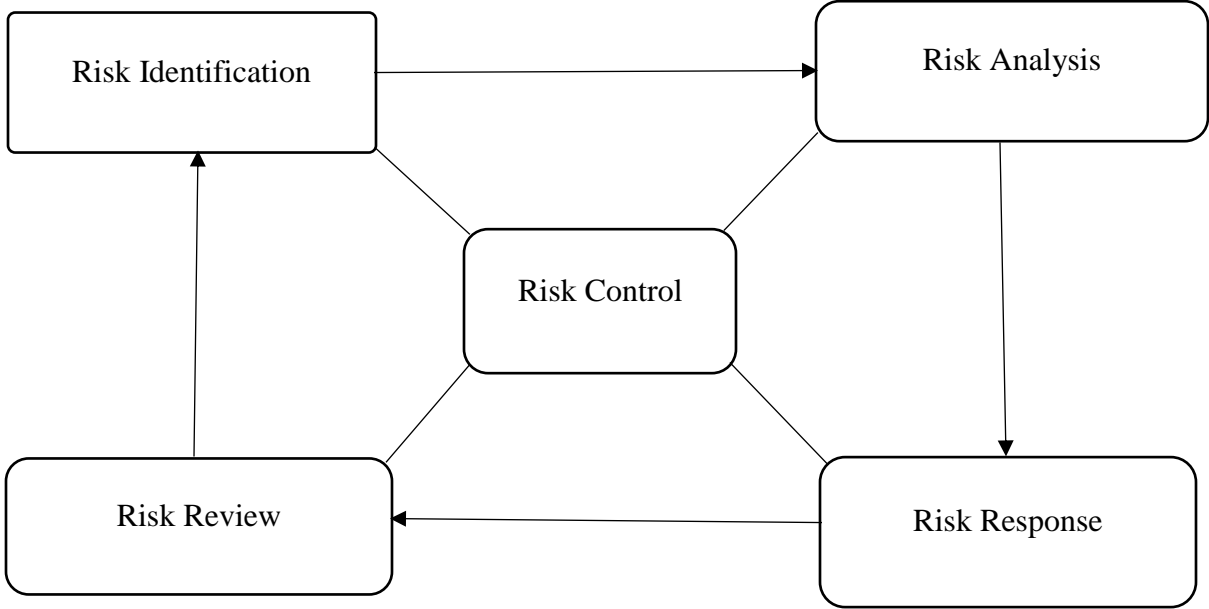
importance since the process of risk analysis and response management may only be performed on identified potential risks (Wang, Dulaimi & Aguria 2004). Risk analysis and evaluation is the intermediate process between risk identification and management. It incorporates uncertainty in a quantitative and qualitative manner to evaluate the potential impact of risk. The evaluation should generally concentrate on risks with high probabilities, high financial consequences or combinations thereof which yield a substantial financial impact.

Once the risks of a project have been identified and analysed, an appropriate method of treating risk must be adopted (Lester 2007). Within a framework of risk management, contractors should decide how to handle or treat each risk and formulate suitable risk treatment strategies or mitigation measures. These mitigation measures are generally based on the nature and potential consequences of the risk (Mills 2001). The main objective is to remove as much as possible the potential impact and to increase the level of control of risk. The more control of one mitigation measure on one risk the more effective the measure is. The process of risk management does not aim to remove completely all risks from a project. Its objective is to develop an organized framework to assist decision makers to manage the risks, especially the critical ones, effectively and efficiently (Wang, Dulaimi & Aguria, 2004).

Management of risk is one of the fundamental issues in ensuring success in urban infrastructure projects, including PPPs. The risk management processes are presented using diverse approaches from various scholars. Irimia-Diéguez et al. (2014) proposed a six-step process namely planning, risk identification, qualitative risk analysis, quantitative risk analysis, risk response planning, and risk monitoring and control. Esty (2004) proposed a four stage process which begins with the broad categorization of risks under which specific risks are identified. The second stage assesses the risks in view of their likelihood of occurrence and the likely impact they would have on the project. This process is then followed by the risk mitigation process. The fourth step is the allocation of risk to party that is best able to control the risks and that can bear them at the least cost.

Risk management process (RMP) is the basic principle of understanding and managing risks in a project. It consists of the main phases: identification, assessment and analysis, and response (Smith et al. 2006) as shown in the Figure below. All steps in RMP should be included when

dealing with risks, in order to efficiently implement the process in the project. There are many variations of RMP available in literature, but most commonly described frameworks consist of those mentioned steps. In some models there is one more step added, and the majority of sources identify it as risk monitoring or review. Esty (2004) argue that the use of risk management from the early stages of a project, where major decisions such as choice of alignment and selection of construction methods can be influenced, is essential. The benefits of the risk management process include identifying and analyzing risks, and improvement of construction project management processes and effective use of resources.



**Figure 2.0 Source: Smith et al (2006).**

**Risk identification** is the process of determining risks that could potentially prevent the program, enterprise, or investment from achieving its objectives. It includes documenting and communicating the concern.

**Risk analysis** involves the process of identifying and analyzing potential issues that could negatively impact key business initiatives or critical projects in order to help organizations avoid or mitigate those risks.

**Risk response** is the process of developing strategic options, and determining actions, to enhance opportunities and reduce threats to the project's objectives. A project team member is assigned to take responsibility for each risk response.

The objective of a **Risk Review** is to reevaluate the risk environment, the risk events, and their relative probability and impact. Risk Reviews are conducted at regular intervals, when change is planned, and when change occurs. Risk Audit frequently focuses on the success or failure of the risk response strategies (Smith 2006).

**Risk control** is a part of the risk management process in which methods for neutralizing or reduction of identified risks are implemented. Controlled risks remain potential threats, but the probability of an associated incident or the consequences thereof have been significantly reduced (Ibid).

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

The level of risk is always related to the project complexity (Darnall and Preston, 2010). The fact that there are so many risks which can be identified in the construction industry, can be explained by the projects' size and their complexity Cleden (2009) claims that complexity is a factor that can limit a project; the bigger and more complex a project is, the more resources are required to complete it. Moreover, when all potential risks have been identified, the project team must remember that there might be more threats. Therefore, the project team should not solely

focus on management of those identified risks but also be alert for any new potential risks which might arise. RM should be used as a tool to discover the majority of risks and a project manager should be also prepared for managing uncertainties not included in a RM plan (Cleden, 2009).

## **2.2 Risks in Toll road projects at the development stage**

Project risks can be divided into three categories, according to the different stages in the project lifecycle: development risks, construction risks and operation risks (El-Amm, 2003). Development risks are encountered by the concessionaire after the award of the concession contract and before the initiation of construction. At this stage, most of the risks are assumed by the sponsors who provide venture capital as seed money to launch the project. Woodridge (2002) argued that the three major risk factors in toll road experience facing concessionaires are the difficulties in the acquisition of the right-of-way and the environmental clearance. Successful project management requires the identification of the factors impacting project scope definition, cost, schedule, contracting strategy and work execution plan (Karaulova, Kramarenko, & Shevtshenko, 2008). Risks can run across the life cycle of a project or they can appear at various times throughout the project. Therefore, identifying and mitigating project risks constitutes crucial steps in managing toll road projects effectively (Elhismawi, 2012).

Santoso et al. (2003) concluded that risk can be identified based on the frequency of occurrence and level of impact based on research work on assessment of risk in high rise building construction in Jakarta. Indonesia like Nigeria is a developing country with Oil and Gas as the major exports. Santoso et al. (2003) identified 130 risk events which were further classified into sub-categories and grouped under low, medium and high risk. The Santoso et al. (2003), study classified risk events associated with high risk projects and that were important to the contractors. Thuyet et al., (2007) identified risk factors affecting the oil and gas construction projects in Vietnam and found bureaucratic government system, poor design, incompetence of project team, and inadequate tendering practices as the major risks. Thuyet et al., (2007) also found 'design changes' as one of the top ten risks affecting the oil and gas industry in Vietnam. Among the root causes of design changes identified by Thuyet et al., (2007) were poor design, changing scopes of work, changing specifications or not predicting underground conditions. Wang et al., (2004) categorized the risk event of unanticipated design changes and errors in

design / drawings under the project level within their proposed three hierarchical risk management framework for construction projects.

The author notes that the works of Woodridge (2002) did not clearly consider risks with regards to the different phases under the development stage which include; feasibility, planning and procurement. In addition, El-Amm (2003) only looked at the general project risks in a project life cycle. On the other hand, Santoso (2003) focused on general risks in building construction and Thuyet et al (2007) only focused on risks in the oil and gas projects without clearly stating the different stages of a project. The author indicates that categorizing project risks through individual phases particularly feasibility, planning and procurement phase is quiet an important aspect towards effective risk management. This is so in that once risks are identified at an early stage, it creates a conducive environment through which effective mitigation measures are established to counter the risks as the project develops.

Sandhyavitri (2017) acknowledged that there exist a number of publications related to risk management (RM) of toll road development projects around the world, including Palestine Argentina, Indonesia, Saudi Arabia, and Canada. These studies identified significant risks affecting delays of the road construction projects in West Bank Palestine, and the importance of strong government supports in the development of toll road in Argentina, tariffs collection, investment policy, and optimization of risk allocation between road users and the project concessionaire. Sandhyavitri (2017) maintained that during the pre-construction phase the development of toll project in Indonesia has identified five main risks affecting project success and they included; project permissions, feasibility study, detailed design, land acquisition and investment. Atul (2013) defined and described toll operations in Indian scenario and narrated various factors affecting tolling operations particularly toll revenue in the country. The factors include willingness to pay toll, toll leakage, local support, parallel routes, plaza design and location, technology and incidents management. However the strategies are mechanisms are not mentioned to overcome these issues that are impediments in tolling operations.

Khans' (2013) road construction research study conducted in Saudi Arabia identified a number of main factors causing cost overrun. Among these risks was the environmental risk which included negative environmental impacts and lack of vegetation cover. Khan (2013) maintained

that due to large volumes of development that are introduced in large scale development projects, it is always expected that the project will have a negative impact on its environment. Therefore, in order to overcome this risk, an environmental impact assessment study needs to be conducted in order to identify the negative impacts of the project along with necessary measures that need to be adopted (Ibid). Lack of vegetation cover is a burden for pollution reduction and landscape design. The absence of plantation does not allow for reducing the second dioxide of carbon and transforming it into oxygen. Furthermore, this represents a burden in front of landscape design as natural elements that are present within the site constitute the bases of such design. In order to overcome this risk, plantation that is convenient to the site climate can be investigated in order to boost the current natural environment, allow for better reduction of pollution and provide a better base for landscape design (Sandhyavitri 2015).

Serpella et al. (2014) argued that risk management in construction projects is full of deficiencies that affect its effectiveness as a project management function and in the end, projects' performance. The absence of an effective project risk management function has several negative consequences for participants in a project due to lack of preventive action against the risks and uncertainty that any project presents (Wolbers, 2011). For example, the lack of prevention against the risk of scope definition of a project, or environmental hazards or communication risks, between others, leads to delays, significant increases in costs and contractual disputes, among others. Preliminary recent research results in Chile have shown that companies that hire construction services on a recurring basis do not systematically apply risk management practices in projects, which has resulted in negative consequences for the performance of projects (Howard and Serpell, 2012). Additionally, a research work by Palma (2007) on claims and contract disputes in a number of construction projects, had reflected the occurrence of a number of risks that were not well analyzed or integrated by either parties, customers or contractors, and that were one of the main causes of some of those claims and disputes (Serpella et al. 2014).

Zaghoul and Hertman (2003) described risk in construction projects as significant element by the total project cost and thus their allocation has a major effect on project budget. Baloi and Price (2003) described construction project as an open system rather than a closed system, which add to variability and riskiness of the project. Klemetti (2006) stated that risk management in the

construction industry still rely heavily on contract and the industry has the bad reputation of involvement in numerous dispute and claims. Floricel and Miller (2001) stated that various studies have shown that contractual structures are the main sources of the lack of flexibility and they have a significant negative effect on actors' relationship. Risk management should be implemented; contracting risks to other parties does not mean they are managed since nothing is done to deal with these risks; rather there will be increase in the cost of contract. Cost overruns and late completion times in large infrastructure projects have been widely recognized as risks impacting project performance (Flyvbjerg et al. 2002). Controlling project budgets over project construction life cycle for mega infrastructure projects is a major challenge for both the public and the private sectors. Klemetti (2006) however asserted that the biggest barrier in construction project risks management are a drive for cost effectiveness; risk management is seen only to consume resources and benefit are difficult to measure in financial terms. Lack of risk management resources and know how restricts the use of risk management techniques.

The author notes that the reviewed literature on risks in toll road projects took a general approach of identifying risks in the entire project life cycle. Understanding risks in the early stages of a project will help project managers to reduce its impacts and complete the project in an improved and more efficient manner. This can be achieved through a well-structured Risk Management process or system. The process of Risk Management comprises of identification, analysis and application of methods to reduce the identified risk. Along with identification and analysis, it is also necessary to allocate the risk properly to the respective contracting parties such as owners, consultants and contractors, so that risk handling decisions can be taken properly with authorization and without any disputes.

**Table 2.0 Summary of risks identified from the presented case studies.**

No.	Author	Case study	Risks Identified
1.	Woodridge (2002)	Valuing Flexibility in Private Toll Road Development: Analysis of the Dulles Greenway	Environmental clearance
			Project permission
2.	Sandhyavitri (2017)	Managing Construction Risks of the Toll Road Project in Indonesia	Lack of feasibility study
			Land acquisition
			Investment
			Inadequate design details
	Thuyet et al. (2007)	Risk factors affecting the oil and gas construction projects in Vietnam	Poor design
			Inadequate tendering
			Incompetent project team
4.	Khan (2013)	Risk management in road construction in Saudi Arabia	Environmental



5	Atul (2013)	Factors affecting tolling operations in India	Plaza design
			Local support
			Toll leakages

Risk identification is the first and perhaps the most important step in the risk management process, as it attempts to identify the source and type of risks. It includes the recognition of potential risk event conditions in the construction project and the clarification of risk responsibilities (Ngoma 2009). Risk identification develops the basis for the next steps: analysis and control of risk management. Corrects risk identification ensures risk management effectiveness. Meredith & Mantel (2006) stated that the identification and mitigation of project risks are crucial steps in managing successful projects.

### **2.3 Effects of risk in toll road projects at the development stage**

Risk Management (RM) has continued to be applied in a number of projects including petroleum industry, infrastructure, and toll road. Risks and uncertainties cause project time delay, cost overrun, and poor quality results (Grimsey 2002). The concept of risk management is maintained to be a systematic method for identification, analyzing and mitigating potential project risks in achieving the project objectives and targets in terms of time, money, and quality (Mudenda 2017). Risk management is generally conducted in three major steps: identification of risk, risk assessment, and risk mitigation/control (Kaliba 2010). Grimsey (2002) asserts that poor risk management as a whole is one of the major aspects causing projects to collapse, and this has become an obstacle to each and every project that is being developed nowadays. In addition, ignoring chances of risks in a project can bring about a lot of costs to the project sponsor hence spoiling the relationship between an organization and the client/customer to which the project is being developed for.

A good example of this risk effect on a project can be traced from delays and suspension of Nigeria's Lekki Toll Road Concession Project. The Toll project was scheduled to commence in 2006 but was delayed for about two and half years. The delay was attributed to a number of risky practices that were not properly handled which included that at the outset of the project, there was a lack of any real procurement and regulatory regime for concession projects at the State level. In addition, during its development phase, the project was faced with the uncertainty of the first transition of power between civilian administrations in Nigeria. At the same time, there was a change in the government of Lagos State with a new Executive Governor being elected (Nigeria, 2012).

Pourrostan and Ismail (2012) studied the effects of delay in Iranian construction projects and identified five effects of delay to include, time overrun, cost overrun, and disputes between key project stakeholders, litigation, and abandonment of projects. They, however, argued that time and cost overruns were the most important of these effects. Yang, Chu, and Huang (2013) identified arbitration, in addition to time and cost overruns as important consequences of delays in construction projects. Fallahnejad (2013) argued that while abandonment is an important result of delays, abandonment is a less important consequence in developed and emerging economies than in developing economies where funding is a critical issue. Abandonment important in developing countries, especially those in Africa, because, firm are less able to cope effectively with project interruptions (Fallahnejad, 2013) For instance, apart from having a poor reputation for dealing with delays, project managers leading construction projects in Nigeria are known to have little or no delay analysis strategy. Shebob, Dawood, and Shah (2012) noted that it is common practice for Nigerian project managers to ignore project delay analysis, or perform delay analysis by simply adding a contingency.

Kamanga & Steyr (2013) conducted a study to identify the causes of delay in completing road construction projects in Malawi. A literature review was done which yielded typical causes of project delay in Malawi. The results were analysed using the Relative Importance Index (RII) and Spearman's Rank Correlation Coefficients, which indicated that the top ten causes of delay in Malawi are: shortage of fuel, insufficient contractor cash-flow, shortage of foreign currency for importation of materials and equipment, slow payment procedures adopted by the client in

making progress payments, insufficient equipment, delay in relocating utilities, shortage of construction materials, delay in paying compensation to land owners, shortage of technical personnel, and delay in site mobilization. The causes of delay are significant and should be given attention by client organizations, consultants and contractors to enable the timely completion of projects in future. It should also be noted that most of the causes of delay are not unique to Malawi, and have been observed in other southern African countries such as South Africa, Botswana and Swaziland (Kamanga & Steyr (2013).

Alinaitwe, Apolot and Tindiwensi (2013) also carried out a study on causes of delays and cost overruns in Uganda's public sector construction projects and the results showed the major causes as: Change of work scope and/or changes in material specifications; High inflation, insurance and interest rates; Poor monitoring and control, due to incompetent and/or unreliable supervisors; Delayed payment to contractors, subcontractors and/or suppliers; and Fuel shortages. Memon (2014) conducted a study on contractor perspective on time overrun factors in Malaysian construction projects and the major factors causing delays were: Frequent design changes; Change in the scope of the project; Financial difficulties of owner; Delays in decisions making; and Unforeseen ground conditions. In India, Desai and Bhatt (2013) studied the critical causes of delay in residential construction projects and found out that the most important delay factors were: Original contract duration was too short; Legal disputes between various parties; Ineffective delay penalties; Delay in progress payments by owner; and Delay to furnish and deliver the site to the contractor by the owner.

Sweis et al, (2008) studied delays in construction projects in Jordan and the major causes of delay were: Financial difficulties faced by the contractor; too many change orders from owner; poor planning and scheduling of the project by the contractor; Presence of unskilled labour; and Shortage of technical professionals in the contractor's organization. In India, Ravisankar, Anandakumar and Krishnamoorthy (2014) conducted a study on the quantification of delay factors in the construction industry. The researchers indicated that time overrun vary between 50% and 80% for projects completed worldwide. The study revealed that the most important causes of delay were: Shortage of unskilled and skilled labour; Design changes by owner or his agent during construction; Fluctuation of prices; High waiting time for availability of work

teams; and Rework due to errors. Shanmugapriya and Subramanian (2013) investigated significant factors influencing time and cost overruns in Indian construction projects. The researchers indicated that 60% of projects in India suffered time overruns. The study found out that the following were the most significant factors causing time overruns: Material market rate; Contract modification; Rework of bad quality performance; unclear specification; and Dependence on freshers to bear the whole responsibility.

In addition, El-Razek, Bassioni and Mobarak (2008) conducted a study on causes of delay in building construction projects in Egypt and found out that the most important causes of delay were: Financing by contractor during construction; Delays in contractor's payment by owner; Design changes by owner or his agent during construction; Partial payments during construction; and Non-utilization of professional construction/contractual management. Sambasivan and Soon (2007) researched on the causes and effects of delays in Malaysian construction industry and the results showed the following major causes of delay: Improper planning; Site management; inadequate contractor experience; Finance and payments of completed work; and Subcontractors. Patil, Gupta, Desai and Sajane (2013) researched on the causes of delay in Indian transportation infrastructure projects and the results showed that the following were the most important causes of delay: Delay due to Land Acquisition; Environmental issues related with project; Financial closure; Change orders by the client; and Poor site management and supervision by Contractor.

The trend in project challenges and failure globally is a proof that risks are not properly dealt with. Additionally, Tar and Carr (2000) attributed the reason for poor project performance to lack of formalized risk management procedures. Hence, one can infer that risk management is all about making decisions that improve project performance to achieve project objectives. This implies that risk management is an effective decision tool that can improve the performance of construction projects.

Zou, Wang & Fang (2008) established that project risks often have negative impacts on project's objectives during project life cycle. In addition, the scholars argued that pre-construction process is the most risky process and at the same time very important in the development of commercial project in particular and construction project in general. This is so in that it is mostly at this phase when the project cost, schedule and quality are initially defined. Therefore, any change at

this time is easier and take lower cost and time than the later project stages (Silungwe 2015). Fabrycky & Blanchard (1991) and Paulson (1976) stated that the ability to change decreases continually as the project progresses, from 100% at project sanction to typically 20% or less by the time construction starts (Kishk et al., 2003). However, the pre-construction process in construction industry often involves risks and uncertainties (Baker 2005). Political, social, environment and other related risk influence pre-construction process while uncertainties arise from the incomplete knowledge and information of the project. Therefore, risk management constitutes the most important and essential aspect of the project pre-construction process.

The author notes that the reviewed works or studies by different scholars mostly looked at the general effects of risks on a project life cycle and not specifically toll road project (s). It is worth noting that the reviewed literature indicates that the effects of risks on a project can be summed up into cost overruns and time constraints. In addition, the author asserts that effective management of risks is possible if these risks are managed from the perspective of a project life cycle. A number of risks may arise in more than one phase of a construction project and hence they need to be considered in more than one phase. For example, tight project schedule results from clients' expectation of carrying out the construction project against time as outlined in the feasibility report.

Zou, Zhang & Wang (2009) asserts that in the meantime, it also happens in the design phase where the designers are urged to work out the drawing and prepare the documentation quickly and in the construction phase where contractors have to reduce program schedules to catch up with the progress. Such an unrealistic schedule can heavily influence the achievement of project objectives in terms of cost, quality, environment and safety. Wang (2004) maintained that once accidents happen or conflicts between construction programs arise, the project schedule can be even further delayed. As much research suggested, addressing project risks earlier rather than later in the project life cycle can minimize the negative consequence brought by the risks (Ibid).

The author further indicates that identifying the possible occurrence of risks in each stage and making appropriate actions to cope with them are significant. On the other hand, as these risks are all project stakeholders orientated, how to effectively get different participants to manage them in the context of a project life cycle is decisive to the project success. Suseno et al., (2015),

work on risk management in high-rise commercial projects in Vietnam, established that addressing project risks earlier rather than later in the project life cycle has the capacity to effectively minimize the negative consequence brought by the risks.

Akoh (2018) maintains that ensuring effective delivery of construction projects to meet costs, schedule, performance and environmental sustainability requirements requires identifying and managing the risks to the projects at all project stages from conceptualisation to termination. The construction industry is exposed to more risks and uncertainties compared to other businesses (Dey and Ogunlana, 2004; Zeng et al, 2007). This is as result of the complexities of construction projects and the involvement of many parties with different interest. Instances of many project failures have been related to ineffective and poor risk management (Zou et al., 2007). Failure to manage construction project risks effectively, can lead to failure in achieving the desired project objectives, resulting in increased costs, time delays, lack of quality, and issues related to the functionality of the facilities (Choudhry and Iqbal, 2013); flawed planning, possible breakdown in the relationship between the client and the contractors, difficulties in delivering the project and inevitable project delays and cost overruns.

#### **2.4 Risk management framework and Toll road projects**

Guasch (2004) maintained that countries with successful toll road network development usually have a well-established strategic planning framework whereas less successful countries exhibit weakness in this area. France, Italy, Japan, and Spain, for example, regularly update national toll road network development plans that are supported by appropriate legislation. In Indonesia and Mexico, on the other hand, various sections of the current toll road program were conceived in isolation and not derived from a long-term strategic interregional network development plan, and accordingly they were not well coordinated with plans for capacity expansion of non-toll highways (Suseno, Wibowo, & Setiadji, 2015). A strategic planning framework incorporating network analysis is important to optimize the benefits and minimize costs of toll road development (George 2003). Components of such planning should include: refining the strategic road network and the most appropriate alignments of the key links; firming up the appropriate timing of construction of individual links based on corridor studies; and establishing clear economic and financial viability (Ibid).

Guasch (2004) argued that for a risk management framework to be effective, there is need to clearly and consistently involve all key stakeholders. This is so in that stakeholders constitute a significant measure in managing risks through risk allocation. Ignatius et al. (2016) stated that ineffective stakeholder involvement in projects led to project failure. Therefore it was difficult to provide both inputs to specifications formulated and actively participate in subsequence project phases. Furthermore, Khan and Kamal (2017) stated that when stakeholders are communicated and informed in an ill manner, they will not effectively get involved in the project, eventually project quality will be compromised as Clients needs and expectations are missed out. Therefore its' ineffective stakeholder engagement was noted to have had influence over project outcomes quality. Ineffective project stakeholder involvement in construction projects was noted to have had key contributing factor to specifications. Stakeholders in projects were observed to be at the center of uncertainty in any project as such ignoring them implies neglecting quality since product specifications are mainly determined by clients and designers.

Silungwe et al (2015) advocated for the Integrated Risk Management (IRM) which is a risk management approach which encourages all key parties involved in a project to focus on the best outcome of the project at the best final cost. At the beginning of every project, a team is established by the selection of different partners, and these are based primarily on the needs of the project. The team is comprised of the client, consultants, contractors and suppliers. This team then works in a group to accomplish the best project possible for the client.

**Table 2.1 Risks that Can Be Mitigated by IRM**

No.	Risk
1	Conflicts amongst construction team members and adversarial relationships
2	Insufficient information in the contract specification, drawing and design
3	Communication and coordination amongst construction team members
4	Communication and coordination amongst construction team members

5	Delay in completion of construction project
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**Source: Adopted from Silungwe et al (2015).**

Wang, Dulaimi & Aguria (2004), proposed the qualitative risk mitigation framework for construction industry among developing countries. This was so in that the framework was going to provide detailed risk management strategies and procedure that international firms, could adopt. The proposed framework is argued to be practical and relatively easy to apply. The study indicated that under this framework, mitigation measures for one risk should be prioritized with their effectiveness when they are implemented to mitigate the risk. Furthermore, as there is influencing relationship among risks under the three hierarchy risk levels, the prioritizing of mitigation measures should also take into account the risk hierarchy levels. This could be illustrated further by following example.

Let Risk A's Mitigation Measure 1= A1M, Risk B's Mitigation Measure 1=B1M and also assume the relationship between Risk A and Risk B is 'A→B' (i.e.Risk A is influencing Risk B or Risk B is influenced by Risk A), then there is 'A1M→B1M', which means that Risk A's Mitigation Measure 1 has to be implemented before the Mitigation Measure 1 for Risk B. This is because that Risk A is influencing Risk B and therefore prioritizing the Mitigation Measure 1 for Risk A will help to reduce the possible occurrence of Risk B (Ibid). According to Wang, Dulaimi & Aguria (2004), the qualitative risk mitigation framework contains the following steps.

### **Step1**

Define the nature of any identified risk, i.e. whether the risk is close in definition and scope to a risk identified and which hierarchical level the risk falls in.

### **Step2**

Find the risk's criticality from established critical risks statistics and its proposed mitigation measures' effectiveness.



### **Step3**

Find the risk's influence relationship with other risks from the established Risk Influencing Matrix.

### **Step4**

If the risk falls in the Level I, only the mitigation measures (referred as group X) specific to this risk should be implemented but the mitigation measures with higher effectiveness and higher priority if the measures are applicable.

### **Step5**

If the risk falls in Level II, implement Group X mitigation measures first followed by Group Y measures which are specific to this level of risk. For the mitigation measures of one risk, implement the measures with higher effectiveness first.

### **Step6**

If the risk falls in Level III, the implementation sequence would be first Group X, second Group Y and lastly Group Z mitigation measures. For the general implementation sequence of mitigation measures, prioritized mitigation measures should be used. It is worth noting that in addition, Wang, Dulaimi & Aguria (2004) introduced a risk model (named Alien Eyes' Model), which shows hierarchical levels of risk and the affected relationship between the risks.

Ceric (2003) proposed the development of PDRMF (Process-Driven Risk Management Framework) which was demonstrated on the Sveta tri kralja Tunnel in Croatia. The application of the proposed framework is the implementation of the risk management process, which is carried out separately for each phase of the construction project in accordance with Process Protocol (PP). After the experts confirmed the identification of the key risks in each phase, they used the (PP) Risk computer programme to determine risk probability and risk impact, and depending on risk exposure and risk acceptability they proposed the appropriate strategy of risk

response. The procedure was repeated for each phase within a stage. Applying the framework to risk management in this way, before the project begins to be executed, has the drawback of loss of the cyclical nature of the risk management process. During project execution risk response may lead to the appearance of new risks in the phase under analysis or in one of the later phases. Since new risks should be treated equally as the initial risks, risk management is by its nature a cyclical process (Ibid).

Furthermore, Zou, Wang & Fang (2008) argued that if the framework is applied to risk management before the project begins no account is taken of the fact that fundamental changes may occur in the relative values of time, cost and quality depending on success in the realization of preceding phases and on the circumstances and environment in which the project is being executed. This fundamentally affects risk impact, and thus also risk exposure, risk acceptability, and finally risk response. Therefore, process driven risk management, and the full application of the proposed framework, can only be realized if it is applied to a project during its execution, from describing the need to Operation and Maintenance (Ceric 2003).

Ceric (2003) also argued that construction projects are unique in terms of design, construction methods, personnel and location. Variations in these factors will induce different types of risk factors into construction projects. In addition, risk factors could come from many different directions, such as social, legal, economic, environmental, political, logistic, management and technological sources. Therefore, most risk management frameworks may not accommodate risk factors that are peculiar to a developing country like Nigeria and this could influence risk management of a building construction project. Hence developing a risk management framework is undoubtedly required.

A study by Nicholas & Babajide (2010) indicated that to develop a risk assessment and management framework for the Nigerian highway and road construction project there is a critical evaluation of the risk events that have to be analysed and be mitigated at each stage of the project life cycle. The steps to be undertaken in their proposed risk assessment and management model for highway and road schemes include:

Step 1: Identification and grouping of risk events into levels



Step 2: Identification of group level and mitigation measures



Step 3: Implementation of mitigation measures

**Source: Nicholas & Babajide (2010)**

According to Nicholas and Babajide (2010), the proposed model comprises of three hierarchy levels and is focused on the following three important stages in highway and road schemes namely, the feasibility study, the design and construction stages. The framework deals with actual processes in the highway and road schemes, the formulation of the risk management team and the project life cycle. However, it was stressed that the proposed Risk Assessment and Management framework for Highway and Road Schemes is limited only to highway and road schemes with little emphasis on the technicalities involved in design and construction but from the project and management approach. The risk assessment framework should be used as a guide on how risk can be assessed and managed for a road scheme (Ibid).

The author indicates that if successfully fitted in the project, risk management framework offers the chance to gain a clear understanding of the goals, duties and contents of the service and the feasibility of the project. El-Amm (2003) argues that a risk management framework provides an information basis for the quantitative data, sorted according to size, for the purpose of supporting decisions, such as e.g. the choice between costs and implementing goods or the comparison between several possible options. For this, however, it is necessary that a high quality of the status of information is always available in order to make determinations on the basis of useable and comprehensive information.

Guasch (2004) maintained that risks are closely linked to infrastructure projects, and toll road projects are no exception. These are a consequence of an uncertain condition which quite often

cannot be predicted accurately. It is therefore necessary to have risk management framework from the beginning of the construction project, to reduce the impact of possible risks (Zou, Wang & Fang 2008).

Chapman and Ward (2003) and Smith (2014) posit that the manner in which risks are managed determines whether the risk would be an opportunity or a threat. Lehtiranta (2014) is of the view that opportunities in project teams are rarely seen. This lack could explain why the perception of risk in projects is normally negative and the emphasis is on dealing with negative risk events as opposed to the opportunities that could be harnessed from the risk events. Project risk management is, therefore, the logical method of establishing the context, identifying, analyzing, evaluating, treating, monitoring and communication of risk associated within any activity, function or process in a way that enables losses to be minimized and opportunities to be maximized (Silungwe 2015).

The author also indicates that risk is inherent and difficult to deal with, and this requires a proper management framework both of theoretical and practical meanings. Risk management is a formal and orderly process of systematically identifying, analyzing, and responding to risks throughout the life-cycle of a project to obtain the optimum degree of risk elimination, mitigation and/or control (Ceric 2003). Significant improvement to construction project management performance may be achieved from adopting the process of risk management.

*Risk Management in Toll Road Projects at Project Development Stage*

**2.5 KNOWLEDGE GAP**

<b>Author</b>	<b>Topic</b>	<b>Year of Publication</b>	<b>Findings of the study</b>	<b>Research Gap</b>
Firmansyah, Veronika & Trigunarsyah	Risk analysis in feasibility study of building construction project: case study - Pt. Perusahaan gas Negara Indonesia	<b>2006</b>	<p>Before investment, the feasibility of the project has to be done that gives figures of cash flow on the following years.</p> <p>This can be one of the considerations for making a decision whether this project is feasible or not. Risks that overshadow the construction project have to be calculated as an influential factor towards the failure of a project.</p>	The study covered only the first phase (feasibility) of the project development stage and its focus was on general construction projects.
Indhu and Ajai	Study of Delay Management in a Construction Project.	<b>2014</b>	The study results revealed that the most important causes were slacks in contractor's payments, inadequate materials in construction, shortage of human resource (skilled, semi-skilled and unskilled labour), reduced site management and inappropriate management of the skilled workers and tendering of diagrams.	The research mainly focused on identifying the risks that affect project at construction stage.

***Risk Management in Toll Road Projects at Project Development Stage***

<b>Author</b>	<b>Topic</b>	<b>Year of publication</b>	<b>Findings of the study</b>	<b>Research Gap</b>
Silungwe et al	Risk Reduction on Infrastructure Projects in the Zambian Construction Industry through Integrated Risk Management (IRM) Approach.	<b>2015</b>	The study revealed that the management of risks in the Zambian Construction Industry (ZCI) on projects is hugely hampered by the over-reliance on the traditional method of procurement in which teams are segregated resulting in adversarial relations. Hence, the reduction of risks on projects cannot be effectively achieved traditionally due to fragmentation of the parties involved.	The study was based on the entire Zambia construction industry and more towards the procurement phase of the project development stage.
El-Amm	Risk Management in Toll Road Concessions	<b>2003</b>	The research indicated that with a degrading road infrastructure and dwindling public funds, governments are turning towards the private sector to develop roads and finance them through toll revenues. It also indicated that if a thorough and pertinent risk management program is implemented by private concessionaires, with the support of the government, then many risks could be mitigated.	The study looked at overall risk management in a toll road project. The study did not clearly analyse the application of risk management at each stage of the project.

***Risk Management in Toll Road Projects at Project Development Stage***

Zou, Wang & Fang	A life-cycle risk management framework for PPP infrastructure projects	<b>2008</b>	The paper found that properly assessing risks (financial, government’s political and public’s acceptance/rejection risks), ensuring value for money and protecting the public (and end users’) interests are essential in PPP infrastructure projects and this can only be achieved through optimal risk identification, assessment, allocation and management from a life cycle perspective and balanced interests between the Government/public and private partners as well as product end users	The study generally looked at a risk management framework in a project life–cycle and not specifically analyzing it thoroughly based on the different stages of the project.  The study focused more on risk allocation between the parties involved in the construction project.
Seboru	An Investigation into Factors	<b>2015</b>	The top five causes of project	The study looked at

***Risk Management in Toll Road Projects at Project Development Stage***

	Causing Delays in Road Construction Projects in Kenya		delays observed included payment by client, slow decision making and bureaucracy in client organization, inadequate planning and scheduling, and rain. It is recommended that clients should improve their financial management systems so that they are able to pay contractors in a timely manner.	overall risks that causes delays in road projects.
Sharaf & Abdelwahab	Analysis of Risk Factors for Highway Construction Projects in Egypt	<b>2015</b>	Results indicated that the risk factors arise from owner side is one of the most common risk factors in the construction industry in Egypt as the owner in the majority of construction project in Egypt is the governmental sector, however, the overall project risk of highway construction projects in Egypt is considered as at a medium level.	The study looked at the overall risk factors in a project without analyzing them based on the different project stages



*Risk Management in Toll Road Projects at Project Development Stage*

<p>Mweemba, B</p>	<p>Risks Associated with Infrastructure Public Finance in Developing Countries – The Case of Zambia</p>	<p><b>2014</b></p>	<p>The cancellations of some PPP projects was due to procurement improprieties Specific risks like skills in the public sector to structure project finance projects, procurement process and support by Ministry of Finance ranked generally high. Political violence, law and order rank as one of the lowest risks in Zambia.</p>	<p>The study generally looked at public sector infrastructures and not specific projects.  The study only focused on the procurement phase of the project development stage.</p>
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## **2.6 CONCLUSION**

The literature reviewed in this chapter shows different works and researches on risk management in toll road and general road projects life-cycle locally and across the globe. It derives citations from different authors, locations and tries by all means to narrow down to the development stage of a project. The different types of risks associated with toll road projects were well highlighted. The chapter also gives understandings on the effects of risks in toll road projects and importance of a risk management framework based on previous researches. Lastly, it highlighted the knowledge gap based on already existing literature on risk management in toll road projects. The general observation by the author is that most of the literature reviewed focused on one aspect of the development stage of a project. Risk management in toll road project development is a key aspect as it clearly determines the projects viability especially at inception.

## **CHAPTER THREE**

### **3.0 THEORETICAL AND CONCEPTUAL FRAMWORK**

#### **3.1 Introduction**

This Chapter focuses on the theoretical review and conceptual frameworks to be used in guiding the researcher with study investigations. The theories considered included: Contingency, Agency and Transactional Theories. The Chapter will further consider establishing of conceptual framework of the study aimed at depicting and explaining the independent and dependent variables with their respective bounds in the study.

#### **3.2 Theoretical Framework**

Acharyya (2007) defines the theoretical framework of the study as a structure that can hold or support a theory of the research work. It presents the theory which explains why the problem under study exists and serves as a basis for conducting research. As each study requires a theoretical framework to be built upon, various theories were evaluated for this thesis in order to choose an appropriate theory constructing the concept of this thesis which is risk and its management. The theories that will guide this research include Contingency theory, Agency theory and Transactional theory.

#### **Contingency theory**

Ghahramanzadeh (2013) argued that contingency theory recognizes that there are a range of contextual variables (risks), each influencing the project that the theory is going to be applied to. Examples of these variables are external environment, technology, organizational structure and size, cost, culture, people involved, supply chain, strategy. The theory recognizes the complexity involved in managing risk of construction projects but uses patterns of relationship of risks in order to facilitate risk management. Although the contingency approach refuses the existence of one best way for managing risk, it proposes that there is „one most appropriate approach for each specific situation (Contingencies). The word contingency indicates how the environment (external source of risk) relates with the system, and determines the activities and construction of an organizational system (Ibid).

Panthi et al. (2009) have pointed out that construction projects are complex and unique, and because it is difficult to evaluate the level of risks in construction projects, it therefore is hard

to apply risk management activities appropriately. One of the unavoidable outcomes of a construction project is variation that may lead to adverse impacts on time, cost and quality. Hence, utilizing contingency theory in projects is useful for mitigating these variations that arise later, through organizational learning which uses past experiences and applies them to current situations where possible. These guidelines can be communicated vertically within an organization and horizontally between organizations. As discussed above, contingency theory is predominantly created for elimination / mitigation of adverse impacts of unforeseen events and therefore contingency cost can be considered as a significant element of contingency theory for confronting these events (Ibid).

The theory has been criticized by authors like Galbraith (1973) and Schoonhoven (1981) on the ground that it has problems such as lack of clarity in its theoretical statement (Noor and Tichacek, 2009). As a consequence of this problem, theoretical statements also fail to provide any clues about the specific form of the interaction intended. Although some objections may have been pointed out about contingency theory, it was found to be the most appropriate theory for this study as it is risk-based (the focus of the thesis), which gives it the power to consider the environmental circumstances that can be considered as a significant source of risk for construction projects (Ghahramanzadeh 2013).

### **The Agency theory**

The Agency Theory Agency theory refers to the relationship between a principal and an agent. Sappington (1991) described the circumstance as simply as when it is too complicated or too costly for the 'principal' to do a job itself, it must hire a competent 'agent' to perform the task. According to Ayee (2005) the challenges faced by principals is to choose best agents, whether employees or contractors or other third parties. Secondly, it is a challenge to monitor the behaviour of the agents in order to ensure that they perform their assigned tasks properly. In many instances the principal tries to exploit the agent by trying to get the best possible deal. Meanwhile, the agent also wants to extract more gains from the partnership. This is especially true because the agent normally has more information than the principal regarding the contract.

Agency theory is very useful in describing risk management in toll road project contracts. Differences in risk preference has an effect on how risk sharing is done in a contract. It is

widely assumed that the principal is usually risk neutral and the agent is usually risk averse (Lindunda 2019). Below is a suggestion made by Shavell (1979) on how the principal pays a fee to the agent for its services:

- a) If the agent is risk neutral, then fee should equal outcome minus the principal's share (the principal's share is a constant). In this case, the agent's effort has no value in determining the fee. This case can be aligned with outcome-based contract.
- b) If the agent is risk averse, then fee should depend on some extent on the outcome, but never leaves the agent paying all risk. In this case, the agent's effort has some value, given that the principal knows the effort. This case can be categorized as behavior based contract (Eisenhardt 1989).

### **Transactional theory**

It is worth noting that contrary to the Agency theory, the Transaction Cost Theory focuses more on the contract. While the agency theory considers agents as merely responding to contracts designed by principals, the transaction cost theory regards the parties entering into a transaction or exchange as contracting both the terms of the exchange and their execution (Ayee, 2005). The contracting costs are ordinarily very high because they include both the costs of structuring and costs of negotiations. According to Koschatzky (2017), transaction costs within projects may be reduced internally, but could rise externally. The cost goes beyond monetary values and considers the time taken to weave the entire long-term relationship. Bovaird (2004) notices that in situations where contracts are complex, the high costs of designing, letting, monitoring and enforcement of these contracts imply that organizations are better off carrying out the activities through traditional procurement unless relational contracts which rely on trust rather than pure economic considerations are set up (Lindunda, 2019).

In this regard, toll road construction projects tend to attract high transaction costs especially in conditions where the contracting authority lacks structuring expertise and have to depend on expert advisers. This leads to more costs (Lindunda 2019). The endogenous and exogenous risks that toll road projects carry require a thorough analysis in order to prepare appropriate risk responses which are handed to the party best able to handle them. Without this, it becomes impossible to talk of success for these inherently long-term contracts. Hall

(2015) argues that construction projects like toll roads conceal public borrowing, while providing long-term state guarantees for profits to private companies. Furthermore, although such projects are often promoted as a solution for countries under fiscal constraints, the evidence suggests rather that they worsen fiscal problems.

### **3.3 Conceptual Framework**

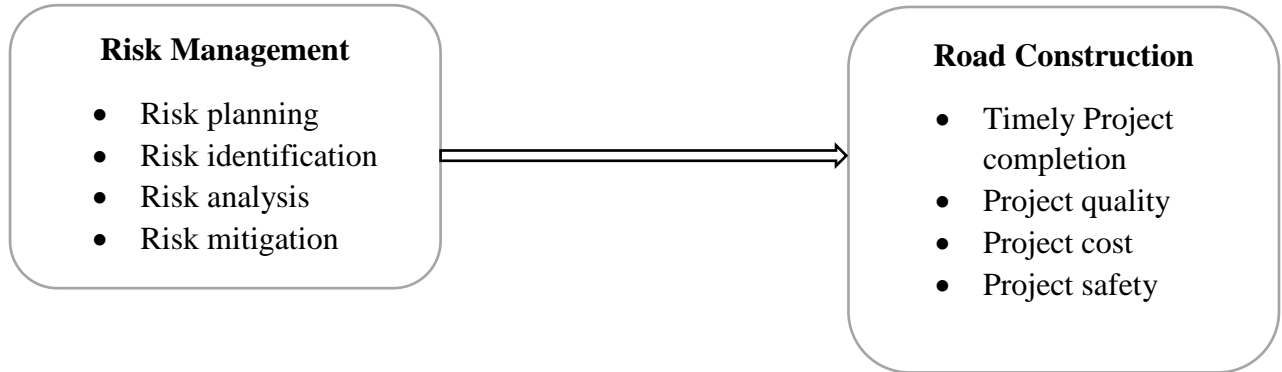
A Conceptual framework is a sketch of independent and dependent variables coupled with their assumed connection. It depicts an outline of variables the researcher uses in order to respond to the set research objectives (Rajablu et al., 2017). It connects the independent variable to the dependent variable. It is an illustration of the key variables of the study on hand and their assumed relationships with each other (Sakala, 2019). This study endeavours to formulate an ideal conceptual framework using two frameworks developed by different researchers but with similarities of the study on hand. The conceptual frameworks were shown as follows:

#### **Conceptual framework for managing risks in road construction: Patil & Gaikwad (2015).**

Patil & Gaikwad (2015) maintained that risk management is fore sighting the future events and preventing before anything goes wrong. Managing risks in road construction projects is very important process in order to achieve the objectives of project in terms of time, cost, quality and safety. Risk management in road project deals with risks present with each activity and its possible effect on time and cost of the network prepared. It also deals with planning, identification analyzing risks involved in a road project together with their likelihood of occurrence, impact and severity.

**Independent variable  
variable**

**Dependent**

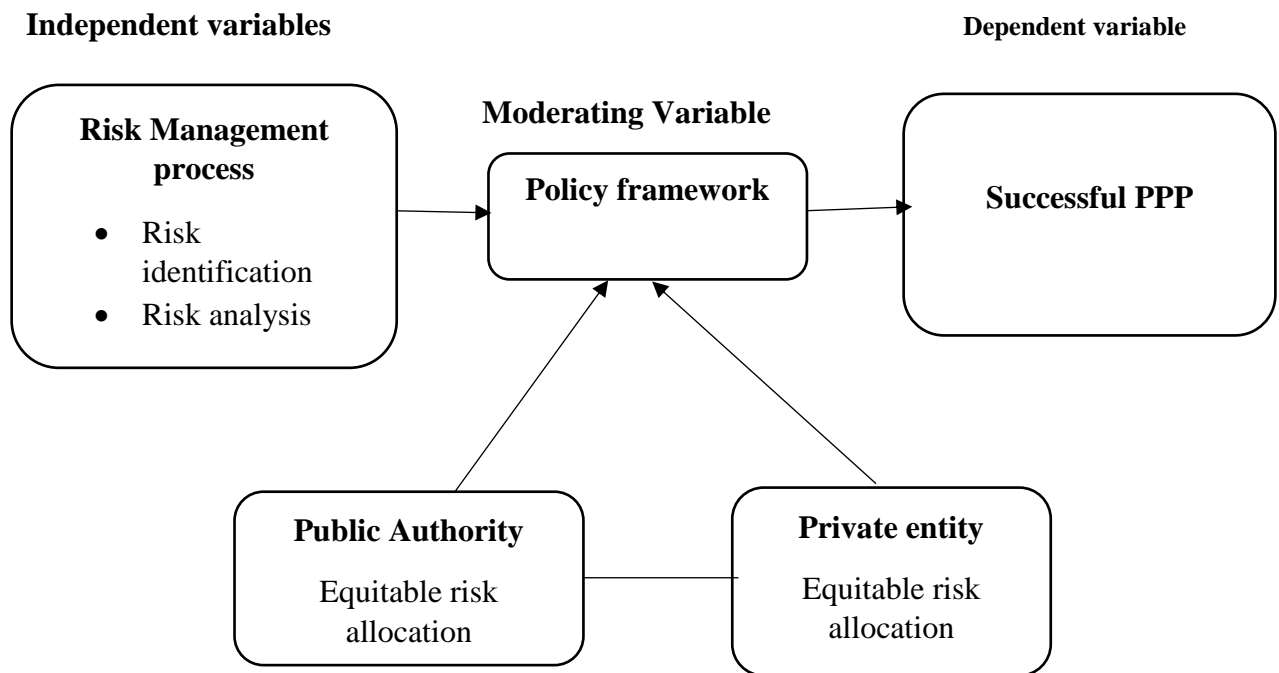


**Figure 3.1** Conceptual framework for managing risks in road construction

**Source:** Adopted from Patil & Gaikwad (2015).

**Conceptual Framework for Managing Risks in PPPs – Lindunda (2019).**

Developing opportunities for project success, regardless of complexities of PPP projects, is a key objective in risk management for PPP projects. The identification of risks within a PPP project requires going through the entire risk management process for a thorough analysis and response planning (Lindunda 2019). The various frameworks (legal, institutional, policy regulatory and technical) have to be in place as this will assist in ensuring equitable risk allocation between the private authority and private entity. Only after then should the concession be drafted. This process will ensure that the PPP is successful. The interaction of all these variables is expected to lead to the ultimate goal of managing risk, which is successful PPPs (AlAzemi, and Bhamra, 2014).



**Figure 3.2** Conceptual Framework: Risk Management in PPPs

**Source:** Lindunda (2019)



### 3.3.1 Conceptual Framework of the study

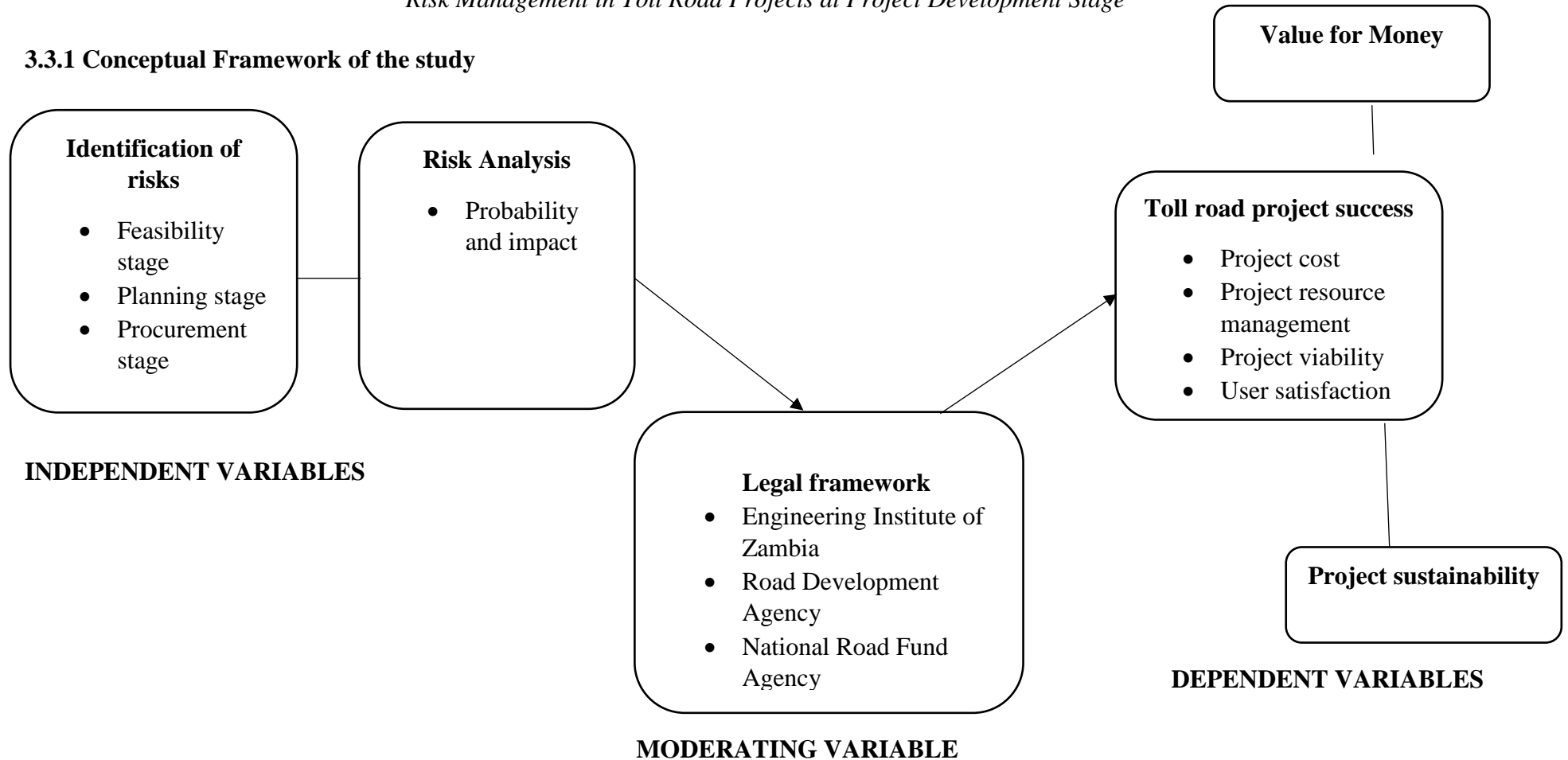


Figure 3.3 Conceptual Framework: Risk Management Toll road projects

Source: Author (2020)

### **3.3.2 Explanation of the variables**

#### **3.3.2.1 Independent Variables**

The independent variable for this research is identification of inputs which are to be measured against latent variables that include feasibility, planning and procurement phases of risks. Effective management of risks is possible if the risks are managed from the perspective of the stages or phases of a project life cycle. This in itself accounts for a thorough and accurate management of project risks as they are handled according to their potential occurrence in a particular project phase. These important phases include the feasibility, planning and procurement phase. As much research suggested, addressing project risks earlier rather than later in the project life cycle can minimize the negative consequence brought by the risks. Identifying the possible occurrence of risks in each stage and making appropriate actions to cope with them are significant (Smith, 2003).

Accompanying the identification of inputs is the aspect of managing the risks through risk identification, planning, analysis and stakeholder engagement. This is an important aspect in that it is only when the risks are systematically identified and analysed that there will be higher chances of project success (AlAzemi, and Bhamra, 2014).

#### **3.3.2.2 Moderating variable**

Legal framework is the moderating variable for the research study. A project legal framework involves existence of well-defined rules, regulations and institutions that have influence regarding the execution and success of the project. In this regard, it therefore follows that in order to ensure effective risk management in Toll road projects, there is need to have a well-established legal framework. The framework will be able to clearly provide effective guide on how risks are to be handled at different phases by the key project players or stakeholders. In other words, having a legal framework provides a systematic way of handling risks and ensuring project feasibility and success through risk sharing. The key players in this research's legal framework includes; Ministry of Finance, Road Development Agency, National Road Fund Agency and Road Transport and Safety Agency.

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It is worth noting that with this legal framework constituency in place, it presents a viable platform that facilitates the success of the project. This in itself ensures the creation of value for money and project sustainability.

#### **3.3.2.3 Dependent variables**

The dependent variable for the research is Toll roads project success. The variable consists of underlying variables against which are to be measured and these include project cost, project viability, resource management, and project viability and user satisfaction. The project cost will look at whether the project is implemented within the budget without experiencing overruns or shortfalls. The project viability will consider the practicality of the project in that for the construction project to be successful, it has to be sustainable. Regarding project resource management, this will focus on ensuring effective allocation and utilisation of project resources. Lastly, there will be need to look at whether the specifications of the client are met or not. Conformance of the toll roads to the requirements of the clients/end users will satisfy their desires and the roads will have met the quality standards.

#### **3.4 Conclusion**

The Chapter focuses on both theoretical and conceptual frameworks of the research. Different theories relating to this study were explained as well as their respective areas of applications. It was stated that in all theories effective project risk management is key to project feasibility and success. Subsequently, the Chapter endeavoured on formulating an ideal conceptual framework of this study which was derived from the examples from past literature studies. The conceptual framework had variables which were later explained in form of independent and dependent variables.

## **CHAPTER FOUR**

### **4.0 RESEARCH METHODOLOGY**

#### **4.1 Introduction**

This chapter focuses on description of the methodology adopted in undertaking this research. The Chapter specifies the research approach, research design, philosophy of the study, study population, sample size, data collection tools and data analysis. The chapter also presents the reliability, validity and ethical considerations of the research.

#### **4.2 Research Approach**

There are three types of research approaches, which include; Qualitative, Quantitative and Mixed methods. Qualitative research implies that the enquirer makes knowledge claims based primarily on constructivist perspectives. Quantitative research is a means for testing objective theories by examining the relationship among variables. These variables in turn can be measured, typically on instruments, so that numbered data can be analyzed using statistical procedures (Creswell, 2012). Mixed method paradigm means that both the qualitative and quantitative research paradigm are used for carrying out research. This is in an effort to reach convergence of findings. This study adopted a mixed methods approach and the driving factors for choosing this method was the nature of the research questions and significance of the study. This method also made it easy for the researcher to apply statistics in analysis of the problem but also explanations.

#### **4.3 Research Design**

A research design involves determining how data is to be collected and analyzed. In view of this, the research adopted descriptive research design was employed. Hale (2018) defines descriptive research design as describing characteristics of a sample taken from the population and generalize their conclusions to be those of the entire population. This study used a survey method of descriptive research design which aims at enabling participants to be able to provide answers from questionnaires and interviews. This descriptive research design method is appropriate for the study as it helped in collecting data that describe events thereafter, leads to arrangement, tabulation, and defines the collected data on the current status regarding the level of risk management in Lusaka's toll road projects with a focus on the development stage and develop a risk management model.

#### **4.4 Philosophy of the Research**

Research philosophy is argued to be the coordination of ideologies and prospects regarding knowledge growth. It is fundamentally speaking, what a researcher does when undertaking a study; that is coming up with knowledge in a given area (Saunders, 2016). Additionally, Bal (2014) stated that research philosophy can be viewed or considered as the development of knowledge as well as its utilization". Furthermore, research method to be applied is dependent on the hypothesis regulating study activity particularly the beliefs on the nature of reality and human (Ontology), knowledge theories about the research (epistemology) and the way knowledge would be acquired (methodology) (Saunders 2016).

##### **4.4.1 Epistemology**

Epistemology is premised on the understanding of what can be known or what should be the acceptable know-how in a specific area (Lindunda 2019). Easterby-Smith et al (2012) established two epistemological approaches which are; Positivism and Social Constructivism. Positivism in epistemology was perceived to support use of suitable approaches for natural sciences regarding study of societal reality. On the other hand, under, social constructivism, researchers focus on knowing their analysis based on their experience individually, ethnic, and historically. This researcher chose both positivism and social constructionism to be its appropriate epistemological standpoint as it is in tandem with the research demands including the set specific and main objectives. It is noted from the Social Constructivism perspective that interviews shall be conducted in order to discover the respondents' experience about the research study areas whereas, from the positivism side this research will undertake data analysis using SPSS version 16.0.

##### **4.4.2 Antology**

The concept of ontology is the process of accepting the perceived social reality by a number of people whilst showing their interpretations shape actions (Bracken 2014). The focus, primarily is on having an understanding that leads to questions based on assumptions about the way in which the world exists. Ontology is normally categorized into four approaches which include; relativism, realism, nominalism and internal realism. This research shall adopt the realism approach. This was because the approach creates an impartial environment thereby existing autonomously from human opinions and beliefs.

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### **4.5 Study Population**

The study respondents shall include Motorists (55), the Road Development Agency (35), the National Road Fund Agency (20), the Road Transport, and Safety Agency (15) and the Ministry of Finance (10) employees. These are the key players in the Zambian road network development and maintenance.

<b>S/n</b>	<b>Study population</b>	<b>Respondents</b>
1	Road development agency employees	35
2	National Road Fund Agency employees	20
3	Road Transport and Safety Agency employees	15
4	Motorists	55
5	Ministry of Finance employees	10
<b>Total</b>		<b>135</b>

**Table 4. 1 Study population**

### **4.6 Sample Size**

Sample size entails small fraction extracted from a study population for observations and examination. It is an important feature in which the objective is to make conclusions about a population (Creswell, 2012). Through observing the features of the sample, it becomes feasible to make certain deductions about the entire population from which it is systematically derived (Berg, 2009).

This study sample size was established by way of calculation using the Slovincs' formula as shown below:

$$n=N/[1 + N (e) ^2]$$

Where n =Sample size, N =Population size, e = Margin of error

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In this study the population (N) size is 135, Margin of error (e) 5%, with 95% confidence level. Therefore, sample size of the research is calculated using Slovin's formula as shown below:

$$\begin{aligned}n &= N / [1 + N (e)^2] \\ &= 135 / [1 + 135(0.05)^2] \\ &= 135 / [1 + 135(0.0025)] \\ &= \mathbf{100}\end{aligned}$$

### **4.7 Sampling Techniques**

Creswell (2014) maintains that sampling technique is the process used to select elements of an established sample size from a population. It involves picking individuals or objects from a population such that the selected group are representative of the entire population (Kombo, 2016). The study adopted simple random sampling technique which is an unbiased a subset of a statistical population in which each member of the subset has an equal probability of being chosen. In this case all the Motorists stood a chance to be selected for the research participation.

### **4.8 Data Collection Tools**

The study adopted a standard questionnaire and an interview guide to collect the data. The questionnaire consisted of both structured and unstructured questions. The questionnaire was planned and gathered in such a way that it would gather information relevant to answer research glitches. Hence it only consisted of important questions aimed at bringing out necessary information to answer the study questions. A five-point Likert scale questionnaire was used to enable respondent provide the appropriate solution to the question raised. The lower value says 5 1=highly dissatisfied or not at all whereas 5=Very great extent. Highly satisfied. The questionnaire was designed in a such a way that it comprised of two subsections: Section A consisting of Personal Information and Section B comprising of detailed questions aimed at capturing key information to address research concerns. Section B also had sub-headings taken from the three research objectives with a view to obtain information in line with study objectives". Self-administered questionnaire was applied in the study to obtain information from the respondents.

#### **4.9 Data Analysis**

Data analysis entails modeling data collected in a given research or study with the aim of determining useful information towards the identified research problem (Creswell, 2014). With regards to quantitative data, the researcher opted to make use simple regression analysis and one sample test analysis with help of Statistical Package for Social Sciences (SPSS) version 16.0 and Microsoft Excel in order to facilitate with analysis of feedback. Data was analysed using descriptive analysis techniques which involves the use of frequencies and percentages.

To analyse the qualitative data, the researcher used the Analytical Hierarchy Framework. According to Ritchie and Lewis (2007), this comprises familiarising with data by identifying initial key themes of the data collected via interviews before undertaking data management (i.e., structuring of raw data).

#### **4.10 Validity and Reliability**

According to Taherdoost (2016), validity is argued to be the explanation of how well the collected data covers the actual area of study. It is the degree to which research instruments accurately measure what was intended to be measured. This research realised validity in three ways; (i) ensuring that instruments used were logical and comprehensive; (ii) a validity test was conducted using a pilot study where 10 respondents answered the questionnaire and gave feedback on clarity of some questionnaires and (iii) using two instruments enabled triangulation with secondary data.

In order to state the appropriateness of the questionnaire for the entire sample, it had to be subjected to some form of pre-test. The researcher intends to undertake a Reliability Test prior to distribution of questionnaires to the study respondents. This was done after a total of Five (5) questionnaires was distributed to various stakeholders within the scope of this study. The said questionnaires were prepared in order to facilitate with reliability of the data collected.

#### **4.11 Ethics**

The research endeavoured to consider making ethical considerations by way of ensuring that respondent's opinions and willingness to participate are respected. Additionally, the researcher shall ensure utmost confidentiality of respondents' personal details in the study.



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As such, no specific respondents' personal details shall be linked to the research suggestions raised from analysis and conclusion. In view of aforementioned ethical considerations all respondents shall be able to provide reliable and sufficient feedback.

### **4.12 Conclusions**

This Chapter looked at how the research shall be conducted through documentation of suitable research approach and design; and research philosophy which include Ontology and Epistemology with respect to areas of application in the study. In addition, study population was highlighted with specific sample size which was computed by Slovins' formula. Furthermore, the Chapter looked at sampling technique to be used in the study together with data collection tools. Lastly, the study's' appropriate data analysis package was identified and explained in line with their application parts.

## CHAPTER FIVE

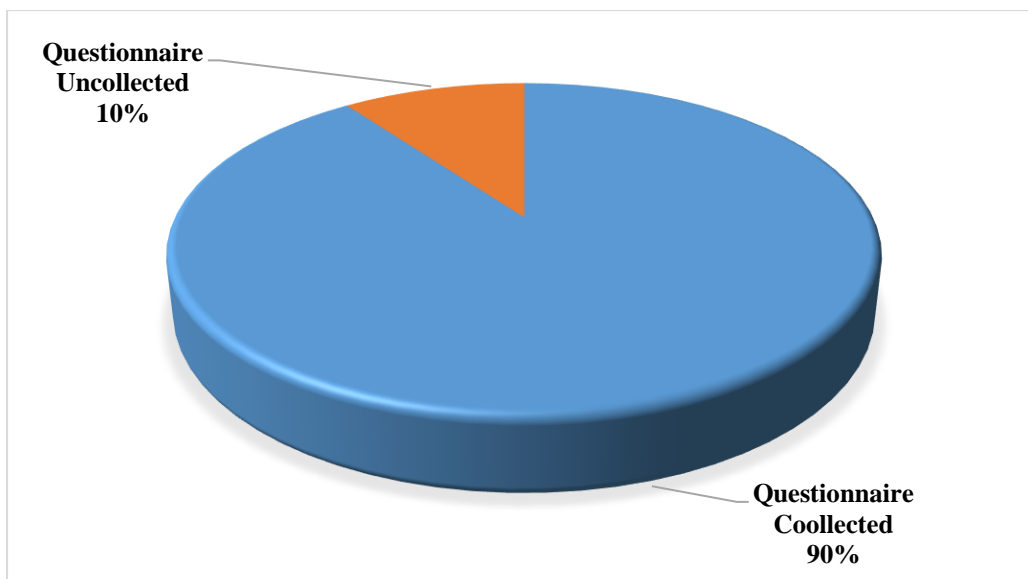
### DATA FINDINGS AND PRESENTATIONS

#### 5.1 Introduction

Chapter five provides insights of data findings and presentations based on the questionnaires collected from respondents. All the findings were centered on the main purpose of the study involving Risk Management in Toll Road Projects in Lusaka Province.

#### 5.2 Analysis of Responses

A total number of 100 questionnaires were administered to the target respondents. The researcher targeted only respondents who were involved in the Toll Roads Project. Out of the 100, only 90 questionnaires were filled in and brought back, representing 90% response rate while 10 meant for the motorists were not returned. This was a good sign that the majority of the research participants took part in the study and the researcher was able to go through the questionnaire together with the respondents before leaving it. Furthermore, the researcher had an opportunity interview key pioneers of the Lusaka Toll Roads project who are employees of Roads Development Agency, National Road Fund Agency and Ministry of Finance. Figure 5.1 displays the respondent's response rate.



Source: Formulated by Author (2020)

Figure 5.1: Respondents response rate.

### 5.3 Personal Information

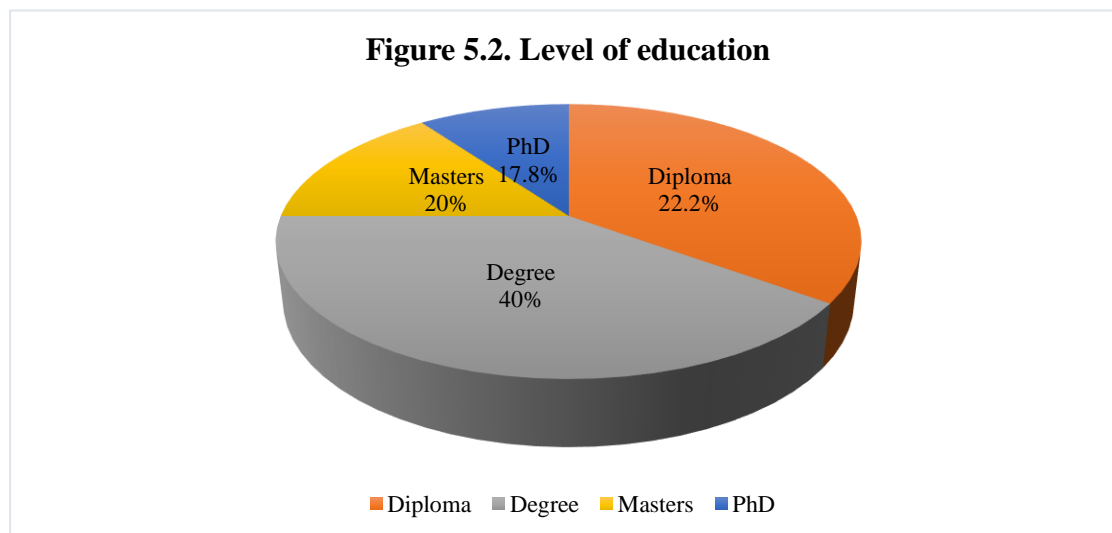
The general characteristics of the sample considered involved gender, position of the respondents and work experience in roads construction.

**Table 5.1: Gender Responses**

S/n	Details	Frequency	Percent	Cumulative Percent
1	Male	66	73.3	73.3
2	Female	24	26.7	100
	<b>Total</b>	<b>90</b>	<b>100</b>	

**Source: Formulated by Author (2020)**

The respondents were asked to indicate their gender. From the results, it was revealed that 73.3% of the respondents were male whilst 26.7% were female as shown in Table 5.1. This implies that data was collected from both male and female thereby reducing the aspect of gender biasness.



**Source: Formulated by Author (2020)**

Most of the respondents (40%) held Degree qualification, 35% held Diploma, 15% had Master's Degree and 10% had attained PhD education qualification as shown in Figure 5.2. This clearly indicates that the respondents were well able to understand and provide the needed information for the study.

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**Table 5.2.: Length of service**

S/n	Details	Frequency	Percent (%)	Cumulative Percent
1	1 – 2 years	18	20	20
2	3 – 4 years	41	45.6	65.6
3	5 years and above	31	34.4	100
	<b>Total</b>	<b>90</b>	<b>100</b>	

**Source: Computation based on field data 2020**

The majority (45.6%) of the respondents have worked in their respective profession and organization between 3 – 4 years, while 20% have worked between 1 – 2 years and 34.4 % for over 5 years as shown in Table 5.2.

### **5.4 BENEFITS OF RISK MANAGEMENT**

**Table 5.3 Cost Reduction**

S/n	Details	Frequency	Percent (%)	Cumulative Percent
1	Strongly Agree	27	30	30
2	Agree	53	58.9	88.9
3	Disagree	10	11.1	100
4	Strongly Disagree	-		
	<b>Total</b>	<b>90</b>	<b>100</b>	

**Source: Computation based on field data 2020**

From the findings in Table 5.3 cost reduction constitutes one of the benefits of risk management in Toll road projects. In view of this, the majority (58.9%) of the respondents agreed, while 30% strongly agreed and the least 11.1% disagreed. This implies that when risks are identified and mitigation measures put in place, it helps to reduce costs.

**Table 5.4 Timely project completion**

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<b>S/n</b>	<b>Details</b>	<b>Frequency</b>	<b>Percent (%)</b>	<b>Cumulative Percent</b>
1	Strongly Agree	25	27.8	27.8
2	Agree	56	62.2	90
3	Disagree	9	10	100
4	Strongly Disagree	-		
	<b>Total</b>	<b>90</b>	<b>100</b>	

**Source: Computation based on field data 2020**

From the findings in Table 5.4 risk management in Toll roads projects brings about timely completion of the project. In view of this, the majority (62.2%) of the respondents agreed, while 27.8% strongly agreed and the least 10% disagreed.

**Table 5.5 Effective resource mobilization**

<b>S/n</b>	<b>Details</b>	<b>Frequency</b>	<b>Percent (%)</b>	<b>Cumulative Percent</b>
1	Strongly Agree	41	45.6	45.6
2	Agree	49	54.4	100
3	Disagree	-		
4	Strongly Disagree	-		
	<b>Total</b>	<b>90</b>	<b>100</b>	

**Source: Computation based on field data 2020**

The research revealed that risk management in Toll roads project leads to effective project resource utilization. In view of this, the all respondents agreed, with 45.6% strongly agreeing and 54.4% just agreeing as shown in Table 5.5. This implies that when risks are identified and mitigation measures put in place, the project team will be able to ensure effective resource utilization.

**Table 5.6 Effective project decision making**

### *Risk Management in Toll Road Projects at Project Development Stage*

<b>S/n</b>	<b>Details</b>	<b>Frequency</b>	<b>Percent (%)</b>	<b>Cumulative Percent</b>
1	Strongly Agree	68	75.6	75.6
2	Agree	22	24.4	100
3	Disagree	-		
4	Strongly Disagree	-		
	<b>Total</b>	<b>90</b>	<b>100</b>	

**Source: Computation based on field data 2020**

From the findings in Table 5.6 risk management in Toll roads projects brings about effective project decision making. In view of this, the majority (72.5%) of the respondents agreed, while 24.4% strongly agreed.

**Table 5.7 Enhancement of investment confidence**

<b>S/n</b>	<b>Details</b>	<b>Frequency</b>	<b>Percent (%)</b>	<b>Cumulative Percent</b>
1	Strongly Agree	28	31.1	31.1
2	Agree	44	48.9	80
3	Disagree	18	20	100
4	Strongly Disagree	-		
	<b>Total</b>	<b>90</b>	<b>100</b>	

**Source: Computation based on field data 2020**

The research revealed that risk management in Toll roads project leads to effective enhancement of investment confidence in the project. In view of this, 31.1% of the respondents strongly agreeing, with 48.9% agreeing and 20% disagreeing as shown in Table 5.7.

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**Table 5.8 Proper project risk accounting**

S/n	Details	Frequency	Percent (%)	Cumulative Percent
1	Strongly Agree	19	21.1	21.1
2	Agree	71	78.9	100
3	Disagree	-		
4	Strongly Disagree	-		
	<b>Total</b>	<b>90</b>	<b>100</b>	

**Source: Computation based on field data 2020**

The research revealed that risk management in Toll roads project leads to effective project risk accounting. In view of this, the all respondents agreed, with 21.1% strongly agreeing and 78.9% just agreeing as shown in Table 5.8.

**Table 5.9 Reduced project overrun**

S/n	Details	Frequency	Percent (%)	Cumulative Percent
1	Strongly Agree	29	32.2	32.2
2	Agree	50	55.6	87.8
3	Disagree	11	12.2	100
4	Strongly Disagree	-		
	<b>Total</b>	<b>90</b>	<b>100</b>	

**Source: Computation based on field data 2020**

The research revealed that risk management in Toll roads project leads to a reduction in project overruns. In view of this, the majority (55.6%) of the respondents agreed, with 35.2.6% strongly agreeing and 12.2% disagreeing as shown in Table 5.9. This implies that when risks are identified and mitigation measures put in place, it enhances potential of undertaking the project within budget and timeframe.

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**Table 5.10 Effective Stakeholder engagement**

<b>S/n</b>	<b>Details</b>	<b>Frequency</b>	<b>Percent (%)</b>	<b>Cumulative Percent</b>
1	Strongly Agree	72	80	80
2	Agree	18	20	100
3	Disagree	-		
4	Strongly Disagree	-		
	<b>Total</b>	<b>90</b>	<b>100</b>	

**Source: Computation based on field data 2020**

The research results as shown in Table 5.10 indicate that risk management in Toll road projects has capacity to enhance stakeholder engagement in the project. In this regard, all the respondents supported this benefit with 72% strongly agreeing and 18% agreeing.

## **5.5 EFFECTIVENESS OF KEY TOLL ROADS PROJECT INSTITUTIONS**

**Table 5.11 Effectiveness Road Development Agency**

<b>S/n</b>	<b>Details</b>	<b>Frequency</b>	<b>Percent (%)</b>	<b>Cumulative Percent</b>
1	Extremely effective			
2	Very effective	25	27.8	27.8
3	Effective	43	47.8	75.6
4	Ineffective	22	24.4	100
	<b>Total</b>	<b>90</b>	<b>100</b>	

**Source: Computation based on field data 2020**

With regards to the effectiveness of Road Development Agency towards risk management in Toll Road projects, all the respondents supported that it has been effective. In view of this, the majority (47.8%) of the respondents rated effective, 27.8% indicated very effective and 24.4% rated the institution ineffective as shown in Table 5.11.



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**Table 5.12 Effectiveness of National Road Fund Agency**

<b>S/n</b>	<b>Details</b>	<b>Frequency</b>	<b>Percent (%)</b>	<b>Cumulative Percent</b>
1	Extremely effective	-	-	-
2	Very effective	24	26.7	26.7
3	Effective	36	40	66.7
4	Ineffective	30	33.3	100
	<b>Total</b>	<b>90</b>	<b>100</b>	

**Source: Computation based on field data 2020**

When asked to rate the effectiveness of the National Road Fund Agency with regards to risk management in Toll road projects, 26.7% of the respondents rated very effective, 40% rated effective and 33.3% indicated ineffective as shown in Table 5.12.

**Table 5.13 Effectiveness Ministry of Finance**

<b>S/n</b>	<b>Details</b>	<b>Frequency</b>	<b>Percent (%)</b>	<b>Cumulative Percent</b>
1	Extremely effective	-	-	-
2	Very effective	19	21.1	21.1
3	Effective	59	65.6	86.7
4	Ineffective	12	13.3	100
	<b>Total</b>	<b>90</b>	<b>100</b>	

**Source: Computation based on field data 2020**

With regards to the effectiveness of Ministry of Finance towards risk management in Toll Road projects, all the respondents supported that it has been effective. In view of this, the majority (65.6%) of the respondents rated effective, 21.1% indicated extremely effective and 13.3% rated ineffective as shown in Table5.13.

**Table 5.14 Effectiveness of Road Transport and Safety Agency**

<b>S/n</b>	<b>Details</b>	<b>Frequency</b>	<b>Percent (%)</b>	<b>Cumulative Percent</b>
1	Extremely effective	-	-	
2	Very effective	46	51.1	51.1
3	Effective	20	22.2	73.3
4	Ineffective	24	26.7	100
	<b>Total</b>	<b>90</b>	<b>100</b>	

**Source: Computation based on field data 2020**

When asked to rate the effectiveness of the Road Transport and Safety Agency with regards to risk management in Toll road projects, 51.1% of the respondents rated very effective and 22.2% rated effective and 26.7 indicated ineffective as shown in Table 5.14

## **5.6 RISKS ASSOCIATED WITH TOLL ROAD PROJECTS**

The interviewees were asked questions regarding what, in their opinion, are the risks associated with Toll road projects at development stage. Below are some of the main risks that were identified;

- i. Environmental clearance
- ii. Project approval and permission
- iii. Land acquisition
- iv. Inadequate design details
- v. Contract variations
- vi. Lack of feasibility study

### **5.6.1 Environmental clearance**

The interviewees indicated that one of the key risk factors associated with toll road projects is environmental clearance. Under this risk factor, the respondents stated that mostly if the process of assessing the environmental impact of the toll road project is not thoroughly undertaken, it has great potential to bring about stakeholder conflict regarding its viability. The respondents indicated that, for example, in an event that the project will affect existing

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human settlement, and there is no proper environmental assessment, the toll road project will surely face opposition from the affected community.

*“Through a thorough environmental impact assessment, project implementers are well able to identify and understand the key possible impact a project like toll roads would have on people and environment; and they will be able to come up with effective measures to mitigate the impact”- PPP Department, Ministry of Finance and RDAA Director Projects*

### **5.6.2 Project approval and permission**

Possible delay in granting permission and approval of the project was also identified as a risk factor in toll road projects. The respondents indicated that existing bureaucracy towards approval of projects has capacity to affect the successful implementation of toll road projects.

*“The rate at which a projects including toll road projects are approved and permitted to be undertaken has an effect on its success. In an event that the project is not approved as planned for commencement, all other stages and processes involved are affected. This trend of delaying approval of road projects has been seen in the existing project development system in Zambia, more so among implementing agencies”. The situation on the ground has been that even when funds are disbursed early for the project, it will take time for the approval process to be completed” – NRFA respondent.*

### **5.6.3 Land acquisition**

The interviews indicated that respondents were in agreement that land acquisition is a risk factor in toll road projects. The respondents revealed that if the necessary steps and stakeholders are not fully engaged in the acquisition of a specific land for a project to be implemented, the project faces high chances of resistance and ultimately not being viable.

*“The effects of not acquiring land based on the full guidelines and processes brings about problems for project development and implementation. This is so in that the problems accrued to this include; computation errors especially for unregistered land, payment of compensation, inadequate compensation leading to complaints and resistance among the community affected. This ultimately affects contract time and budget” – RDA respondent*

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### **5.6.4 Inadequate design details**

The interviews further revealed that development of toll road projects' can be attributed to wrong and not detailed designs, unskilled manpower, poor contracts and poor stakeholder engagement. The respondents indicated that these factors all can come about as a result of little experience in practical toll road project structuring.

*“Having detailed and correct designs for toll road projects is key as it helps to ensure that there is a reliable and effective view of how the project should be developed and completed. The absence of a clear design creates challenges with regards to having a clear understanding of the required project materials and estimates of costs to be incurred. Therefore it is important that key stakeholders and skilled designers or architects are engaged in ensuring that the correct and detailed design are presented and adopted”* – RTSA/RDA respondents

### **5.6.5 Lack of feasibility study**

The research interviews revealed that the absence of an effective and thorough feasibility study hinders the viability of the project. Conducting an effective feasibility study helps to determine the viability of the project. The research respondents indicated that through a feasibility study, project team is well able to ensure that the project is legally and technically feasible as well as economically justifiable.

*“A feasibility study remains a key component towards ensuring the viability of a project, more so Toll roads. This is so n that through a feasibility study, the project team or implementers are well able to understand and indicate as to whether the project is worth the investment or not”*. Ministry of Finance/ RTSA respondents

### **5.6.6 Contract variations**

The research interviews revealed that contract variations constitute one of the key risk factors in projects such as toll roads. The interviewees revealed that the contract needs to be developed and designed in a consistence manner that does not leave room for unnecessary changes to project works. The scope of the project work should go as outlined and specified in the contract.

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“When undertaking huge projects such as toll roads, there is need to ensure that there is proper contract management before the project is implemented. This is important so as to ensure consistence with what the project aims to achieve or problem to be solved. In an event of additions or omissions to the contract, then all concerned stakeholders should be involved and consulted” – RDA/NRFA/Ministry of Finance respondents

### **PROBAILITY OF RISK OCCURANCE AND EFFECTS ON TOLL ROAD PROJECTS**

Table 5.15 below gives a summary of the results from the survey on the mean ranking regarding the probability of risk occurrence and effects on Toll road projects.

<b>Risks</b>	<b>Probability (P)</b>	<b>Impact (I)</b>	<b>Effect (P*I)</b>	<b>Std. Dev <math>\sigma = \sqrt{\frac{\Sigma (X-X)^2}{n-1}}</math></b>	<b>Significance (<math>\sqrt{P*I}</math>)</b>	<b>Rank within category (out of 6)</b>	<b>Overall Rank (out of 23)</b>
Environmental clearance	3.62	4.25	15.38	0.894	3.92	1	1
Delay in project approval and permits	3.80	3.62	13.75	0.734	3.70	2	6
Land acquisition	2.5	3.5	8.75	0.942	2.95	3	16
Inadequate project design	2.38	3.5	8.3	0.894	2.88	4	17
Lack of an effective feasibility study	2.25	3.12	7.0	1.169	2.64	5	21
Contract variations	2.13	3.13	6.66	1.002	2.58	6	22

## *Risk Management in Toll Road Projects at Project Development Stage*

### **Average Mean**

$(\sum x_i) / n$                       2.78              3.52              9.97                      3.15

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Table 5.15 Mean raking of Toll road Risk occurrence and Effect

### **CHALLENGES AFFECTING TOLL ROAD PROJECTS**

The interviewees were asked to indicate what, in their opinion, are the challenges with Toll road projects at development stage. The challenges indicated included and not limited to;

- i. Poor procurement practices
- ii. Poor budget estimates
- iii. Stakeholder conflicts
- iv. Poor scope control

#### **5.8.1 Poor procurement practices**

The research interviews revealed that poor procurement practices with regards to projects such as Toll roads, has posed to be a problem. The respondents indicated that the procurement methods adopted are mainly characterised by lack of transparency and to some extent they are mainly politically driven.

*“Despite having standards with regards to government procurement practices through the Zambia Public Procurement Authority, the practices have not been adhered to as per provision in the ZPPA Act. Procurement contract adverts are not run according to the standard timeframe and in some cases awards of contract are not published”- Anonymous respondent*

It is worth noting that this in itself has the potential to hinder the progress or implementation of a project. The complete success of a project like Toll roads is highly assured by way of ensuring acquisition of quality project materials through the right procurement process.

#### **5.8.2 Poor budget estimates**

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The respondents indicated that major projects such as Toll Road projects face a problem relating to poor budget estimates. The interviews revealed that it is good practice to have project budgets and deadlines stated before the commencement of works. Usually, if project definition and planning are not done in advance, the project kicks off with inadequate resources and this is mostly not realized until at advanced stages of implementation.

*“Mostly Toll road projects budgets are not thoroughly estimated and as a result they normally take off with inadequate resources which are even key at development stages. In this regard there has been instances where the project starts but within a short period, the works are halted due to finances. This has had adverse effects with regards to having a strong foundation for the project, thereby affecting the level of its sustainability” – Anonymous respondent*

### **5.6.7 Poor scope control**

The interview revealed that poor scope control has been one of the prominent challenge with regards to Toll road projects. This is where on a number of occasions, scope of the project has mostly not been defined early with regards to cost, time and quality. Mainly the focus has slanted towards ensuring quality but neglecting cost and time project factors.

*“Out of the existing Toll road projects, about 70% of them have had an experience where the terms of reference have not been well defined and contractor took time to finish. A good example of toll road projects that exhibited poor scope of control include, Katuba, Toll Road project. Here during design submissions, the emphasis was on trying to ensure quality works but timeframe remained not very clear, hence had the time on their end which delayed the process of implementing of the project – RDA/Ministry of Finance respondents*

Any successful project ensures that the team sticks to the scope and operates within the terms of reference. If the scope of the project is defined at the planning stage of the project and communicated for agreement, then the project team should anticipate problems at the implementation stage which are likely to recipe failure.

**TECHNICAL INPUTS FOR ESTABLISHING RISK MANAGEMENT  
FRAMEWORK IN TOLL ROAD PROJECTS**

**Table 5.16 Defined procurement practices**

<b>S/n</b>	<b>Details</b>	<b>Frequency</b>	<b>Percent (%)</b>	<b>Cumulative Percent</b>
1	Strongly Agree	74	82.2	82.2
2	Agree	16	17.8	100
3	Disagree	-		
4	Strongly Disagree	-		
	<b>Total</b>	<b>90</b>	<b>100</b>	

**Source: Computation based on field data 2020**

From Table 5.16, the responded indicated that there is need to have well defined procurement practices in Toll road projects. In this regard all the respondents agreed with 82.2% strongly agreeing and 17.8% agreeing.

**Table 5.17 Transparency and accountability**

<b>S/n</b>	<b>Details</b>	<b>Frequency</b>	<b>Percent (%)</b>	<b>Cumulative Percent</b>
1	Strongly Agree	84	93.3	93.3
2	Agree	6	6.7	100
3	Disagree	-		
4	Strongly Disagree	-		
	<b>Total</b>	<b>90</b>	<b>100</b>	

**Source: Computation based on field data 2020**

The respondents stated that transparency and accountability in project risk management of Toll road projects is key. To this effect, 93.3% of the respondents strongly agreed and 6.7% Agreed as shown in Table 5.17.

**Table 5.18 Result based performance measurement and management**



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<b>S/n</b>	<b>Details</b>	<b>Frequency</b>	<b>Percent (%)</b>	<b>Cumulative Percent</b>
1	Strongly Agree	72	80	80
2	Agree	18	20	100
3	Disagree	-		
4	Strongly Disagree	-		
	<b>Total</b>	<b>90</b>	<b>100</b>	

**Source: Computation based on field data 2020**

From Table 5.18, the responded indicated that there is need to have well defined procurement practices in Toll road projects. In this regard all the respondents agreed with 72% strongly agreeing and 20% agreeing.

**Table 5.19 Establishing contract Team**

<b>S/n</b>	<b>Details</b>	<b>Frequency</b>	<b>Percent (%)</b>	<b>Cumulative Percent</b>
1	Strongly Agree	28	31.1	31.1
2	Agree	62	68.9	100
3	Disagree	-		
4	Strongly Disagree	-		
	<b>Total</b>	<b>90</b>	<b>100</b>	

**Source: Computation based on field data 2020**

The respondents indicated that there is need to establish an effective contract management team in Toll road projects. In view of this, the majority (68.9%) agreed and 31.1% strongly agreed as shown in Table 5.19

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**Table 5.20 Management of disputes and resolutions**

<b>S/n</b>	<b>Details</b>	<b>Frequency</b>	<b>Percent (%)</b>	<b>Cumulative Percent</b>
1	Strongly Agree	23	25.6	25.6
2	Agree	67	74.4	100
3	Disagree	-		
4	Strongly Disagree	-		
	<b>Total</b>	<b>90</b>	<b>100</b>	

**Source: Computation based on field data 2020**

The respondents indicated that there is need to ensure effective management of project disputes and resolution to ensure project implementation success. To this effect, the majority (74.4%) agreed and 25.6% strongly agreed as shown in Table 5.20.

**Table 5.21 Involve all stakeholders at development stage**

<b>S/n</b>	<b>Details</b>	<b>Frequency</b>	<b>Percent (%)</b>	<b>Cumulative Percent</b>
1	Strongly Agree	73	81.1	81.1
2	Agree	17	8.9	100
3	Disagree	-		
4	Strongly Disagree	-		
	<b>Total</b>	<b>90</b>	<b>100</b>	

**Source: Computation based on field data 2020**

From Table 5.21, the research respondents indicated that stakeholder involvement at the early stage of a project is key in combating risks. In view of this 81.1% strongly agreed and 8.9% agreed.

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**Table 5.22 Frequent Communication of project risks and impact**

<b>S/n</b>	<b>Details</b>	<b>Frequency</b>	<b>Percent (%)</b>	<b>Cumulative Percent</b>
1	Strongly Agree	54	60	60
2	Agree	36	40	100
3	Disagree	-		
4	Strongly Disagree	-		
	<b>Total</b>	<b>90</b>	<b>100</b>	

**Source: Computation based on field data 2020**

From Table 5.22, the responded indicated that there is need to have well defined procurement practices in Toll road projects. In this regard all the respondents agreed with 60% strongly agreeing and 40% agreeing.

### **5.10 CONCLUSION**

This chapter has outlined and tabulated the results obtained from interviews and questionnaires. The presentation covered details of the respondent's profiles before providing responses obtained using direct quotes. This was followed by results from the Likert scale ranking of various risks and benefit of risk management which were categorised during data analysis The results in this chapter also from the Likert scale have highlighted the inputs required for the establishment of a risk management framework.

## **CHAPTER SIX**

### **DISCUSSION OF RESEARCH FINDINGS**

#### **6.1 INTRODUCTION**

The Chapter Presents on the discussion of the research findings presented in Chapter 5. The chapter also incorporates existing literature from Chapter 2 and 3. Furthermore chapter also presents the proposed risk management framework which will help enhance Toll road project delivery.

#### **6.2 DISCUSSION OF RESERCH FINDINGS**

The discussion of the research findings shall be done in line with the established research objectives.

##### **6.2.1 Type of risks are associated with Toll road projects at the development stage**

The research revealed that all respondents agreed that risk management is an important aspect which should be effectively incorporated in managing projects such as Toll roads. In this regard the respondents indicated that the benefits of risk management in Toll road projects include; cost reduction, timely project completion, effective project decision making, enhancement of investment confidence , effective project risk accounting, reduction in project overruns and effective stakeholder engagement as shown in **Tables 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9 and 5.10**. Tis implies that with an effective risk management approach in place, the success of a project is highly guaranteed even before the project is implemented. This is so in that through an effective risk management response plan, it becomes easy to identify risks and mitigate them.

In supporting this value of risk management in Toll road projects, Mills (2001) maintains that managing risks in construction projects has been recognized as a very important process in order to achieve project objectives in terms of time, cost, quality, safety and environmental sustainability. Project risk management is an iterative process: the process is beneficial when is implemented in a systematic manner throughout the lifecycle of a construction project, from the planning stage to completion. A systematic approach to risk management in construction industry consists of three main stages: a) risk identification; b) risk analysis and evaluation; and c) risk response (Mills 2001).

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The research also revealed that there are a number of risks that are associated with Toll road projects. Just like other infrastructure projects, Toll roads project are also prone to risks that include;

### **6.2.1.1 Environmental clearance**

The research revealed that one of the key risk factors associated with toll road projects is environmental clearance. Under this risk factor, the respondents stated that mostly if the process of assessing the environmental impact of the toll road project is not thoroughly undertaken, it has great potential to bring about stakeholder conflict regarding its viability. This was attributed to the observation that environmental assessment are not thoroughly conducted to guarantee effective environmental clearance.

The researcher notes that indeed environmental clearance is a potential risk factor that has the capacity to hinder the development and ultimate success of a project like Toll Roads. Having a clear understanding of the environmental and human impact of a project is key towards enhancing the viability of huge projects such as Toll roads.

### **6.2.1.2 Project approval and permission**

The research revealed that possible delay in granting permission and approval of the project is a potential risk factor in toll road projects. The respondents indicated that existing bureaucracy towards approval of projects has capacity to affect the successful implementation of toll road projects. It was established that any form of delay with regards to the process on ensuring that the project meets the required standards to be undertaken greatly affects the rate at which the project is initially scheduled to be undertaken.

The researcher indicates that when approval and permission processes are not well defined and are too bureaucratic, it becomes very difficult to ensure that the project commences as planned. This is because this delay comes with other problems such as delay in procuring of required materials, which if done in a hurry would lead to poor procurement practices. It is worth noting that the end product of poor procurement practices is poor quality of materials which affects the projects sustainability

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### **6.2.1.3 Land acquisition**

Delay in land acquisition also constituted as one of the prominent risk factors in toll roads projects. The research revealed that in an event that the necessary steps and stakeholders are not fully engaged in the acquisition of a specific land for a project to be implemented, the project faces high chances of resistance and ultimately not being viable. The researcher indicates that in the process of land acquisition, if the affected community or people are not actively considered, for example, with some form of relocation compensation, then it possess a serious risk towards the implementation of the project.

### **6.2.1.4 Inadequate design details**

The study revealed that development of toll road projects' can be attributed to wrong and not detailed designs, unskilled manpower, poor contracts and poor stakeholder engagement. The respondents indicated that these factors all can come about as a result of little experience in practical toll road project structuring. The researcher supports that having designs that are not complete or those which are not done by qualified or skilled architects has capacity to affect the viability of the project even before implementation. This is so in that incomplete or less detailed project designs have the potential to lead to wastage of resources and increase costs.

### **6.2.1.5 Lack of feasibility study**

The research study also revealed that the absence of an effective and thorough feasibility study hinders the viability of the project. Conducting an effective feasibility study helps to determine the viability of the project. The research respondents indicated that through a feasibility study, project team is well able to ensure that the project is legally and technically feasible as well as economically justifiable.

The researcher supports this and maintains that a feasibility study helps to ensure that the desired project ia environmentally friendly and economically justifiable. Through a feasibility study, it becomes easy to have a clear picture of the impact of the project and estimates of the costs involved to avoid overruns and delay. A feasibility study ultimately enhances the viability of a project.

#### **6.2.1.6 Contract variations**

Furthermore on the risk factors associated with Toll roads, the research showed that contract variations constitute one of the key risk factors in such projects. The interviewees revealed that the contract needs to be developed and designed in a consistency manner that does not leave room for unnecessary changes to project works. The scope of the project work should go as outlined and specified in the contract.

The researcher supports this by articulating that having changes or variations in a project contract becomes a thorn to the execution of the project. This is so in that variations in a project contract give rise to potential conflict of interests and also brings about poor scope control of the project.

These findings are supported by, Woodridge (2002) who argued that the three major risk factors in toll road experience facing concessionaires are the difficulties in the acquisition of the right-of-way and the environmental clearance. Successful project management requires the identification of the factors impacting project scope definition, cost, schedule, contracting strategy and work execution plan (Karaulova, Kramarenko, & Shevtshenko, 2008).

Furthermore, Sandhyavetri (2017) also maintained that during the pre-construction phase the development of toll project some key risks were identified as affecting project success and they included; project permissions, feasibility study, detailed design, land acquisition and investment. Atul (2013) further defined and described toll operations in Indian scenario and narrated various factors affecting tolling operations particularly toll revenue in the country. The factors include willingness to pay toll, toll leakage, local support, parallel routes, plaza design and location, technology and incidents management.

Khans' (2013) road construction research study also established a number of main factors causing project cost overrun. Among these risks was the environmental risk which included negative environmental impacts and lack of vegetation cover. Khan (2013) maintained that due to large volumes of development that are introduced in large scale development projects, it is always expected that the project will have a negative impact on its environment. Therefore, in order to overcome this risk, an environmental impact assessment study needs to

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be conducted in order to identify the negative impacts of the project along with necessary measures that need to be adopted.

In view of identifying risks associated with Toll road projects', the research results revealed that Toll road institutions that include; National Road Fund Agency (NRFA), Road Development Agency (RDA) , Ministry of Finance (MoF) and Road Transport and Safety Agency (RTSA) have not been as effective as expected in managing Toll roads projects'. This is evidenced from the results showing a level of ineffectiveness indicated in Tables 5.11, 5.12, 5.13 and 5.14 respectively. These institutions constitute the major regulatory framework for Toll road projects and any level of ineffectiveness calls for immediate attention. This is because in an event that the legal regulatory framework of such projects remains ineffective, the viability of the project is compromised as the project will not have the much needed legal back up or support. These government agencies are key in providing primary information with regards to the feasibility, planning and procurement practices engaged at the development stage of toll road projects in Zambia. Furthermore, the toll road system, supplements the efforts of these institutions in resource mobilization for road maintenance and development.

### **6.2.1.7 The probability and impact of risk in Toll road projects at the development stage**

The research established that the identified risks associated with toll road projects have a moderate chance of occurrence and effect on Toll road projects at development stage. This is shown through an overall mean effect score of 9.97 and a significance of 3.15 presented under Table 5.15. This implies that the identified risks have the potential to occur and have a bearing on the implementation and success of Toll road projects. The possible effects include; cost overrun, project delays and reduced level of project sustainability.

In support of these finding, Serpella et al. (2014) argued that risk management in construction projects is full of deficiencies that affect its effectiveness as a project management function and in the end, projects' performance. The absence of an effective project risk management function has several negative consequences for participants in a project due to lack of preventive action against the risks and uncertainty that any project presents (Wolbers, 2011). For example, the lack of prevention against the risk of scope definition of a project, or



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environmental hazards or communication risks, between others, leads to delays, significant increases in costs and contractual disputes, among others.

Mills (2001) also supports by indicating that Construction projects can be extremely complex and fraught with uncertainty. Grimsey (2002) also asserts that poor risk management as a whole is one of the major aspects causing projects to collapse. This has become an obstacle to each and every project that is considered for development in today's world. In addition, ignoring chances of risks in a project can bring about a lot of costs to the project sponsor hence spoiling the relationship between an organisation and the public or client to which the project is being developed for. As a result of this, the concept of risk analysis and management continue to be a major feature of the project management of construction projects in an attempt to deal effectively with uncertainty and unexpected events and to achieve project success (Kaliba 2010).

### **6.2.2 Technical inputs are required in establishing an effective risk management framework for toll road projects at the development stage**

The research established that there exist some challenges affecting Toll road projects in Zambia. These challenges included, Poor procurement practices, Poor budget estimates, Stakeholder conflicts and Poor scope control.

#### **Poor procurement practices**

The research interviews revealed that poor procurement practices with regards to projects such as Toll roads, has posed to be a problem. The respondents indicated that the procurement methods adopted are mainly characterised by lack of transparency and to some extent they are mainly politically driven.

#### **Poor budget estimates**

The research established that major projects such as Toll Road projects face a challenge relating to poor budget estimates. The interviews revealed that it is good practice to have project budgets and deadlines stated before the commencement of works. Usually, project definition and planning are not done in advance resulting in project commencing with inadequate resources.

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In view of this finding, Silungwe (2015) maintained that it is always good practice to have project budgets and deadlines stated before the commencement of works. Usually, if project definition and planning are not done in advance, the project kicks off with inadequate resources and this is mostly not realized until at advanced stages of implementation. Many failed projects are categorized as such based their overrun on budgets and time. In addition, Frimpong (2003) in a study established that contractors and consultants pointed out monthly payments difficulties as the most important cost overruns factor, while owners ranked poor contractor management as the most important factor.

### **Stakeholder conflicts**

The research established that there has been a lapse in the process of engaging all key stakeholders in Toll road project risk management. The respondents indicated that not all key stakeholders are fully involved in Toll road projects especially at development stage. The researcher notes that inadequate engagement of all key stakeholders in a project such as Toll Roads has great potential to face resistance thereby demeaning the viability and sustainability of the project.

Hendrickson, (2000) supports this finding and argue that whenever the major project characteristics and deliverables are not defined in advance, differences in expectations amongst stakeholders emerge. This is despite taking the initial direction from sponsor the reason being that as the project gets larger even the sponsor may lose hold of a complete picture of what needs to happen to have a successful project. Kishk et al. (2003) also maintains that sometimes the sponsor might have a vision but there could be other better visions from the stakeholders and these conflicting situations may cause confusion on a project resulting in some parties withdrawing their support. This is quite common with government projects where politicians develop visions and make pronouncements without engaging experts. Suseno et al., (2015) noted that inclusive stakeholder involvement in the project life cycle, especially at development stage, is an important practice as it allows for effective participation and acceptance of the project

### **Poor scope control.**

The research revealed that poor scope control has been one of the prominent challenge with regards to Toll road projects. This is where on a number of occasions, scope of the project

### ***Risk Management in Toll Road Projects at Project Development Stage***

has mostly not been defined early with regards to cost, time and quality. Mainly the focus has slanted towards ensuring quality but neglecting cost and time project factors.

Kerzner, (2009) supports this finding by stating that any successful project ensures that the team sticks to the scope and operates within the terms of reference. If the scope of the project is defined at the planning stage of the project and communicated for agreement, then the project team should anticipate problems at the implementation stage which are likely to recipe failure. Larson and Gray (2011) also established several steps within the project definition stage; the first step comprises the definition of the project scope. In the Sydney Opera House project for example, the project scope was not clearly defined. The original project objective was not to build an opera house in the first place, but a major concert hall with a dual function as an opera (Ibid).

Furthermore, Lartey's (2011) evaluation of donor-funded infrastructure projects in Zambia argued that there were serious problems with planning processes that led to projects not being completed on schedule or budget. Lartey stated that planning had not been very efficient and effective resulting in implementation bottlenecks. To this effect, several infrastructure developments such as roads have been characterized by budget overruns and delays due to inadequate resources which are mostly realized at an advanced stage of implementation.

However, besides the challenges, the research also established that there exist key technical inputs towards development of an effective risk management framework. In this regard, the research respondents indicated a number of inputs that in general terms constituted of institutional capacity (defined procurement practices, result based measurement and management, Transparency and accountability), Contract management (contract team, managing contract conflicts and resolutions) and Stakeholder engagement (involvement of all stakeholder in initial project stages, frequent communication of project risks and impact) as shown in Tables 5.16, 5.17, 5.18, 5.19, 5.20, 5.21 and 5.22.

The author supports that an effective risk management needs to have checks and balances with regards to institutional capacity, contract management and stakeholder engagement. It is mainly when all these categories are well founded that arising risks shall be able to be effectively mitigated especially in infrastructure projects such as Toll roads. Having a risk

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management framework with these technical inputs will surely help to ensure that future Toll Road project are viable and sustainable way before the project is implemented.

### **6.3 CONCLUSION**

The chapter thoroughly looked at summary of the findings based on chapter five presentations. Thereafter, discussions based on study objectives were made in line with previous research findings.

## **CHAPTER SEVEN**

### **CONCLUSION AND RECOMMENDATIONS**

#### **7.1 INTRODUCTION**

Chapter seven (7) presents the conclusion and recommendations based on the research findings and discussion of research objectives. The conclusion constitute of a summary of the research findings in line with the established research objectives. On the other end the recommendations constitute the measures that can be adopted and implemented in ensuring effective risk management in Toll Road projects.

#### **7.2 CONCLUSION**

##### **7.2.1 Type of risks are associated with Toll road projects at the development stage**

The research concludes that risk management in Toll road projects has a number of benefits that includes; effective resource utilization, timely implementation of the project, effective decision making, effective stakeholder engagement and enhanced project accountability. The research also concludes that there a various key risk factors associated with toll road projects and these include; environmental clearance, land acquisition, delay in project approval and permission, inadequate design details and lack of thorough feasibility study. The risk factors should be identified during the early stages of the project so as to avoid possible delays and cost overruns during and after project implementation.

With regards to the effectiveness of the existing legal framework for toll roads in Zambia, the research concluded that these institutions that include; National Road Fund Agency (NRFA), Road Development Agency (RDA), Ministry of Finance (MoF) and Road Transport and Safety Agency (RTSA) have not been as effective as expected in managing Toll roads projects. This shows that the institutions are not providing adequate management and control of Toll road projects. It is worth noting that the effectiveness of such institutions is of great importance as they constitute the major regulatory framework for Toll road projects and any level of ineffectiveness calls for immediate attention.

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### **7.2.2 The probability and impact of risk in Toll road projects at the development stage**

The research concluded that by nature of the Toll road projects, the occurrence of risks is inevitable and these risks do have an impact on the project. Some of the impact include that the project shall be characterised by budget or cost overruns and waste of project resources more so during the development stage. Ultimately this will have a bearing on the quality, sustainability and viability of the project. Therefore it follows that risks associated with Toll road projects should be identified early so as to allow for effective development of mitigation measures and enhance project success right at the development stage of the project.

### **7.2.3 Technical inputs are required in establishing an effective risk management framework for toll road projects at the development stage**

The research concludes that there exist some challenges affecting Toll road projects in Zambia. These challenges included, Poor procurement practices, Poor budget estimates, Stakeholder conflicts and Poor scope control. Just like other infrastructure projects are prone to risks which should be mitigated especially at development stage. To help establish effective ways of risk management, the research concluded that some technical inputs can be incorporated towards establishment of an effective risk management framework. The essence of the risk management framework is to provide reliable and consistent guidance in project risk management especially at development stage. The technical inputs to constitute an effective risk management framework include; institutional capacity (defined procurement practices, result based measurement and management, Transparency and accountability), Contract management (contract team, managing contract conflicts and resolutions) and Stakeholder engagement (involvement of all stakeholder in initial project stages, frequent communication of project risks and impact). It is from these inputs that a proposed risk management has been developed.

## **7.3 RECOMMENDATIONS**

Based on the research findings and conclusion, this research recommends that;

- i. All stakeholders should be involved actively in project risk management during the development stages of Toll Road project planning in order to ensure that project produces required outcomes as set by concerted efforts. Once all stakeholders are

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involved and project communication channels are established then it increases the chances of mitigation possible risks that emanates from the absence of other key stakeholders

- ii. There is need for key Toll road government agencies such as NRFA, RTSA, MOF and RDA to review their efforts towards management and control of Toll road projects. As these institution constitute the legal framework for Toll road projects, any level of ineffectiveness needs or call s for immediate attention and rectification. The roles and responsibilities among these institutions need to be clearly established and aligned with result based key performance indicators.
- iii. There is need to ensure that procurement practices are highly characterised by transparency and accountability. The ZPPA Act provisions need to be clearly embedded in such projects and should be followed to the later to ensure that the right bidders are attracted and selected based on merit. This in turn will help procure relevant project skills and materials.
- iv. Toll Road projects designs should be undertaken by an architect who meets the minimum standard of qualifications and experience. There should at least be enough referral work experience with regards to detailed designs covering all that is required to ensure that the project is viable and does not bring about cost overruns or possible delay in implementing. This will surely help with regards to ensuring that the required and exact project materials are budgeted for, thereby reducing project resource wastages.

#### **7.4 Limitation to the study**

The research faced limitations in areas that include;

- i. Respondent's response rate: In view of this, a number of respondents took time in completing the questionnaires and this affected the pace at which the researcher had to conduct data analysis and ultimately compile the whole dissertation. To mitigate the situation from getting worse, the researcher had to make regular physical visits and phone calls to ensure that questionnaires were answered. Of course this was done with permission from respondents to be reminded.
- ii. Last minute change: A good number of respondents especially from the regulatory institutions, made last minute changes with regards to participating in the research.

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This was after indicating earlier the willingness to participate and questionnaires being left in their care. However the researcher managed to engage other reliable employees in the respective institutions.

- iii. Incomplete questionnaires: Some of the respondents did not adequately complete the questionnaires and at same time some questionnaires were not submitted. However the researcher managed to have a 90% response rate.

### **7.5 Future Research Areas**

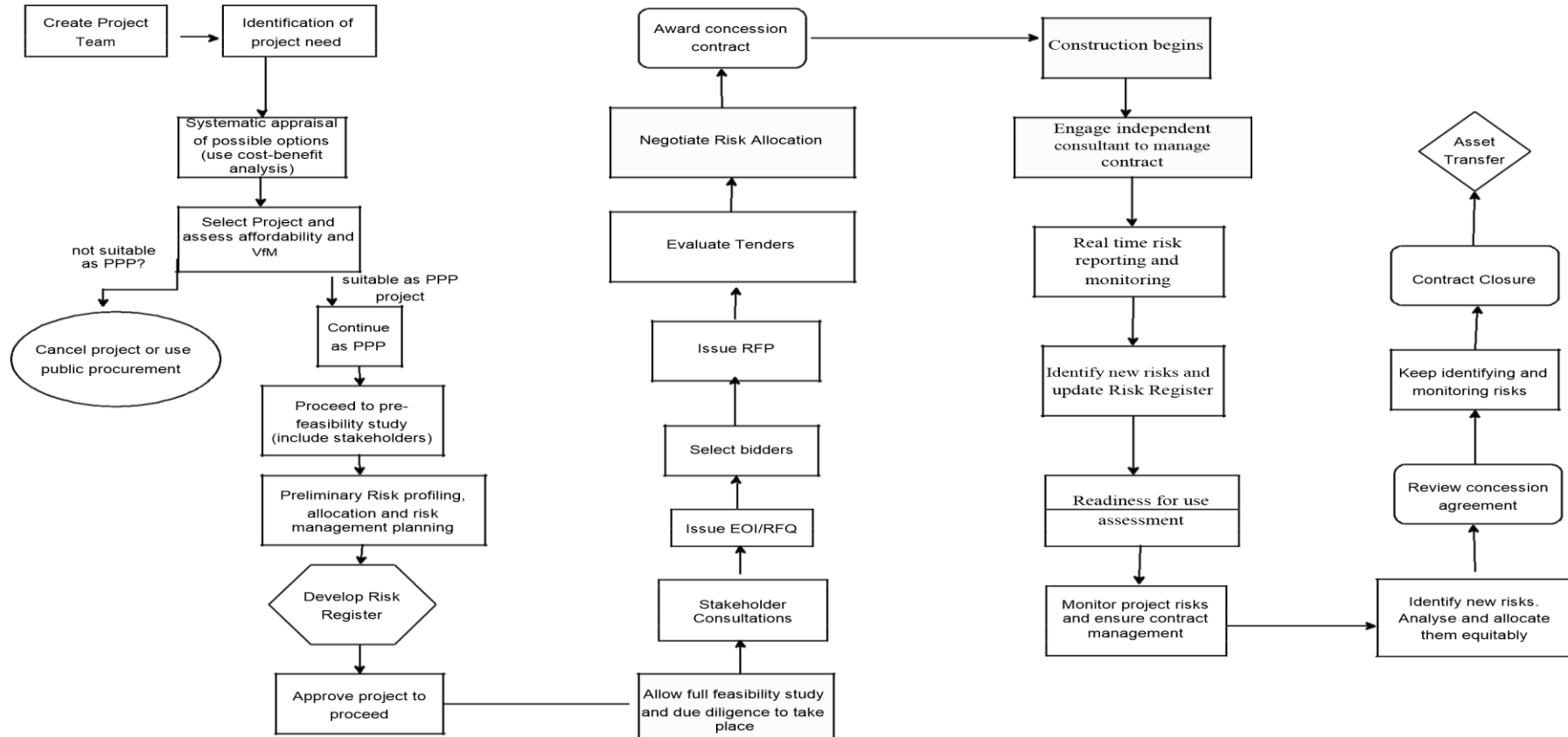
The possible directions for further research based on this research include that;

- i. This study was limited to the development stage of Toll road projects. Future research can be done for other stages in the project life cycle of Toll roads.
- ii. Comparative studies could be undertaken under risk management in different Toll road projects, for example the new Chilonga and Chongwe Toll roads.



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**Figure 7.1: Proposed Risk Management Model**



**Figure**

**7.1**

**proposed**

**risk**

**management**

**framework**

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**APPENDIX I: Structured Questionnaire**



Dear Respondent,

I am a research student at the University of Lusaka pursuing a Master of Science Degree in Project Management. In fulfilment of the dissertation requirements, I am undertaking a research on **Risk Management in Toll Road Projects at Project Development Stage- Case study of Lusaka Toll roads.**

The research seeks:

1. To identify the risks associated with Toll road projects at the development stage
2. To establish the probability and effects of risk in toll road projects at the development stage
3. To develop technical inputs into the risk management framework for Toll road projects at the development stage

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

Thank you in anticipation.

Yours Sincerely,

Bwalya C. Lungu (Masters Research Student)

**SECTION A. GENERAL INFORMATION**

1. Name of organization.....
2. Type of Establishment:
  - a) Consulting [ ]
  - b) Contracting [ ]
  - c) Government [ ]
  - d) Concessionaire [ ]
  - e) Others specify.....
3. Level of Education:
  - a) Certificate [ ]
  - b) Degree [ ]
  - c) Master's Degree [ ]
  - d) Other (s) specify .....
4. Profession:
  - a) Quantity Surveying [ ]
  - b) Architecture [ ]
  - c) Engineering Building [ ]
  - d) Project Management [ ]
  - e) Others (specify).....
5. How long have you been working for the organization/firm:
  - a) 1 – 2 Years [ ]
  - b) 3 – 4 Years [ ]
  - c) 5 Years and above [ ]

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**SECTION B. IDENTIFICATION OF RISKS ASSOCIATED WITH TOLL ROAD PROJECTS (Please (tick) as appropriate)**

**6. Benefits of Risk management in Toll road projects**

Please tick (✓) as appropriate to indicate your knowledge of the benefits that come along with risk management risk in Toll road project. The scale are as follows:

Strongly Agree	Agree	Disagree	Strongly disagree
1	2	3	4

No.	Benefits of Risk management	Rating			
		4	3	2	1
1	Cost reduction				
2	Timely completion				
3	Effective resource mobilisation				
4	Effective project decision making				
5	Enhanced confidence in investment				
6	Proper accounting for project risks				
7	Reduced project overrun				
9	Effective stakeholder engagement				

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**7. Risks associated with toll road projects**

Please tick (√) as appropriate to indicate your understanding of the risks associated with Toll road project you have handled. The scale are as follows:

Strongly Agree	Agree	Disagree	Strongly disagree
1	2	3	4

Strongly agree = Identified risk is very much applicable to the project

Agree = Identified risk is applicable to the project      Disagree = Identified risk is applicable to the project

Strongly disagree= Identified risk management is extremely not applicable to the project

No.	RISK ASSOCIATED WITH TOLL ROAD	Relation measurement				
		5	4	3	2	1
1	Environmental clearance					
2	Project permission					
3	Land acquisition					
4	Lack of feasibility study					
5	Inadequate design details					
6	Inadequate tendering					
7	High Bidding Costs					
8	Incompetent project team					
9	Public opposition to projects					
10	Level of demand for the project					
11	Availability of Finance					

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12	Delay in project approvals and permits					
13	Inadequate distribution of authority between partners					
14	Excessive contract variation					

**SECTION C. PROBABILITY OF OCCURRENCE AND EFFECT OF RISK IN TOLL ROAD PROJECTS AT THE DEVELOPMENT STAGE. [Please (tick) as appropriate]**

Please tick (✓) as appropriate to indicate your assessment of the probability of occurrence and criticality of the impact of identified risk Toll road project you have handled. The scale are as follows:

Disastrous	Severe	Substantial	Marginal	Negligible
5	4	3	2	1

Disastrous = project investment could not be sustained,

Severe = serious threat to project objectives, Substantial = reduces attainment of project objectives significantly, Marginal = small effect on project objectives, and; Negligible= trivial effect on project objectives.

Likelihood/probability of occurrence;

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

No.	Risk factor at development stage	Probability					Impact				
		5	4	3	2	1	5	4	3	2	1
1	Environmental clearance										
2	Project permission										
3	Land acquisition										
4	Lack of feasibility study										
5	Inadequate design details										
6	Inadequate tendering										
7	High Bidding Costs										
8	Incompetent project team										
9	Public opposition to projects										

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10	Level of demand for the project									
12	Delay in project approvals and permits									
13	Inadequate distribution of authority between partners									
14	Excessive contract variation									

**SECTION D: TECHNICAL INPUTS REQUIRED IN ESTABLISHING AN EFFECTIVE RISK MANAGEMENT FRAMEWORK FOR TOLL ROAD PROJECTS AT THE DEVELOPMENT STAGE**

The following scale must be used to rate your preferred answer. Use a 5 point scale, (1=strongly agree, 2=agree, 3=undecided, 4=do not agree, 5=strongly do not agree), to indicate your degree of agreement on the validity of the following questions.

No.	Technical inputs	Relation measurement				
		5	4	3	2	1
1	Well defined procurement process/contract					
2	Defined stakeholder working relationship					
3	Transparency and accountability					
4	Well established budget and resource allocation					
5	Contractual arrangements in place					
6	Favourable internal working environment					
7	Results based performance measurement and management					
8	Defined project requirements					
9						

**APPENDIX II: Interview guide**



Dear Respondent,

I am a research student at the University of Lusaka pursuing a Master of Science Degree in Project Management. In fulfilment of the dissertation requirements, I am undertaking a research on **Risk Management in Toll Road Projects at Project Development Stage- Case study of Lusaka Toll roads.**

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Thank you in anticipation.

Yours Sincerely,

Bwalya C. Lungu (Masters Research Student)



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**INTERVIEW QUESTIONS**

The purpose of this interview is to get your views on risk management for Toll roads projects at development stage in Zambia. Please note that the answers should be based on your experience regarding construction projects.

1. Name of interviewee: \_\_\_\_\_

2. Organization: \_\_\_\_\_

3. Position in the organisation/firm: \_\_\_\_\_

4. Academic qualification \_\_\_\_\_

5. What role does your organisation play in toll road construction?

\_\_\_\_\_  
\_\_\_\_\_

6. What potential risks are associated with Toll road projects at development stage?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

7. From your perspective, what are the benefits of risk management in Toll road project?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

8. How effective have the key Toll road project institutions (Ministry of Finance, RDA, NRFA) been in ensuring effective risk management? Explain your answer

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

9. The tradition procurement method has faced challenges in addressing poor performance, over expenditure and schedule overrun on construction projects. How have Toll road projects addressed these challenges in infrastructure provision?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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10. What are the main concerns and challenges affecting Toll road projects and how can each measure be mitigated?

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11. What measures have been put in place towards value for money in toll road projects? How effective have the measures been?

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12. From your perspective, how is sustainability ensured in Toll road projects?

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13. With reference to risk management in toll road projects, what other views do you have about;

a) Budget overruns

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b). Poor procurement practices

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c). Stakeholder collaboration

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d). Project Viability

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e) Project success factors

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