

**MAIN CHALLENGES OF ROAD INFRASTRUCTURE DEVELOPMENT  
PROJECTS IN MALAWI: A CASE STUDY OF SIX ROAD PROJECTS**

**MASTER OF SCIENCE IN INFRASTRUCTURE DEVELOPMENT  
MANAGEMENT (MSc. IDM.) THESIS**

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**UNIVERSITY OF MALAWI  
THE POLYTECHNIC**

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**Master of Science in Infrastructure Development Management (MSc. IDM.)**

**Thesis**

**By**

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**Submitted to the Department of Mechanical Engineering, Faculty of Engineering, in partial  
fulfilment of the requirements for a Master of Science Degree in Infrastructure  
Development Management (MSc. IDM.)**

**University of Malawi**

**The Polytechnic**

**May 2017**

## **DECLARATION**

I declare that this research entitled, “Main Challenges of Infrastructure Road Development Projects in Malawi: A Case Study of Six Road Projects” is my own work. It is submitted in partial fulfilment of the requirements for the Master of Science Degree in Infrastructure Development Management at the Polytechnic, University of Malawi. It has not been submitted for any other degree to any university.

**SIGNATURE** :

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## **CERTIFICATE OF APPROVAL**

The undersigned certify that they have read and approve for acceptance by the University of Malawi, the Polytechnic this thesis entitled, “*Main Challenges of Road Infrastructure Development Projects in Malawi: A Case Study of Six Road Projects*”.

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## **DEDICATION**

This thesis is dedicated to all those people who strive for the best in their lives. GOD is faithful and He does it in His right time.

My children Atuweni Jessica and Alipo Juan remember you can make it. Life is a journey.

## **ACKNOWLEDGEMENTS**

Firstly, I would like to extend my profound thanks to my academic supervisor, Dr W. S. Kuotcha, for his professional advice, suggestions and endless support offered from the very beginning through to the very end of this research. I wish to also thank my friends and classmates who tirelessly and continuously encouraged me throughout this research, your interest, insight and suggestions have been very valuable to me.

Lastly, I whole heartily thank my wife, Maggie, for your support, perseverance and encouragement.

May **GOD** bless you All.

## **ABSTRACT**

The aim of the study is to highlight challenges in road infrastructure development projects in Malawi. The research has outlined causes of the challenges in the road infrastructure development projects as well as described methods of averting these challenges to achieve efficiency and increase value for money for the projects.

An inductive research approach has been used in this study since information was collected which was used to draw up conclusions involving deriving a general principle from a set of observations. The principles of project management were used to assess a sample of projects which were studied. The sampled projects included those which had been closed, running projects and those which were just commencing. The case study projects were as follows: Karonga – Chitipa Road, Blantyre – Zomba Road, Nchalo - Bangula Road, Kasungu – Msulira Road, Mzimba – Eswanzini – Mzalangwe Road and Jenda – Edingeni Road.

The study has revealed that the challenges that are frequently highlighted to have influenced performance of projects in the road sector include: design errors, design changes, delayed site handovers, increased quantities, devaluation of the Malawi Kwacha currency, abnormal rainfall, missing BOQ items, additional work, change of supervision consultant, delayed payment, limited payments, non-availability of fuel, breakdown of plant and vehicles, delayed approval of designs, delayed approval of addendum, non-availability of base gravel, delays in evaluating and agreeing on claims, tendering procedures, contractor's delays and variations. These results were triangulated by carrying out unstructured interviews with case study project coordinators and also by getting data from other main stakeholders who were involved in the case study projects using a questionnaire.

After analysing the data from the six case study projects, the research has revealed that considering the project cycle, the major challenges in road sector projects are at implementation and, monitoring and evaluation stages. These challenges are mainly mis-procurement, corruption in the system and lack of funds for an entire project. The study further revealed that major causes of these challenges are: corruption, political interference, greed, lack of capacity, poor loan negotiation skills, poor project estimates and poor phasing of projects.

And finally, it has been concluded that these challenges can be averted by continuous capacity enhancement in procurement systems of projects as well as in project management procedures. This capacity enhancement has to cover all project main stakeholders. The research has also highlighted the need of main-streaming anti-corruption policy in the whole project implementation cycle and implementing projects in phases depending on availability of resources.



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## **ABBREVIATIONS AND ACRONYMS**

ADB	African Development Bank
BOQ	Bill of Quantities
CDC	Centers for Disease Control and Prevention
CMAA	Contractors Management Association of America
CMR	Construction Management at Risk
CQBS	Cost and Quality Based Selection
DBB	Design-Bid-Build
DBIA	Design Build Institute of America
EMV	Expected Monetary Value
FIDIC	Federation Internationale Des Ingenieurs Conseils
GDP	Gross Domestic Product
GoM	Government of Malawi
KPMG	Klynveld Peat Marwick Goerdeler
LCM	Least Cost Method
MGDS	Malawi Growth and Development Strategy
MoWS	Ministry of Works and Supplies
MP	Multi-Prime
NAO	National Audit Office
NRA	National Roads Authority
NSO	National Statistical Office
NTP	National Transport Policy
ODPP	Office of the Director of Public Procurement
OGL	Original Ground Level
QBM	Quality Based Method
PMI	Project Management Institute
PMP	Project Management Professional
RA	Roads Authority
RFA	Roads Fund Administration
RMI	Road Management Initiative
SPSS	Statistical Package for Social Sciences
UK	United Kingdom

# **CHAPTER 1**

## **INTRODUCING THE CONTEXT OF THE THESIS**

### **1.1 Background**

According to recent studies, many countries have recently gone through a process of transforming their force account or direct labour road maintenance operations to a private sector contracting environment, (Andreski, Seth & Walker 2007). However, despite moving away from force account to contracting out, there are a lot of projects which do not finish in time, have large cost overruns and have even been abandoned.

In Malawi, just like in so many sub-Sahara African countries, reforms in the roads sector started in 1990s through a World Bank funded Road Management Initiative (RMI) (Malawi Government, 2010). In 1995, most of the Ministry of Works and Supplies (MoWS) casual staff were laid off. The National Roads Authority (NRA) was established by an Act of Parliament in 1997 to take over the road contracting and management responsibility from the Department of Roads in the MoWS. The NRA was also given the responsibility to raise funds for road construction and maintenance under the government oversight. The local contracting and consulting industries had only just started at that time.

In 2008, the NRA was abolished so that there could be separation of powers between mobilizing funds and for implementation of the road programmes. Therefore, the Road Fund Administration (RFA) was established under an Act of parliament in the same year to take over the financial mobilizing responsibilities from the NRA. Then another agency, the Roads Authority (RA) was established through an Act of parliament as well to manage the implementation of the roads sector programmes.

### **1.2 Rationale of the Research**

As indicated by Project Management Institute (PMI), (2008), project governance provides a comprehensive, consistent method of controlling the project and ensuring its success. Hence the project governance should be described in the project management plan. Therefore, a project's governance must fit within the larger context of the program or organisation sponsoring it. The Malawi Government (2011) recognises that road transport is the dominant mode of transport in Malawi. In this respect, the country has over the years

been constructing, rehabilitating, and upgrading road infrastructure. The strategic goal of the Government which has been expressed through the National Transport Policy is “to ensure provision of a safe, affordable, accessible and high quality road transport system”. One of the major challenges of road sector projects as indicated above are not well managed projects which end up being quite costly for the government (Malawi Government, 2006). Therefore this research will look into the above raised issues so that viable solutions could be recommended. This research will contribute to the wealth of knowledge in road infrastructure project management in Malawi in particular and the world at large. The results will also highlight experience of road infrastructure project management in a developing country.

### **1.3 Research Questions and Specific Objectives**

Against this background, it is the intention of this research to answer the following questions among others.

- a. What are the main challenges of road infrastructure development projects?
- b. What are the causes of those challenges in the road sector projects?
- c. How can the challenges be managed so that efficiency is improved in road infrastructure development projects?

The specific objectives of the study are as follows:

- a. To identify challenges in road infrastructure development projects
- b. To identify causes of the challenges in the road infrastructure development projects.
- c. To find methods of averting these challenges in road infrastructure development projects.

### **1.4 Thesis Layout**

To investigate the above outlined questions, the dissertation has been organized into six chapters. Chapter one starts with giving the background of the research, the rationale for carrying out the study, and the expected results of the study.



Chapter two focuses on literature review. This chapter starts by looking at the conceptual framework of the research, then discusses the theoretical principles of project management in relation to the project cycle. Best practices of project infrastructure management project management in Malawi, project risk management are also discussed. Then the chapter closes by discussing challenges of project management from the regional perspective.

In the third chapter, the methodology follows to answer the research questions outlined. This chapter starts by discussing the research proposition, then the research approach and research strategy. The methods of data collection are also covered.

The findings of the research are discussed in chapter four. This chapter starts with identifying the frequently highlighted challenges in the roads sector by examining each case study project. Each case study is examined and challenges evaluated. The chapter closes by discussing the frequently highlighted challenges in all case study projects.

Chapter five focuses on understanding the causes of challenges in the roads sector using feedback from respondents. The chapter starts with assessing at what levels in the project cycle, do most challenges occur, and then analysis of causes of the challenges is carried out. And finally, the chapter closes by discussing general case study project performance according to the responses from the main project implementing stakeholders.

Finally, chapter six focuses on conclusions and research recommendations. The chapter starts with discussing the major conclusions, and then it outlines the recommendations from the study. Finally the chapter looks at limitations and areas of further research.

## **1.7 Chapter Conclusions**

This chapter has introduced the research problem currently being faced by road sector projects and the research questions and specific objectives which would guide the discussions in the rest of the research paper.

The next chapter will perform a critical literature review of the study and discuss the project management approaches in use.

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter reviews literature underpinning this study. Firstly, the concepts of project management are reviewed as a way of highlighting efficient ways of managing projects, and then policy direction of project management by the Government of Malawi are discussed. Thereafter, best practices in infrastructure project management are critically reviewed with emphasis on the roads sector.

Furthermore, project risk management is discussed. These are risks and uncertainties which have to be managed for a project to be implemented successfully.

Finally the chapter concludes by looking at major challenges of project management in the region.

#### **2.2 Conceptual Framework**

In this research, infrastructure management is conceptually set in the context of challenges, in which the objective function would be optimization of infrastructure management subject to constraints.

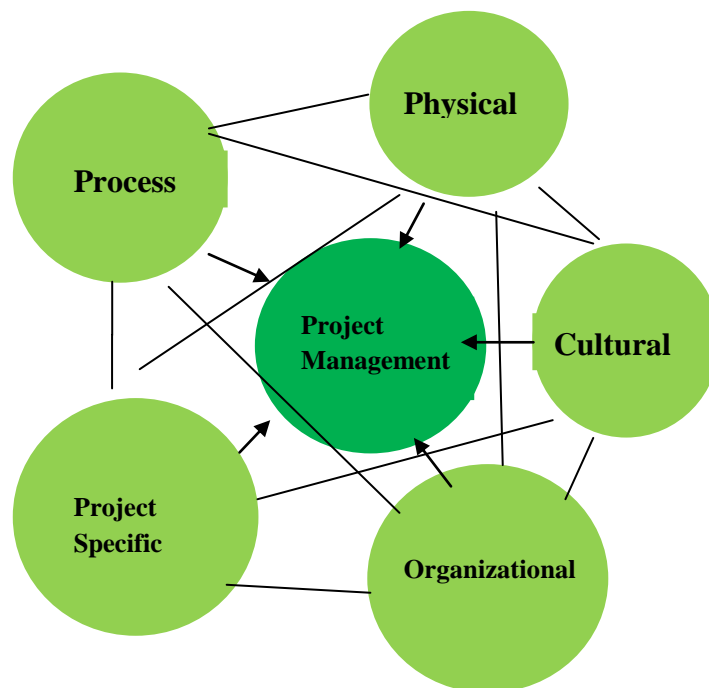
A constraint is generally defined as anything that limits a system from achieving higher performance when measured against its "goal" in respect to continuous improvements in organizations (Goldratt, 1990). Thus, a constraint in infrastructure management is regarded as an inhibiting condition, agency, or force that limits a system's performance in a given context or environment (Whelton, Penneanen & Ballard, 2004). Whilst PMI (2008) states that a constraint is an applicable restriction or limitation, either internal or external to the project that will affect the performance of the project or a process.

Constraints in infrastructure project management can be quite diverse. According to (Ngoma, Mundi & Kaliba, 2014) in their study of challenges of public, private, partnership infrastructure projects in Zambia, twenty-three constraints were ranked by respondents from the public and private sectors and compared. However, Spacey (2016) indicates

nineteen project constraints which are: business, cost, design, due diligence, facilities, human resource, infrastructure, legal, methodology, organizational, physical, process, procurement, quality, resources, risk tolerance, scope, technical and time.

According to Lau and Kong (2006), there are five main categories of construction projects constraints and these are: economic, legal, environmental, technical and social constraints. Among the five, legal constraints are the most leading constraints in Hong Kong. However, according to Lendry (2009), there are five main types of project constraints. And these are: process, physical, cultural, organizational and project specific. Considering the two main categorization, this study will adopt the categorization of Lendry (2009) since the categorization was developed from a general project management approach rather than project specific and all other factors can be categorized in these five main constraints.

Therefore this research will use these five main constraints as its conceptual framework as shown in Figure 2.1 below.



**Figure 2.1: Conceptual Framework for the research – adopted from System Interaction (Mwaiselage, 2003)**

### 2.2.1 Process Constraints

Typical examples of process constraints are: poorly defined strategic objectives, poor business planning –lack of solid business cases for potential projects, lack of cross-

enterprise view, unknown project inventory, lack of understanding of existing resource commitments and lack of supporting processes of the project. Spacey (2016) gives an example of process constraint as a requirement to adhere to a process such as a budgeting process with cut-off dates. According to Kumar (2011), lack of flexibility and resistance to change are the main reasons for project failures. Traditional project management assumes that once a well thought out project plan is created and followed, it will provide good, expected results. However, it fails to address the practical uncertainties such as requirement change, work not completed on time, delayed approvals, etc. that typically occur in any project.

### **2.2.2 Physical Constraints**

Physical constraints can be lack of plant and equipment, and resources not available at the required time. According to Goldratt (1990), a physical constraint is something like the physical capacity of a machine, in other words, it is something that is rigid and in its current state has a limit on its ability or throughput (e.g. materials, machines, people, demand level).

### **2.2.3 Cultural Constraints**

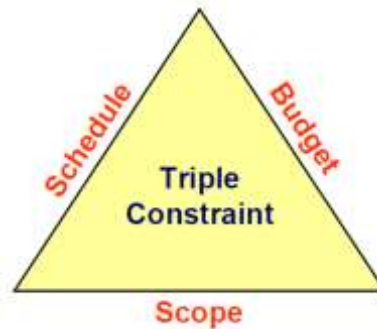
Projects are implemented in normal setups where culture of the surrounding area or environmental has an effect on the project. As started by Lendry (2009), democracy is not easy for it removes power from business leaders who are used to calling the shots. Hence it is hard to make difficult decisions on which projects to undertake and which ones to cancel in a democratic setup since decisions may not be made based on technical facts but popularity. Additionally any new process can be resisted. Hence there is need of sensitization of stakeholders and change management in project management systems.

### **2.2.4 Organizational Constraints**

Project management teams should have the required skills and the personnel needs to be available at the right time. The constraint might be human resource with the necessary skill sets are not available in the project time frame. Spacey (2016), gives typical example of organization constraint such as the need to share resources with functional managers. Risk management in an organization can also be a constraint which mainly depends on the level of organizational tolerance to risk in project management.

### 2.2.5 Project Specific Constraints

A project specific constraint diagram in Figure 2.2 shows that project specific constraint is a triple constraint covering issues of schedule, budget and scope. Any change in one of these elements has an effect on the other; hence a holistic approach needs to be used when managing these specific project constraints.



**Figure 2.2: Diagram Showing Project Specific Constraints (Lendry, 2009)**

### 2.3 Project Management

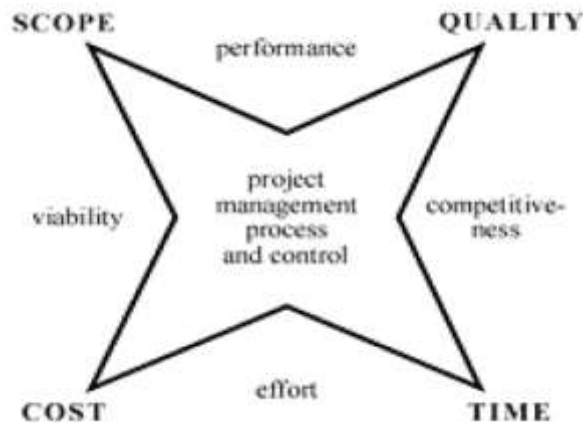
A project is a temporary endeavour undertaken to create a unique product, service, or result (PMI, 2008). Therefore a project has a define start and end point. The end is reached when the project's objectives have been achieved or when the project is terminated because its objectives will not or cannot be met, or when the need for the project no longer exists (PMI, 2008).

Project management is the application of knowledge, skill, tools, and techniques to project activities to meet the project requirements (PMI, 2008). This is accomplished through appropriate application and integration of the following processes: initiation, planning, executing, monitoring and evaluation, and closing.

As stated by Modesto and Tichapondwa (2009), project management is faced with challenges. Meeting or exceeding stakeholder needs and expectations invariably involves balancing competing demands among which are:

- scope, time, cost, and quality which are project management success determinants;
- stakeholders with differing needs and expectations; and
- identified needs and unidentified expectations - client relations challenge.

Figure 2.3 below sums up the core of project management process and control.



**Figure 2.3: The Core of Project Management (Modesto & Tichapondwa, 2009),**

According to Kerzner (2009), the theoretical definition for the life-cycle phases of a system can be applied to a project. These phases are conceptual, planning, testing, implementing and closure. However, according to Parkland (2009), the project phases are initiation, planning, execution, control and closing. Considering the activities of each phase, it can be observed that the phases are just the same.

### **2.3.1 Project Initiation**

Project initiation process consists of processes performed to define a new project. This includes defining of project scope, committing of financial resources, internal and external stakeholders are identified, and selection of project manager (PMI, 2008). The project initiation process helps to ensure that a project is focused to achieve its objectives.

As stated by University of Birmingham (2012), it is important to get project initiation right; this establishes the foundations for the project and can make the difference between a successful and unsuccessful project.

If a project is huge, it can be broken down into several phases and at the beginning of each phase, the project initiation process is undertaken. This ensures that validations of original project direction is done, as well as identify processes to be done at each phase. Involving

stakeholders during the initiation process improves the probability of shared ownership, delivery and acceptance, and customer and other stakeholder satisfaction (PMI, 2008).

### **2.3.2 Project Planning**

Project planning stage consists of processes performed to establish the total scope of the effort, define and refine the objectives, and develop the course of action required to attain the objectives (PMI, 2008). At this stage a project management plan and project documents that will be used to carry out the project are developed. This process can be iterative due to feedback which could result into detailing of the project management plan and documents to be an on-going process. This is known as ‘rolling wave’ planning for a project.

According to Canada Government (1997), project planning defines the project activities and end products that will be performed and describes how the activities will be accomplished. The purpose of project planning is to define each major task, estimate the time and resources required and provide a framework for the management review and control.

The project management plan and project documents developed contain the project scope, time, costs, quality, communication, risk, and procurements. Hence updates during project implementation assist a project to have more precision in terms of the project schedule, costs and resource requirement to meet the defined project scope.

Involvement of stakeholders at this stage is paramount for project success as well, since a defined end period of project planning is set by the owners to ensure that a project is implemented.

Since this is a ‘rolling wave’ planning, if any significant risks are identified towards the end of the planning period, then the iterative process is done to update the project management plan and project documents.

The main activities carried out under the project planning process are as follows:

- a. Development of a project Management plan,
- b. Collect requirements by identifying stakeholders needs to meet project objectives,

- c. Define scope of the project,
- d. Create a work breakdown structure to define project deliverables,
- e. Define specific activities to be performed to produce the project output,
- f. Sequence activities,
- g. Estimate activity resource,
- h. Estimate activity durations,
- i. Develop work schedule,
- j. Estimate costs to complete the project,
- k. Determine budget to establish cost baseline,
- l. Plan quality to meet project compliance,
- m. Develop human resource plan,
- n. Plan communications,
- o. Plan risk management,
- p. Identify risks,
- q. Perform qualitative risk analysis,
- r. Perform quantitative risk analysis,
- s. Plan risk responses and
- t. Plan procurement

### **2.3.3 Project Execution**

Project execution process consists of activities performed to complete the work defined in the project management plan to satisfy the project specifications (PMI, 2008). This process involves coordinating people and resources, as well as integrating and performing the activities of the project in accordance with the project management plan.

Once a project moves into the Execution Phase, the project team and the necessary resources to carry out the project should be in place and ready to perform project activities (Arkansas, 2014).

Often times, during project execution, results may require planning updates and re-baselining. Therefore this might cause changes in activity durations, resources productivity and availability, and unanticipated risks. Such variances may affect the project management plan or project documents and may require detailed analysis and development of appropriate project management responses. The results of the analysis can trigger



change request that, if approved, may modify the project management plan or other project documents and possibly require establishing new baselines.

The project execution process covers spending a large portion of the project budget and includes the following activities:

- a. performing activities defined in the project management plan,
- b. perform quality assurance,
- c. acquire human resource to carry out the activities
- d. Develop a project team to improve competencies, interaction and overall team environment to enhance project performance
- e. Manage project team,
- f. Distribute information,
- g. Manage stakeholder expectations by communicating and working with the stakeholders to meet their needs and,
- h. Conduct procurement for various components of the project as outlined in the project management plan.

#### **2.3.4 Project Monitoring and Control**

Project monitoring and control process consist of processes required to track, review and regulate the progress and performance of the project; identify any areas in which changes to the plan are required; and initiate the corresponding changes (PMI, 2008). The key benefit of this process is that project performance is observed and measured regularly and consistently to identify variances from the project management plan.

The project monitoring and control process includes the following:

- a. Controlling changes and recommending preventative action in anticipation of possible problems,
- b. Monitoring the on-going project activities against the project management plan and the project performance baseline and,
- c. Influencing the factors that could circumvent integrated change control so only approved changes are implemented.

Continuous monitoring provides the project team insight into the status of the project and identifies any areas requiring additional attention. As stated by Canada Government (1997), projects fail due to inattention to basic control principles. Too many times the project team is busy getting on “completing the project” and not spending the time and energy to anticipate problems. Then, once a problem is suspected, the team acts too slowly to resolve the root of the problem. Therefore, the reason of monitoring and control is to prevent project development problems.

The main activities in the project monitoring and control are as follows:

- a. Monitor and control project work by tracking, reviewing and regulating the process to meet the performance objectives as defined in the project management plan.
- b. Perform integrated change control by reviewing all change requests, approving changes, and managing the changes in the project documents.
- c. Verifying the scope by formalizing acceptance of the completed project deliverables.
- d. Control scope by monitoring the status of the project scope and managing change to the scope baseline.
- e. Control schedule by monitoring the status of the project to update project progress and managing changes to the schedule baseline.
- f. Control costs by monitoring the status of the project to update the project budget and managing changes to the cost baseline.
- g. Perform quality control by monitoring and recording results of executing the quality activities to assess performance and recommend necessary changes.
- h. Report performance by collecting and distributing performance information including status reports, progress measurements and forecasts.
- i. Monitor and control risks by implementing risk response plans, tracking identified risks, monitoring residual risks, identifying new risks and evaluating risk process effectiveness throughout the project.
- j. Administer procurement by managing procurement relationships, monitoring contract performance and making changes and corrections as needed.

### **2.3.5 Project Closing Process**

Project Closing process consist of processes performed to finalise all activities to formally complete a project (PMI, 2008). This process when completed, verifies that the defined

processes are completed within all project processes to close the project and formally establish that the project is complete. According to Centers for Disease Control and Prevention (CDC), (2006), the purpose of project closeout is to assess the project, ensure completion, and derive any lessons learned and best practices to be applied to future projects. In a project closing process, the following may occur:

- a. Obtain acceptance by the sponsor or client.
- b. Conduct post-project review.
- c. Record impacts of tailoring to any process.
- d. Document lessons learnt.
- e. Apply appropriate updates to organisational process assets.
- f. Archive all relevant project documents in the project management information system to be used as historical data and
- g. Close all procurements.

#### **2.4 Role of a Project Manager in Project Management**

The project manager is a person assigned by an organisation to lead the team that is responsible for achieving objectives of a project (PMI, 2013). In most times, the project manager works closely with other organisation managers to ensure that the project management plan aligns with the overarching organisation plan.

On the other hand, Jha (2013) said that the main role of a project manager is in the preconstruction stage where planning is the key task. Thus the main role of the project manager is the preparation of deliverable schedule in accordance with client scope, drawing up the preliminary construction schedule, delineating project requirement, allocation of resources, plan review, and goal setting. However, Hopp and Spearman (2011) and Burdge and Robertson (2009), differed from this view and stated that the main role of the project manager is in the administration of the project which agrees with PMI (2013).

According to PMI (2013), Project managers have to satisfy several tasks namely: task needs, team needs and individual needs. This is because project managers are a link between organisation strategy and the project team. An effective project manager requires the following competencies:

- a. Knowledge – he needs to have thoroughly knowledge about the project
- b. Performance – he needs to be able to do or accomplish while using his project management knowledge
- c. Personal – personal effectiveness encompasses altitudes, core personality characteristics, and leadership, which provides the ability to guide the project team while achieving project objectives and balance the project constraints.

Project managers accomplish work through project team and other stakeholders. Hence effective project managers require a balance of ethical, interpersonal, and conceptual skills that help them analyse situations and interact appropriately. Therefore, project managers need the following interpersonal skills:

- a. Leadership,
- b. Team building,
- c. Motivation,
- d. Communication,
- e. Influencing,
- f. Decision making,
- g. Political and cultural awareness,
- h. Negotiation,
- i. Trust building,
- j. Conflict management, and
- k. Coaching.

As stated by Heerkens (2002), the combination of hard skills, soft skills, functional competencies, and personal traits compose the raw materials for a project manager overall capability.

## **2.5 Malawi Government Policy on Project Management**

In order to ensure that good project management processes are followed in public projects, Government of Malawi uses both internal capacity and hired capacity to manage projects. Project Management units are established as well as implementing agencies enacted by an act of Parliament are mandated to manage implementation of projects. Such implementing agencies are like the Roads Authority which was established under Roads Authority Act of

2003. In the construction industry, the National Construction Industry Council (NCIC) was established in 1998 under an act of parliament to regulate and oversee the industry.

Furthermore, according to the Public Procurement Act 2003 (ODPP), all public procurement of goods and services has to follow the Procurement Act of 2003, to ensure transparency and accountability to the public. The Office of the Director of Public Procurement (ODPP) is responsible for managing these public procurement issues.

In infrastructure development projects, procurement of works are usually two phased thus:

- a. Procurement of services to design and supervise the construction and,
- b. Procurement of a contractor for works implementation

According to Design Build Institute of America (DBIA), (2015), there are four main methods of project delivery and these are: Construction Management at Risk (CMR) also known as CM/GC, Design-Bid-Build (DBB) or traditional method, Design-Build (DB) and Multi-Prime (MP). Determining the project delivery method is one of the most important decisions made by every owner embarking on a construction project. Choosing the best method for any project must start with a good understanding of choices available. Owners must also have a firm grasp of the impact of each choice. In all delivery systems, there is always a minimum of three parties involved: owner, designer and contractor. It is important to choose a delivery method that best meets the unique needs of each owner and their project as stated by Construction Management Association of America (CMAA), (2012).

However, it has been observed that in Malawi, the Government mostly use the traditional method of project delivery which in the end affects the performance of contractors (Kululanga, 2012).

As observed by Beckers et al., (2013), procurers frequently select the wrong strategy, due to risk management. However, they usually disregard or misjudge the ability of private-sector players to control certain risks.

### **2.5.1 Procurement of Services**

In the procurement of consultancy services for design and construction supervision for works, there are several methods used to ensure transparency and accountability. Bid documents which are known as Request for Proposal (RFP) documents are produced to procure consultancy services. The RFPs include terms of reference for the assignment, the procurement method to be used, procurement procedures to be followed for the bids, technical requirements, contractual obligations of parties and how the bids will be evaluated. Below are the main procurement methods for procurement of services:

- a. Quality Based Method (QBM) – this method requires a bidder to submit a technical proposal for an assignment. The bidder who scores the highest points is requested to negotiate a cost of implementing an assignment based on the available budget which is based on previous experience and prevailing market rates.
- b. Least Cost Method (LCM) – this is a two staged method which has a technical and financial proposal. Any firm which passes the technical proposal, its financial proposal is opened and an assignment is awarded to the firm which has proposed the lowest cost.
- c. Cost and Quality Based Selection (CQBS) – this is a two staged process as well which has a technical and financial proposal. Any firm which passes the technical proposal, its financial proposal is opened. In this process weighed average points are used for the technical proposal and financial proposal. Usually the technical proposal gets eighty percent and the financial proposal gets twenty percent. The firm which has the lowest financial proposal is given total financial marks and the rest are proportionate to that lowest cost proposal. Then the technical and financial points are combined using the weighed average percentage to find the bidder with highest scores who is invited for negotiations for award of the assignment.

The choice of method to use depends on the type and scope of the assignment and availability of expertise to carry out the assignment. However, for development construction projects, CQBS is the most commonly used method (Kululanga, 2012).

### **2.5.2 Procurement of Works**

In procurement of works, mainly two methods are used which national competitive bidding and international competitive are bidding (Public Procurement Act, 2003). Tender

documents are produced to outline the scope of works, requirements from bidders, how they will be selected, duration of works, contract obligation of parties, and technical specifications.

- a. National Competitive bidding – this is mainly for small works both in scope and budget which can be implemented by local contractors and the duration is usually short
- b. International Competitive Bidding – this is mainly for huge complicated works which require huge capacity both financially and technically. Such projects are usually long duration.

Both methods follow a three staged procurement evaluation process which looks at administrative qualifications, technical qualifications and cost of the bid. The most responsive bidder for the works is invited for negotiations for award of works implementation. As stated by Chilipunde (2010), use of the above methods without considering other project delivery methods, limits the growth of local contractors.

## **2.6 Best Practices of Infrastructure Project Management in Malawi**

According to Baker, Hertogh, Staal-Ong, and Westerveld (2008), key success factor in the organisation and management of infrastructure projects is a dual focus between ‘control’ and ‘interaction’. Control focuses on the internal world of the project and the project team, whilst interaction is related to the external world of society. Two elements are essential for ‘interaction’ which are: an open culture and the ability to adapt to changes within the context of the project. On the other hand, Techrepublic (2012) states that it is hard to overestimate the importance of proper planning for a project. In general, project failures can most often be traced back to deficiencies in the planning process. There are three major deliverables from the project planning process—the project definition, the work plan, and the project management procedures.

As already stated in chapter one of this paper, in Malawi, reforms in the roads sector started in 1990s through a World Bank funded Road Management Initiative (RMI) (Malawi Government 2010).

Therefore, over twenty years after implementing these reforms, there has been both positive and negative developments in the construction industry. Some of the positive developments are as follows:

- Establishment of strong institutions – there are a number of institutions and organisation which have been established under an act of parliament to be responsible for project implementation such as the Roads Authority for the roads sector. The establishment of these institutions have brought sustainability on initiatives and transparency in the procurement processes.
- Development of Private Sector Capacity – due to outsourcing of expertise, this has brought an opportunity for development of consulting firms and construction companies which are gradually improving the perform of the construction industry in the country.

Some challenges which the reforms have brought are as follows:

- a. Limited capacity in the industry – due to the load of work to be implemented every year, it has been observed that the country needs to enhance its project management capacities both in the public and private institutions for the reforms to be effective hence need of continuous education.
- b. Corruption – since the procedures are well outlined, some quarters have manipulated the system so that they can easily benefit from the system using corrupt methods.

However, according to World Bank (2006), sourcing out of projects implementation rather than force account has brought much efficiency in project management in most countries including Malawi. Therefore this has to be continued with relevant improvements to ensure that the system is sustainable and benefits the public at large.

## **2.7 Project Risk Management**

A project risk is an uncertain event or condition that, if it occurs, has an effect on at least one project objective (PMI, 2008). Garvey (2001) states that risk is a measure of a project's inability to achieve its objectives within specified constraints. However, Caltrans (2012) states that risk is an uncertainty that matters: it can affect project objectives either



negatively or positively. Objectives can include scope, schedule, cost, and quality. According to PMI (2010) not all project risks are bad. Risks can present future opportunities as well as future threats to a project. According to Medica (2011), risk management is simply defined as identifying, analysing and managing uncertainties in a project, both positive (opportunities) and negative (threats). This agrees with Berg (2010) that risk management is an activity which integrates recognition of risk, risk assessment, developing strategies to manage it, and mitigation of risk using managerial resources. The benefits of risk management are instrumental to a project's success. By proactively addressing uncertainties, in combination with a strong project management program, problems within the project can decrease by as much as 60 or 70% (Medina, 2011). Therefore, the more you know about a risk and its impacts before-hand, the better equipped you are to handle the risk when it occurs. The objectives of project risk management are to increase the probability and impact of positive events and decrease the probability and impact of negative events on the projects (PMI, 2008). Project risk management is a continuous process that begins during the planning phase and ends once the project is successfully commissioned and turned over to operations (Klynveld Peat Marwick Goerdeler (KPMG), (2014). It is an integral component of good management and decision-making at all levels of an organization (Beg, 2010).

Project risk management processes are as follows: plan risk management, identify risks, perform qualitative risk analysis, perform quantitative risk analysis, plan risk responses and monitor and control risks (PMI, 2008). These stages are also indicated by KPMG (2014) although such are combined as follows: strategy and planning; risk identification; analysis (quantitative and qualitative); response planning; and monitoring and control.

### **2.7.1 Plan Risk Management**

Plan risk management is the process of defining how to conduct risk management activities for a project (PMI, 2008). Planning is important to ensure that enough resources and time for risk management activities. The risk management plan is a vital tool to communicate and agree with the project stakeholders the risk management process so that it is supported throughout the project life cycle. To ensure a holistic approach in risk management, planning is encouraged to start early so that it is completed during the project planning phase. Planning activities set the foundation for a risk management programme and ultimately determine whether the initiative is successful (KPMG, 2014).

In plan risk management, the following activities are conducted:

- a. Process inputs – these are project scope statement, cost management plan, schedule management plan, communication management plan, enterprise environmental factors and organisational process assets.
- b. Tools and techniques – planning meetings and analysis of the risks is done.
- c. Output – the product of the process is the risk management plan. This describes how risk management will be structured and performed on the project. This contains the methodology of handling identified risks, roles and responsibilities of various project stakeholders, budget required for the activities and timing of interventions.

### **2.7.2 Identify Risks**

Identify risks is the process of determining which risks may affect the project negatively or positively and documenting their characteristics (KPMG, 2014). Risk identification produces a deliverable which is project risk register that documents the risks and their characteristics. The risk register is subsequently amended by the qualitative and quantitative risk analysis, risk response, and risk monitoring process (Caltrans, 2012). This process can be iterative since new risks may evolve or become known as the project progresses through the life cycle. Identify risks should involve the project team so that they can develop and maintain ownership and responsibilities for the risks and associated risk response action (PMI, 2008). The appropriate risk identification method will depend on the application area (i.e. nature of activities and the hazard groups), the nature of the project, the project phase, resources available, regulatory requirements and client requirements as to objectives, desired outcome and the required level of detail (Berg, 2010).

In order to get a list of indicators of risk in a project, a structured review of project documentation may be performed. The reviewed documentation may include plans, assumptions, previous project files, contracts and other information. The quality of the plans, as well as consistency between the plans and the project requirements and assumptions can clearly define the indicators of the risk of the project. Such well known techniques as brainstorming, Delphi technique, interviewing and root cause analysis are used to gather the required information (PMI, 2008).

### **2.7.3 Perform Qualitative Risk Analysis**

Risk analysis involves the consideration of the source of risk, the consequence and likelihood to estimate the inherent or unprotected risk without controls in place. It also involves identification of the controls, an estimation of their effectiveness and the resultant level of risk with controls in place (the protected, residual or controlled risk) (Berg, 2010). Garvey (2001), states that risks are analysed according to three criteria and these are the probability that each identified risk will occur, the impacts to the project if the risk occurs, and the timeframe when the risk's impact will be felt on the project. Qualitative risk analysis is a process of prioritizing risks for further analysis or action by assessing and combining their probability of occurrence and impact (PMI, 2008). Project performance can be improved by focusing on high-priority risks. According to PMI (2008), perform qualitative risk analysis assesses the priority of identified risks using their relative probability or likelihood of occurrence, the corresponding impact on project objectives if the risk occur, as well as other factors such as time frame for response and the organisation's risk tolerance associated with the project constraints of cost, schedule, scope and quality.

As stated by PMI (2008), projects of a common or recurrent type tend to have more well-understood risks. Projects using state-of-the-art or first-of-its-kind technology, and highly complex projects, tend to have more uncertainty.

There are several tools and techniques which are used to carry out perform qualitative risk analysis. The common one are risk probability and impact assessment, probability and impact matrix, risk data quality assessment, and risk categorisation.

#### **a. Risk Probability and Impact Assessment**

Risk probability assessment investigates the likelihood that each specific risk will occur whilst risk impact assessment investigates the potential effect on a project objective such as schedule, cost, quality, or performance, including both negative effects for threats and positive effects for opportunities.

The level of probability for each risk and its impact on each objective is evaluated during project interview and meetings which are held for assessment of risks and impacts. Risk probabilities and impacts are rated according to the definitions given in

the risk management plan. Risks with low ratings of probability and impact are included on a watch-list for future monitoring whilst risks with high ratings are red-flagged for immediate action.

b. Probability Impact Matrix

Risks can be prioritized for further quantitative analysis and response based on their risk rating. These risk ratings are usually specified by the organisation in advance of the project and included in organisational process assets. Risk-rating rules can be tailored to the specific project in the Plan Risk Management process. Evaluation of each risk's importance and, hence, priority for attention, is typically conducted using look-up table or probability and impact matrix. Such a matrix specifies combinations of probability and impact that lead to rating the risks as low – no risk response required at the time, moderate/medium – risk response as time and resources permit, or high priority – first priority for risk response (Caltrans 2012).

c. Risk Data Quality Assessment

A qualitative risk analysis requires accurate and unbiased data if it is to be credible. Analysis of the quality of risk data is a technique to evaluate the degree to which the data about risks are useful for risk management. It involves examining the degree to which the risk is understood and the accuracy, quality, reliability, and integrity of the data regarding the risk. If data quality is unacceptable, it may be necessary to gather higher-quality data.

d. Risk Categorisation.

Risk to a project can be categorised by sources of risk, the area of the project affected, or other useful category e.g. project phase.

Risk categorization can reveal common root causes of risk or project areas requiring particular attention. Discovering concentrations of risk may improve the effectiveness of risk responses.

#### **2.7.4 Perform Quantitative Risk Analysis**

Qualitative risk analysis includes methods for prioritizing the identified risks for further action, such as risk response (Caltrans, 2012). Perform quantitative risk analysis is the

process of numerically analysing the effect of identified risks on overall project objectives. Perform quantitative risk analysis is performed on risks that have been prioritised by the perform qualitative risk analysis process as potentially and substantially impacting the project's competing demands. The perform quantitative risk analysis process analyses the effect of those risk events. It may be used to assign a numerical rating to those risks individually or to evaluate the aggregate effect of all risks affecting the project. It also presents a quantitative approach to making decisions in the presence of uncertainty (PMI, 2013).

Perform quantitative risk analysis generally follows the perform qualitative risk analysis process. The following tools and techniques are used to carry out a perform quantitative risk analysis:

- a. Data gathering – this includes all methodologies of gathering data such as interviews to draw experience and historical data to quantify the probability and impact of risks on project objectives. Data may also be gathered from continuous probability distributions which represent the uncertainty in values such as durations of schedule activities and costs of project components.
- b. Risk analysis and modelling – Different types of tools are used to analyse and model risk. Such tools are sensitivity analysis to understand which risks have the most potential impact on the project, expected monetary value (EMV) analysis, calculates the average outcome when the future includes scenarios that may or may not happen (uncertainly analysis) and actual modelling and simulation that translates the specified uncertainties of a project into potential impact on project objectives.
- c. Expert judgement – this is used to identify potential cost and schedule impacts, to evaluate probability, and to define inputs such as probability distributions into analysis tools. Expert judgment is also use to interpret data and choice of tools for analysis to use.

### **2.7.5 Plan Risk Responses**

Plan risk responses is the process of developing strategic options and actions to enhance opportunities and to reduce threats to project objectives (Caltrans, 2012). The importance of this process is that it addresses the risks by their priority and allocating resources for managing the risks as well as schedule the activities in the project management plan.

This activity follows the perform quantitative risk analysis process if used. Each risk response requires an understanding of the mechanism by which it will address the risk. This is the mechanism used to analyse if the risk response plan is having the desired effect. It includes the identification and assignment of one person (an owner of the risk) to take responsibility for each agreed-to and funded risk response. Risk responses should be appropriate for the significance of the risk, cost-effective in the meeting the challenge, realistic within the project context, agreed upon by all parties involved, and owned by a responsible person. Hence selecting optimum risk response from several options is often required.

In plan risk responses, strategies for negative risks or threats are usually, avoid, transfer, mitigate and accept whilst strategies for positive risks or opportunities are exploit, enhance, share and accept (PMI, 2013).

#### **2.7.6 Monitor and Control Risk**

This is the process of implementing risk response plans, tracking identified risks, monitoring residual risks, identifying new risks, and evaluating risk process effectiveness throughout the project. The importance of this process is that it improves efficiency of the risk approach throughout the project life cycle to continuously optimize risk responses (Caltrans, 2012).

This process applies techniques such as variance and trend analysis which require the use of performance information generated during project implementation. Other purposes of the Control Risks process are to determine if:

- a. Project assumptions are still are still valid;
- b. Analysis shows an assessed risk has changed or can be retired,
- c. Risk management policies and procedures are being followed and,
- d. Contingency reserves for cost or schedule should be modified in alignment with the current risk assessment.

Control risks can involve choosing alternative strategies, implementing a contingency or fall back plan, taking corrective measures, and modifying the project management plan. The risk response owner reports periodically to the project manager on the effectiveness of the plan, any unanticipated effects, and any correction needed to

handle the risk appropriately. Control Risks also includes updating the organisational process assets, including project lessons learned database and risk management templates, for the benefit of future projects (PMI, 2008).

Various tools and techniques are used in Control Risks such as risk reassessment, risk audits, variance and trend analysis, technical performance measurements, financial reserve analysis and meetings.

### **2.7.7 Common Risks of Construction Projects**

According to Klemetti (2006), project risks can be categorised in a four groups which are pure risk such as hazards and weather conditions, financial risk such as cash flow or credit risk, business risk such as anything which can happen in a project and political/country risk which refers to certain political environment or risks which can be caused by extreme conditions such as wars.

Therefore the following are the typical risk sources for construction projects as outlined by Klemetti (2006):

- a. Change in project scope and requirements
- b. Design errors and omissions
- c. Inadequately defined roles and responsibilities
- d. Insufficient skilled staff
- e. Subcontractors
- f. Inadequate contractors experience
- g. Uncertainty about fundamental relationships between project participants
- h. New technology
- i. Unfamiliarity with local conditions and
- j. Force majeure.

### **2.8 Major Challenges of Project Management in the Region**

According to Rwelamila and Purushottam (2012) projects in Africa fail because of four major reasons and these are: one-size-fits-all, accountability for results, lack of project management capacity and cultural issues.

On one size fits all, the researcher indicated that the project management approaches used are prescriptive and don't allow for flexibility regardless of the size, or objectives of the project and local environment. As a result, some procedures and approaches stifle the social and cultural elements of getting a project done.

Okoye, Ngwu, and Ugochukwu (2015) states that time; cost, quality, and safety remain the top management challenges facing construction managers in Nigeria. This study also stated that apart from the technical skills, there are other management skills required by the construction manager in managing construction projects and these are communication, organisational effectiveness, decision making, team building, and leadership.

Rwelamila and Purushottam, (2012) continues to state that there is too much emphasis within aid agencies on strong procedures and guidelines, which leads to a culture of 'accountability for results' and of little attention to 'managing for results'. The researcher argues that there is too much weight put on incentives for project managers to report externally and to spend time on monitoring and evaluation. There is not the same level of incentive for a job well done, and project managers lack the tools they need for using project performance data to make decisions that will affect progress.

Amalraj, Hernani, Ladouceur, and Verma (2007) states that a major challenge to any project is the contracting of work. In an environment of scarce labour resources, lack of competition in the bidding for contracts can increase project costs. This lack of a competitive bidding environment can also mean that a parent company is not necessarily getting the best contractor for the job.

On lack of project management, Rwelamila and Purushottam (2012) states that getting good people trained in project management is one thing, but also pointed out that some African countries lack the infrastructure to support projects, even if they did have skilled and experienced project personnel. Working in some areas of Africa means facing challenges like political instability, lack of infrastructure, difficult physical environments, scarce resources and low levels of education and skills. All of these means that aid agencies struggle to deliver projects effectively – and they are just as pressed, if not more so, than other organizations to cut costs and reduce administrative overheads. On the other hand South Africa Commercial (2012), states that a project manager needs to be ahead of



every other member of the team, anticipating problems before they occur and finding viable solutions. The South Africa Commercial (2012) continues to state that “Quality control is another important aspect – a project manager will ensure all systems are in place: from the right contractors on the job to effectively communicating to the team so that every member understands the client’s expectations and delivers a quality end product. Moreover, the project manager is able to improve performance, manage risk and work innovatively, all the while earning greater returns for their clients.”

Finally, on cultural issues, Rwelamila and Purushottam (2012) stated that a lot of donor funded projects have a top-down approach which is contrary to project success. One of the success factors of a project is local ownership and the top down approach is a recipe for a project disaster.

These findings clearly highlight the major project challenges which are faced in Africa and Malawi inclusive. Hence as this researcher will be looking at the case study projects, the links with these raised issues will be discussed further.

## **2.9 Summary of Project Challenges from Literature Review**

Considering the review of project challenges from the above analysis, below are the major issues which have come out:

- a. Poorly defined strategic objectives,
- b. Poor business planning,
- c. Lack of cross-enterprise view,
- d. Unknown project inventory,
- e. Lack of understanding of existing resource commitments,
- f. Lack of supporting processes of the project,
- g. Lack of plant and equipment,
- h. Resources not available at the required time.
- i. Diverse culture or environmental from one place to another (unfamiliarity with local conditions),
- j. Resistance to new processes,
- k. Lack of required skills,

- l. Strict risk management,
- m. Change in project scope and requirements,
- n. Design errors and omissions,
- o. Inadequately defined roles and responsibilities,
- p. Insufficient skilled staff,
- q. Lack of collaboration with Subcontractors,
- r. Inadequate contractors experience,
- s. Uncertainty about fundamental relationships between project participants,
- t. New technology,
- u. Force majeure,
- v. Lack the infrastructure to support projects,
- w. Political instability and
- x. And top-down approach.

## **2.10 Chapter Conclusions**

This chapter has analysed the literature related to the research. This included literature review for project management, policy direction of project management by the Government of Malawi, project management best practices for infrastructure project in Malawi, major project challenges and project risk management.

The next chapter will outline the methodology used in the research.

## **CHAPTER 3**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter describes in detail the research methodology used in the study. Methodology refers to the overall approach to the research process, from theoretical underpinning the research to the collection and analysis of the data. As stated by Saunders, Lewis and Thornhill (2008) two main views of research process dominating the literature are positivism and phenomenology.

In this chapter, research methods employed by different researchers are discussed and justifications for the selection of a particular research methodology for this study are highlighted.

#### **3.2 Research Proposition**

Currently, most projects in the roads sector have a lot of challenges in the ways in which they are being implemented. There are a lot of projects which do not finish in time, have large cost overruns and may even be abandoned.

This study therefore, attempts to give insight on how to improve on these problems in relation to good project management procedures.

#### **3.3 Research Stance**

Saunders et al. (2008), highlights two main philosophies, positivism and phenomenology. Positivism research philosophy reflects the principles of a philosophical stance of a natural scientist where one works with an observable social reality and that the end product of such research can be law-like generalization similar to those produced by the physical natural scientists.

On the other hand, the phenomenology argues that the social world of business and management is far too complex to lend itself to theorizing by definite “laws” in the same way as physical sciences. Phenomenology stand argues that business situations are unique and complex and generalization is less valuable.

Saunders et al. (2008) further highlights that research rarely falls neatly in positivist and phenomenological camps and usually business and management research is often a mixture of the two. Therefore this research adopted the combination of the two. This is due to the fact that the study was looking at project management which is an area composed of both technical procedures approach and general management principles.

### **3.4 Research Approach**

After deciding on the research philosophy, the next thing is to choose the research approach. Below is an analysis of the research approaches which are commonly used.

#### **3.4.1 Deductive versus Inductive**

Deductive research approach involves development of a theory that is subjected to a rigorous test. As stated by Hussey and Hussey in Saunders et al., (2008), this is a dominant approach in natural sciences where laws provide the basis of explanation, permit the anticipation of phenomena, predict their occurrence and therefore allow them to be controlled. The deductive approach usually aims at explaining the causal relationship between variables and dictates that the researcher should be independent of what is being observed.

Inductive research approach is based on a principle that theory of a particular issue is drawn after carrying out an analysis of data collected. This approach was developed since there was a critic of the deductive approach which enabled a cause-effect link to be made between particular variables without an understanding of the way humans interpret their social world. Research in inductive approach is particularly concerned with the context in which such events take place. As further stated by Saunders et al., (2008), followers of inductive approach criticise the deductive approach because of its tendency to construct a rigid methodology that does not permit alternative explanations of what is going on.

After considering both approaches, this research adopted the inductive approach since the research was interested to investigate challenges of project management in road projects in Malawi and draw a theory on why the challenges are there and propose recommendations.

### **3.4.2 Qualitative and Quantitative**

According to Baker (2003), quantitative methods are usually regarded as more robust, leading to actionable results and recommendations whilst qualitative methods are seen as lacking in rigour, resulting in indecisive outcomes.

In general terms, quantitative research is usually based on research of objects which can be measured whilst qualitative research frequently deals with subjective perceptions that are better captured by qualitative methods.

Creswell in Leedy (1997) describes quantitative research as an inquiry into a social or human problem based on testing a theory composed of variables, measured with numbers and analysed with statistical procedures in order to determine whether the predictive generalization of the theory holds true. This is the same as positivism as stated by Saunders et al. (2008).

Although distinct examples are given of research methods utilizing the two methods, Baker (2003) also indicated that the polarization of the two has been challenged since qualitative research is based on assumptions and practices usually identified as ‘quantitative’ whilst quantitative research frequently adopt what might be considered as ‘qualitative’.

Therefore this research adopted mainly the qualitative method since it was dealing more with process issues that are mostly qualitative, although in some aspects of the research, the quantitative method had been used wherever ideal in order to qualify the conclusions.

### **3.5 Research Strategy**

Saunders et al. (2008) defines a research strategy as a general plan of how one goes about in answering a set of research questions. The general research strategies available are experiment, survey, case study and grounded theory.

An experiment is a classical form of research that owes much to natural sciences. This involves subjecting samples to different experimental conditions with varying environment so that the results are compared to a defined theoretical hypothesis Saunders, et al., (2008).

A survey method involves collection of large amount of data from a sizeable population which is standardized to allow easy comparisons and analysis; thereafter an authoritative statement could be produced Saunders et al. (2008). This method is usually associated to deductive approach. Although it requires a large amount of resources to carry out due to its procedures, however the method gives the researcher control over the research Saunders et al. (2008).

According to Perry in Baker (2003) a case study methodology is an investigation of contemporary, dynamic phenomenon and its merging body of knowledge; within the phenomenon's real life context; when explanation of causal links are too complex for a survey or experiment; using interviews, observations and multiple sources of data. This methodology has been criticized that it has an 'unscientific' approach or 'mindless empiricism' since no attempt is made to link the description with theory Baker (2003). However, the methodology brings up a rich understanding of the context of the research and the processes being enacted hence it is a worthwhile way of exploring existing theory (Saunders et al., 2008).

For grounded theory, data collection starts without the formation of an initial theoretical framework. Theory is developed from data generated by a series of observations over several times. This constant reference to the data to develop and test theory leads to a theory which is grounded in continual reference to data (Saunders et al., 2008).

This research adopted a case study approach since the research aimed at developing a detailed and intensive knowledge about challenges of project management in roads sector. As indicated by Robson in Saunders et al. (2008), case study has considerable ability to answer the 'how' and 'what' questions which this research attempts to answer.

### **3.6 Sampling**

As stated by Baker (2003), ideally a researcher would prefer to consult or measure everyone or everything which has a bearing on the problem one is seeking to solve. This can only be done when the population size of the research is small. However, this is not usually possible due to some limiting factors such as time and finances. Therefore sampling is normally used in research work.

Sampling is a process of selecting a predetermined number of elements from the population on which the study will be conducted. A sample is a representative subset of a total population (Henning, 2014). The aim of using a subset is to enable researchers to gather and obtain results that can be used to derive a conclusion.

### **3.6.1 Sample of Case Study Project**

The population of the research was road construction development projects which were being implemented within a period of three years of the research period. The three year period was chosen considering availability of data from the main project implementing stakeholders which are client, consultants and contractors. A total of six road projects were implemented during the period and all projects were selected. These are large road development projects which require huge financial resources to implement hence availability of such projects is generally low which has resulted in the seemingly low number of case study projects under this research despite using one hundred percent of the population.

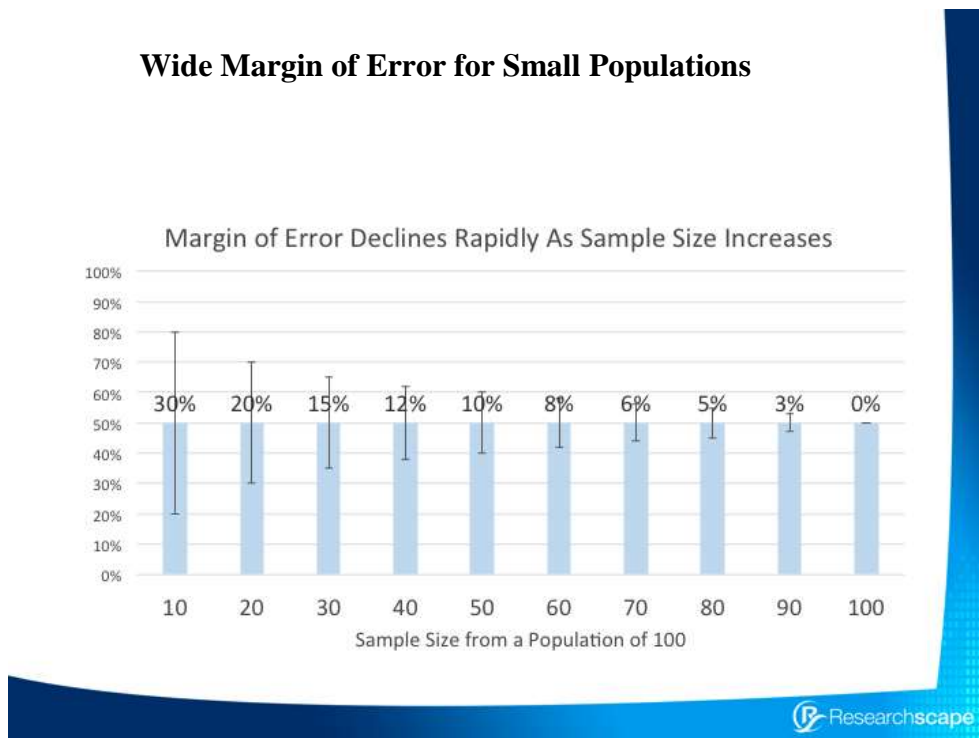
### **3.6.2 Selected Sample for Interviews**

Project management is mostly done by senior managers; as such a purposive sampling was employed in this study. This was aimed at interviewing main stakeholders who were involved in the implementation of the case study projects. Hence, the sample was from senior and middle managers from Ministry of Transport and Public Works, the Roads Authority, Road Fund Administration, consultants and contractors.

As stated by Lund (2012) purposive selection for a whole population is usually carried out when the population size is relatively small and when that population shares an uncommon characteristic(s). Lund (2012) illustrates an example of a case study research in a single firm of 400 employees, examining the effect of senior manager mentorship on employee motivation, there may only be 5-10 senior managers. In this example, the uncommon characteristic is the fact that the people (i.e., units) of interest are all senior managers. Since the total number of senior managers is very small, it makes sense to include all of them in the research; in other words, it makes sense to create a total population sample.

As stated by Henning (2014), the public considers convenience samples with tens of thousands of responses to be more accurate than random samples with 400 responses, not

realizing that the random sample is far more accurate. Henning (2014) continues to state that the advantage with a small population is that margin of error declines rapidly as sample size increases. Therefore, it is important to get as much sample as possible for a small population. This requires multiple rounds of reminders to interviewees and using multiple modes of contact e.g. emails and telephones to drive that response rate high. Figure 3.1 below shows the Margin of Error for a small population.



**Figure 3.1: Margin of Error for a Small Population. Adopted from Henning (2014)**

Considering the number of case study projects which was six (6), a total of twenty two (22) people were targeted to be interviewed in the study. The selection was based on the criteria that each project will interview a single representative from the Client, the Consultant and the Contractor. Additionally, other respondents were from donor agency, Ministry of Transport and Public Works, Ministry of Finance and Road Fund Administration. The study managed to get a total of twenty one (21) responses which is 85% response rate. This translates into a margin of error of 4%.

### 3.7 Data Collection Methods

The study adopted three methods of data collection and these are: review of projects reports, unstructured interviews and use of a questionnaire. The main sources of



information were the Ministry of Transport and Public Works - Roads Department, Ministry of Local Government and Rural Development, the Roads Authority, The Roads Fund Administration, the donor community active in roads sector, such as African Development Bank, European Union, Badea and Abdab Fund, Consultants and Contractors.

- a. Review of monthly progress reports, mid-term reviews (if it was done) and final project reports

As highlighted by Saunders et al. (2008) that the extent to which one is clear about the theory at the beginning of a research, raises an important question concerning the design of the research project. An inductive research approach was used in this study since information collected was used to draw up conclusions and a general principle was derived from a set of observations. The principles of project management were used to assess a sample of projects which were studied. The sampled projects included those which had been closed, running projects and those which were just commencing.

In order to address specific objective (i) “To identify challenges in road infrastructure development projects with specific focus on road sector projects”: monthly progress and final project reports were reviewed.

- b. Carrying out unstructured interviews with the project Coordinators of the selected case study projects.

According to Kahn and Cannell in Saunders et al., (2008), an interview is a purposeful discussion between two or more people and this helps to gather current, relevant and valid data. As stated by Zhang and Wildemuth (2007), unstructured interview cannot be started without preparation and knowledge. Therefore, unstructured interviews were arranged by first making a booking and introducing the subject of the research. Then an interview was held with the project coordinator at his/her office on the appointed day where the interview was held. The interview was guided by the research objectives and aims. This was done by using a questionnaire which was used in the last method of data collection as indicated in (c).

c. Questionnaire Development and Administration

The last method used was administration of a questionnaire. A questionnaire is a technique of data collection in which each person is asked to respond to the same set of questions (Baker, 2003). In this research, a questionnaire was used to get data from other major stakeholders who were involved in the case study projects to increase the research coverage. A sample of the questionnaire is attached as Appendix 1. The questionnaire was developed on the premise of the challenges which were highlighted from the literature review and unstructured interviews to augment information. The questionnaire covered all the areas that the research was analyzing from project implementation, challenges being faced, how to manage those challenges and suggested recommendations to improve project performance. The questionnaires were mostly sent by email and received by email, although some were delivered and collected by hand. A covering letter to explain the purpose of the research was sent together with the questionnaire. Although use of a questionnaire would not be a good approach for a research of this nature, however due to limitations of time, funding and availability of the targeted respondents, it was not possible to carry out structured interviews with each of one them.

The questionnaire was divided in three parts. The first part was an introductory part. In this section, personal information of interviewee was collected. As stated by Jenkin and Dillman (1995), in a self-administered survey, respondents must first perceive the information before they can comprehend it. Once respondents perceive the information, they must comprehend the layout (the visual aspect) of the information as well as the wording (the verbal aspect). Furthermore, respondents must comprehend much more than just the wording of the survey questions and response categories. In a self-administered survey, respondents are often given introductory material and instructions. Also, they must comprehend directions that are meant to guide them through the questionnaire.

Therefore, this section contained a preamble to the questionnaire so that the interviewee should fully understand the purpose of study. The covering email explained the objective of the study being academic and that the information would be treated in confidence and option of not participating in the survey was clearly

stated. Some questions in this section were also optional such as name and position in the organization.

The second section covered the general experience of the interviewee, stage of a project cycle at which he is involved, and from his experience: at what level do most road sector projects encounter a lot of problems. And also what the interviewee thought were the main challenges and their causes in roads projects. The respondents were given a long list of challenges and causes from which they selected the challenges and causes respectively.

The last section in the questionnaire covered an assessment of the case study projects performance. This was based on the three project performance determinants of cost, time and quality. This section also looked at the institutions involvement in roads sector and level of influence on project management.

### **3.8 Data Quality Issues**

In order to ensure the quality of the data, triangulation was used. According to Saunders et al. (2008), triangulation refers to the use of different data collection methods within a study to verify data. As stated by Cohen and Crabtree (2006), a single method can never adequately shed light on a phenomenon. Using multiple methods can help facilitate deeper understanding. Hence, unstructured interviews were arranged with clients' project coordinators so that the study could get some information which could not be acquired through the self-administered questionnaire. Six (6) project coordinators were interviewed for all the case study projects. These interviews were set in a way that it was a free-flowing discussion on project management issues about the case study projects. This exercise helped to clear some issues which could not be decoded from the questionnaires and also clarification from the secondary data: thus project reports which were analyzed. Additionally, use of the questionnaire to guide the unstructured interviews assisted to pre-test the questionnaire as well. Vague questions and gaps in the questionnaire were revised before the administering of the questionnaire.

### **3.9 Data Analysis**

When the questionnaires were received, all the information was typed in Microsoft Excel software which acted as a database. Each case programme had its own data sheet so that

the information could easily be analyzed. Qualitative data was analyzed by comparing responses of the same questions from various respondents whilst quantitative data was tabulated, thereafter graphs or pie charts were generated in the Microsoft Excel sheets for comparison and analysis.

### **3.10 Chapter Conclusion**

This chapter has presented the methodology used for data collection for this research. This includes the research approach, research strategy, data collection methods and an introduction on how the data was analysed. Triangulation was used in data collection by analysing case study projects reports, carrying out interviews with case study project coordinators and using questionnaires.

The next chapter will present the challenges of roads sector projects based on the data that was collected.

## **CHAPTER 4**

### **CHALLENGES IN THE ROADS SECTOR INFRASTRUCTURE DEVELOPMENT PROJECTS**

#### **4.1 Introduction**

This chapter presents the findings on the challenges experienced in road sector projects based on review of the data that was collected.

First, the analysis looked at the background information of each project which was selected as a case study. Secondly, the progress of the projects were reviewed based on information from monthly progress reports, mid-term reviews if it was done and final project report. And finally the main challenges of the road sector projects were outlined.

From project reports, the challenges that were frequently highlighted to have influenced performance of projects in the road sector included: design errors, design changes, delayed site handovers, increased quantities, devaluation of the Malawi Kwacha currency, abnormal rainfall, missing bill of quantity (BOQ) items, additional work, change of supervision consultant, delayed payment, limited payments, non-availability of fuel, breakdown of plant and vehicles, delayed approval of designs, delayed approval of addendum, non-availability of base gravel, delays in evaluating and agreeing on claims, tendering procedures, contractor's delays and variations, As such each case study project was tested to check whether these challenges were also experienced and the analysis also identified the frequently highlighted challenges.

The case study projects were as follows: Karonga – Chitipa Road, Blantyre – Zomba Road, Bangula – Nchalo Road, Kasungu – Msulira Road, Mzimba – Eswanzini – Mzangwe Road and Jenda – Edingeni Road. Figure 4.1 for Map of Malawi shows the projects location.

These case study projects have been analyzed using the approach recommend by (Yin, 2014) for case study research.



Figure 4.1: Map of Malawi showing Case Study Projects Sites

#### 4.2 Identifying the frequently highlighted challenges

Table 4.1 demonstrates the results of highlighted challenges based on case study projects through the analysis of the monthly reports, reviews and final project reports. From the

literature review, twenty four project management challenges were identified. However, after reviewing the case studies, sixteen challenges were identified as those common in the case study projects.

**Table 4.1 Challenges Experienced During the Execution of Road Sector Projects**

<b>Challenges</b>	<b>Case Study Projects</b>					
	<b>Karonga - Chitipa</b>	<b>Blantyre - Zomba</b>	<b>Bangula - Nchalo</b>	<b>Kasungu – Msulira</b>	<b>Mzimba – Mzlangwe</b>	<b>Jenda - Edingeni</b>
Design Errors	No	Yes	Yes	No	Yes	Yes
Design Change	No	Yes	Yes	No	Yes	Yes
Delayed Site handovers	No	Yes	No	No	No	No
Increased/Change in Quantities	No	Yes	Yes	No	No	Yes
Devaluation of the Currency	No	Yes	Yes	No	No	Yes
Abnormal rainfall	No	Yes	No	No	No	No
Missing BOQs items	No	No	Yes	No	No	Yes
Additional Works	No	No	Yes	No	Yes	No
Change of Supervision Consultant	No	No	Yes	No	No	No
Delayed/Limited Payments	No	No	No	Yes	Yes	Yes
Unavailability of Fuel and Forex	No	No	No	Yes	Yes	No
Breakdown of Plant & vehicles	No	No	No	Yes	No	Yes
Delayed approval of designs/addendum	No	No	No	Yes	No	No
Non-availability of base gravel	No	No	No	Yes	No	No
Tendering Procedures	No	No	No	No	No	Yes
Works delays/capacity constraints	No	No	No	No	No	Yes



#### **4.2.1 Karonga – Chitipa Road**

The Karonga – Chitipa Road is in the Northern Region of Malawi and connects two border Districts of Karonga and Chitipa. The road is 100km long and passes through hilly areas of Karonga West and Chitipa.

The project commenced in August 2008 and was completed in November 2012, a period of 51 months. The funding agency was a grant from Chinese Government and the Contractor was from China as well. The budget for the project was not disclosed as there were no project progress reports which were produced. The Chinese Government took the responsibility of all works and just handed over to the Malawi Government after completion. Since the project was under a grant funding, the implementation plan was through Chinese Government guidelines hence all materials and experts were from China. The project did not have a consulting engineer, and the approach used was a design build by the appointed Contractor. Roads Authority had a project engineer on site who was overseeing the project implementation. However, his duties were just a client representative on site without any delegated duties for decision making, not even on quality assurance.

On the other hand, the Karonga – Chitipa Road project was completed within the agreed period and was handed over to Government of Malawi. The only challenge recorded in Roads Authority (2013), Final Inspection Report was that localized bitumen bleeding on the road surface was observed on several sections of the completed road. This was due to heavy traffic which was using the road as well as bitumen spray rate which might have been a bit high.

This challenge was rectified by applying quarry dust and the problem was treated within 3 months.

From table 4.1, it can be observed that there were no major challenges during the implementation of this project. This could be due to the fact that this project was implemented as a ‘design build’ approach whereby the donor, the Chinese Government took responsibility to procure a consultant and a contractor to work on a project as one entity. Thereafter, the project was handled over the

project after completion. This avoided so many pitfalls of project management which are created by dynamics of several stakeholders in a project setup.

#### **4.2.2 Blantyre – Zomba Road**

The Blantyre – Zomba Road is a 60km road which connects the cities of Blantyre, the major commercial City in Malawi and Zomba, the Old Capital City. These two cities are located in the Southern Region of Malawi.

The Blantyre – Zomba Road was one of the first roads to be constructed in Malawi during the colonial government in 1893. However, the road was improved in 1956 to have a stone base with asphalt surfacing (Baker, 1971). The engineering design of the road was basic hence the road had very poor horizontal and vertical alignment with a carriageway of an average width of 5m. Therefore the project was a rehabilitation project to improve both the geometric, pavement and carriageway design. The project was funded by the African Development Fund at the total cost of MK5,444,901,295.90 with an exchange rate of 1 USD to MK166.0798. The supervising consultant was a local firm and the contractor was an international contractor which had been working in the country for a long time and has a local office. The project duration was 24 months and the project commenced on 19<sup>th</sup> March 2012.

#### ***Major Challenges of the Project***

##### **a. Design Errors**

At the time of commencing the works, the original ground levels surveyed by the Contractor and the Consultant indicated substantial discrepancies compared to the original ground level (OGL) in the contract document. Hence an independent surveyor from Ministry of Lands was engaged to check the situation and subsequently issue new coordinates and levels for control points.

Hence the vertical profile of the road was redesigned and the first section of 6+500 to 35+000 was issued on 27<sup>th</sup> June 2012. Prior to this date, in order not to ground the contractor to a total standstill, he had been authorized to do earthworks based on the contract document values. The Contractor had cut/worked on section from 6+500 to 9+400 to roadbed level until when the new levels were issued. After the issuance of the vertical profile, which was higher for the stretch, the Contractor had to backfill most of the stretch. By this time the Contractor had already issued an

early warning on 12<sup>th</sup> June 2012 for a claim for additional costs and/or delay arising from the prolonged setting out.

Further survey works and redesign were done between July and December 2012. Revised drawings were issued to the Contractor in March 2013.

b. Design Change

The Client wanted to have a dual carriageway in a section from 0+000 to 6+500, thus Maselema Roundabout in Blantyre to Chiradzulu Turn-off at the commencement of the project. But this decision was changed and the Contractor was instructed to revert to the original design of a single carriageway in September 2012. However, the Contractor had already started making diversions in preparation of commencement of activities.

In January 2013, after setting out the site, it was realized that some adjustments to the alignment and profile were necessary to accommodate accesses to properties and fit the widened road in the available land. The revised drawings were issued in March 2013.

c. Delayed Site Handover

Due to delays in concluding compensation issues by the Client, the section from 35+000 to 59+620, thus Namadzi to Zomba was handed over to the Contractor in January 2013 instead of September 2012. This was mainly due to pressure of saving old trees, un-removed properties, unshifted services and structures claimed to have cultural heritage value especially between Three Miles to Zomba City. These were mostly resolved by shifting the works to the other carriageway of the proposed dual carriageway. Therefore the Contractor submitted notification of claim for extension of time and/or additional costs.

d. Increased Quantities

At the project commencement, it became apparent that quantities in some bills of quantities line items were substantially underestimated and in a few cases over estimated. Factors which that contributed to the changes include redesign due to inaccuracies of survey data and some minor modifications in design. Hence revised BOQ was produced and issued to the Contractor. The Contractor presented a claim for extension of time and for change of rates in respect of increased

quantities. In August 2013, the Consultant assessed and made a recommendation to the Client. Extension of time was granted in respect of this claim from 18<sup>th</sup> March 2014 to 13<sup>th</sup> August 2014.

e. Devaluation of the Kwacha

The Government of Malawi substantially devalued the Kwacha and floated it in mid-2012. As a result of this, inflation increased as well as wages rates, prices of goods and many others.

The Contractor claimed that this had a substantial adverse effect on their finances as they received 25% of their payments in local currency. The contract did not provide for fluctuation of price payments. Hence the Contractor claimed for additional payment arising from change of legislation which was granted.

f. Abnormal Rainfall

The project specifications had provided for 60 days of rainfall work preventative effects. By the end of 2012/2013 rain season, 59 days had accumulated, with only one day remaining. The Contractor submitted an extension of time claim due to prolonged wetness of work sites and materials. After determination by the Consultant, the extension of time due to prolonged wet conditions on site was granted.

However, considering the summary of challenges as in table 4.1 above, Blantyre – Zomba Road Project had six challenges. Five of these challenges can be attributed to the Consultant and Client, whilst one of abnormal rainfall is a force majeure.

### **4.2.3 Nchalo - Bangula Road**

This project was phase 2 of the Chikwawa – Nchalo – Bangula Road project which was a rehabilitation/reconstruction of about 82 km of the M1 road from Chikwawa southwards through Nchalo to Bangula. The situation was that the road surface was paved for the first 30 km from Chikwawa to Nchalo, but in poor condition. The last 51 km had lost most of the sealed surface and was mainly a gravel riding surface. The road runs along the flood plain west of the Shire River and connects Mozambique through Marka in Nsanje District. The area is subjected to massive floods during rainy seasons and leads to persistent wash away of low-lying areas and drainage structures.

The works included repair and single seal of sections in good condition. The reconstruction of the gravel section was with gravel sub-base, crushed stone base and double surface sealing. Repairs to drainage structures, construction of new culverts, erosion protection and river training works were also carried out.

Phase 2 of the project was for 24 months, commencing on 3 September 2012. However, due to some variations, a three months extension of time was granted and the project was completed in December 2014. The total original contract price was Euro20,860,869.10 and the revised variation figure was Euro23,142,584.04. Phase 1 of the project which was 44 km was funded by European Delegation and Phase 2 which was 37km was under the Malawi Government.

### ***Major Challenges of the Project***

#### **a. Design Errors**

Early in the original project (Chikwawa – Nchalo – Bangula), it was discovered that the initial design needed some critical design because of the following reasons:

1. Many survey points were missing and the designed centreline was largely displaced from the centreline of the existing road,
2. The pavement design did not consider the strength of the existing underlying layers,
3. Present and future traffic was not considered in the original pavement design and
4. The hydraulic design and protection structures did not include all watercourses, maximum rainfall and other hydraulic data.

The Client agreed with the assessment and a redesign was carried out by the Consultant from 1 September 2009 and the design was formally accepted by the Client in early April 2011.

#### **b. Existing Road Condition – Design Change**

At the commencement of the works, it was discovered by the Client that the existing road condition was far worse than what was envisaged during tendering stage. This was apparent especially between Nchalo and Bangula due to the trucks carrying sugarcane at Illovo Sugar factory as well as equipment and vehicles which were to be used at Nsanje Port which was inaugurated in 2010. The total number of axles using the road was foreseen that it would greatly

increase. Hence redesign of the pavement, review of hydrology, re-design of the drainage structures including up and downstream structures to both culverts and bridges and longitudinal and horizontal profile was done.

However, some sections of the re-designed road by the Consultant were not agreed with the Client hence the Contractor re-designed the section from km 0 to 37+950 whilst from km 37+950 to km 81+740, the design done by the Consultant was used.

c. Missing BoQ Items

Another addendum was required for the purpose of including concrete class C-35 in the Bill of Quantities. The designer already specified that concrete class for box culverts to C-35; however such item was not introduced in the original contract. Hence an addendum was issued to cover this item. The total cost under this item was Euro 327,578.47.

d. Additional Works

Due to a wash away on Shire River at Chiromo/Bangula, the Government instructed that a bailey bridge be constructed at Mtayamoyo in Bangula. The variation included construction of an abutment for the Bailey bridge and 2.8km long gravel road connecting Chiromo Bridge with Bangula including transportation of the Bailey bridge parts from the Northern Region of Malawi. The value of the variation work including contingency and tax was less than the contingency amount in the original contract; therefore it was decided to include this variation without altering the original contract sum. However, by the end of the works, which was at the end of the project, it was discovered that the works amount were beyond the original contract contingency amount hence an addendum had to be issued after the closure of the project, and thus during the defects liability period. The total amount for these works was EUR2, 047,507.02.

e. Change of Supervision Consultant

As already reported above, Phase 1 of the project was funded under the European Delegation funding whilst Phase 2 was under Malawi Government funding. Due to lack of forex in 2012 and delayed payments from the Government funding component, the Consultant for Phase 1 did not accept a contract for Phase 2. Phase 2 commenced on 3 September 2012 for a period of 24 months. However, an arrangement was made for the Consultant to continue the supervision of the

Phase 2 works (Malawi Government funded phase), until the allocated budget for the services from Phase 1 were consumed. Hence this was continued until 30<sup>th</sup> June 2013. An advert for a local consultant was done and the local consultant continued with the supervision of the works from 1 July 2013 up to the end of the project in December 2014.

Considering the complexity of the project before the coming in of the local consultant, and considering that the Contractor continued with the works for both phase 1 and 2, it was paramount that part of the supervision team be retained in Phase 2 for ease of management of the project. This was successfully done, and the Measurement Engineer for Phase 1 was the Resident Engineer in the Phase 2 of the project despite that it costed the local consultant a fortune since he was an expatriate.

Nchalo – Bangula Road Project has a total of seven challenges. Five of the challenges were caused by client, one of the challenges thus design errors, was caused by a consultant, and the last one on design change was due to on site conditions changes between the time of the designs and time of implementation.

#### **4.2.4 Kasungu – Msulira Road**

The project was for the rehabilitation of the Game Reserve Section of the Msulira – Nkhotakota (M18) Road, Game Reserve Section. This is a 33 km section from M’bobo Gate (Chainage 62+100) to Bauti Gate (Chainage 95+100). The Section was initially constructed to sub base level with a single 14 mm seal applied as a protective layer of the underlying material. However, the section had deteriorated to subgrade class hence required reconstruction.

The project commenced on 16<sup>th</sup> May 2009 and the original completion date was 23<sup>rd</sup> June 2010. However, due to various reasons, the completion date was revised several times and the last revised completion date was 27<sup>th</sup> February 2012. Works were still in progress by July 2012 when the last progress report was produced, and progress was at 58% and thereafter, the Contractor stopped working and the contract was terminated after a prolonged discussion with the Client in 2014.

Project funding was from Malawi Government and the original contract price was K2,417,137,339,00. By February 2012, the revised contract sum was at K4,085,292,492.70. On the other hand by May 2012, the total payments to the Contractor were K3,835,218,153.95 which was 94% of the revised contract sum and progress was at 58%. This indicates that if the works were to be completed using the same rates and conditions, the total project cost would be in excess of K6.6 billion.

### ***Major Challenges of the Project***

#### **a. Delayed and Limited Payments**

Delayed and limited payment of invoices to the contractor affected the progress of the project since there was delayed procurement of materials. By July 2012, the Contractor had not yet purchased any bitumen since the commencement of the project in May 2009. This negatively affected the progress of the Works and the Contractor was owed about K542,621,991.34 in unpaid invoices by the close of the project. And a total of K49,859,947.65 was unpaid to the Consultant as well.

#### **b. Non-availability of Fuel**

The non-availability of fuel in the country during 2011 and first part of 2012 heavily affected the progress of works. However, this improved after April 2012 and the stock improved on site.

#### **c. Breakdown of Plant and Vehicles**

The project experienced a lot of breakdowns of plant and vehicles. As of June 2012, there were six numbers (6 No.) tippers which were on breakdown out of fourteen (14) tippers which were available. This affected the haulage of base and sub base material on site.

#### **d. Delayed Approval of Design of Kaombe Bridge**

A detailed engineering design for Kaombe Bridge was done during the project period. However, as at the termination of the project, the designs not yet approved pending direction from the Client.



e. Addendum

In June 2012, the Consultant submitted to the Client comments on the Contractor's Addendum 2 totalling K 7,044,266,183.99. By August 2012, the Client was yet to comment on the addendum. Hence this was one of the negotiation issues during closing of the project.

f. Non -availability of base gravel

It was discovered that the available gravel was not fit for base material. Hence trial mix designs of sub base gravel with quarry dust were done in order to improve the CBR and reduce PI. This stabilised gravel was used for an eleven (11) km section of the road.

Considering the challenges of the project as outlined in Table 4.1 above, the project has a total of five challenges. Among the five challenges, three were due to the Client, one to the Contractor and one to the Consultant.

#### **4.2.5 Mzimba – Eswanzini – Mzlangwe Road**

Mzimba – Eswazini – Mzlangwe Turn-off Road Project was an upgrade of the existing 60km earth road to a Bitumen Class II road. The project also involved construction of drainage structures that included a 4-span reinforced concrete bridge across Mzimba River and concrete pipe or box culverts at designated locations along the road section.

The project commenced on 1 May 2009 and was supposed to be completed on 30 April 2012 which was a period of 68 months. However the contract period was revised to 31 December 2014 due to various reasons.

The original contract sum was K7.1 billion and was revised to K7.4 billion due to some claims. The project was funded by Malawi Government and it faced funding constraints. The Malawi Government devalued the Kwacha substantially and floated it in mid 2012. This resulted into increase inflation which resulted into huge escalation of costs due to increase in wages, prices of goods and equipment. Therefore when the government realised that the original 60km works could not be accommodated within the available budget of K7.4 billion, the scope of works was reduced to 24 km. Hence over fifty percent of the works on the project were abandoned.

### ***Major Challenges of the Project***

- a. Design of the works – despite that the works construction project commenced on 1<sup>st</sup> May 2009, it was observed that there were no complete designs of the road. It is recorded that the Consultant submitted to the Client and Contractor drawings and setting out data for horizontal alignment design for the first 10km on 15<sup>th</sup> September 2009. Approval by the Client to the Consultant to proceed with design was given in January 2010. Hence, updated vertical alignment drawings that included pavement layers details were issued to the Contractor on 15<sup>th</sup> February, 2010 by the Consultant. Complete design drawings for first section which was up to 23.84km were submitted to the Client and Contractor on 11<sup>th</sup> January 2011.

The Design of the road for the section KM14+300 to KM60+000 had been issued by the Client from another design consultant. The Client issued a copy of the design drawings to the Supervising Consultant on January 31, 2013.

The Supervising Consultant proceeded to check the design drawings and observed that there were several discrepancies and omissions that required the Client's redress. The Client thus withdrew the drawings pending revisions by the designer and by the closure of the project; the designs were not yet available.

On the other hand, the bridge works on a four span bridge across Mzimba River at KM 0+840 were delayed by the Contractor due to logistical problems to construct the designed bridge which was ready by September 2010.

However, in June 2011, the Contractor requested to change foundation design of the bridge from piles to open spread footing following reported problems the Contractor faced in identifying a subcontractor of the works. The Contractor had intended to sublet the construction of the Pile Foundations, due to his lack of capacity, to a South African company as he did not have the piling equipment. But due to shortage of forex in the country at that particular time, the Contractor failed to engage the subcontractor hence requested for a design change. The design was reviewed by October 2011.

In August 2012, the Contractor resorted to revert to Piles Foundations from the Spread Footings in the face of difficulties experienced in excavating for open foundations due to lack of appropriate equipment for excavating, shoring of the excavations and dewatering of the excavations. He resolved to once more sublet the piles foundation works to the South African company. The decision was endorsed by the Engineer. Hence the lack of proper and timely by the Contractor delayed the bridge works.

b. Delays in Payments

The following were recorded as main challenges to the project funding mechanism:

- Delayed payment of Invoices to the Consultant which negatively affected their site operations.
- Delayed payment of the Contractor's IPCs which continued to create Cash Flow problems for the Contractor.

It was reported that payment delays were due to delays in processing invoices at both the Roads Authority and at the Roads Fund Administration. A total of MK 91,474,022.40 in unpaid invoices was outstanding for the Consultant. The delayed payments accrued an interest of **MK 24 356 438.18** for the Consultant and **K339,472,085.38** for the Contractor by May 2014.

c. Claims

The Contractor was awarded 200 days extension of time with costs due to delayed design. Then in April 2012, the Contractor was awarded a further 410 days extension of time due to works disruptions. Within the 410 days, 267 days extension was with costs due to fuel shortage, works delay due to delayed relocation of private structures and services, and additional works for 7 days and extension of time without cost was 136 days. The awarded extension of time revised the completion date from November 16, 2012 to December 31, 2013. Then the Malawi Government granted the Contractor a Unilateral Extension of Time which revised the Expected Completion Date of the Contract from December 31, 2013 to December 31, 2014.

The total claims with cost implication amounted to K299.4 million.

According to Table 4.1 above, the Mzimba – Eswazini - Mzarangwe Road project had five challenges and three of the challenges were caused by the Client whilst two were caused by the Contractor.

#### **4.2.6 Jenda – Edingeni Road Lot 1**

The Jenda – Edingeni Road project was an upgrade from earth to bitumen road standard which links the two trading centres in Mzimba District. The project road is approximately 53 km comprised of two sections namely: Jenda – Chindoka 15 km and Chindoka – Edingeni 38km.

The phase 1 contract covered the section No. 1. The project commenced on 16<sup>th</sup> December 2013 and the original completion date was 30<sup>th</sup> June 2015. However, the project was extended by 9 months and the revised completion date was supposed to be 15<sup>th</sup> March 2016. Due to some delays in works, the project was further extended to 30<sup>th</sup> August 2016. In total, the eighteen months project duration was extended to thirty two months, thus fourteen months extension of time.

Contract sum was a total of K3,954,817,5466.31 comprising of K2,357,231,749.65 for road works and K1,597,585,796.66 fixed amount for a 77m three span South Rukuru Bridge. The project funding was 40% Malawi Government and 60% Abdab Fund.

#### ***Major Challenges of the Project***

##### **a. Tendering Procedure**

At the commencement of the project, the Client advertised for a consultant to carry out design review and construction supervision of the project. However, at the same time, the Client also advertised for tenders for construction works. This was done since the Malawi Government had secured funding from Abdab Fund hence the aim was to fast track the procurement process so that works could commence as soon as possible. The procurement of the works contractor was based on the previous design which was about to be reviewed by the new consultant who would be procured.

When the new Consultant was procured, he discovered huge anomalies in the design and wrote the Client that the designs need to be redone. This was accepted by the Client, however, they continued to procure the Contractor using the old designs and indicated that the quantities in the

Bills of Quantities were just provisional. However according to FIDIC Conditions of Contract, any change in magnitude of works over 5% attracts a revision of rates. This contract condition was not changed in the particular conditions of contract so that it should not apply in this project, since it was obvious that a lot of quantities would change due to the re-design of the works. According to communication between the Consultant and the Client, the Consultant advised the Client on this issue several times but the Client did not change the clause in the particular conditions.

b. Project Delays

It was reported that the Contractor delayed in the commencement of the works since he was waiting for the payment of the advance payment as per contract conditions. However, when the 60% foreign currency amount was paid, the Contractor could still not commence to wait for the local currency component by the Malawi Government. The works commence 6 months after commencement date due to flimsy contractual issues which could be easily agreed upon by the Contractor and Client.

When the works commenced, the progress was very slow due to unavailability of required equipment. For instance, the Contractor had only one grader in good working condition since the second one was perpetually on break down. This heavily affected the time management aspect of the project.

c. Variations

Variations in this project were mainly due to change in the scope of works. As previously indicated, according to FIDIC Conditions of Contract: any change in magnitude of works over 5% attracts a revision of the rate.

- i. The first variation was accommodation for the engineer. The number of senior staff houses was increased from three (3) to (four). However, when the contractor was requested to submit a revised rate, the revised rate submitted by the contractor was seventeen (17) times more than what was the original rate. This was the case with all structures which the Contractor was requested to submit a new rate. The reason given by the Contractor was that the revision was due to the devaluation of the Malawi Kwacha

against the Dollar. However, the Client argued that the depreciation of the kwacha was about 100%. Hence the Client had to request the Ministry of Lands to make a valuation of the houses which were built and use the rates to negotiate with the Contractor. Below in Table 4.2 is the comparison of the rates.

**Table 4.2: Comparison of Rates**

Item	Description	BoQ Original Rate (MK)	Contractor Revised Rate (MK)	Employer's Accepted Offer (MK)
PS 14.07	Junior Staff Houses	7,350,000.00	116,404,677.24	32,400,000.00
PS 14.09	Office and Laboratory	17,013,350.00	117,564,289.89	41,100,000.00
PS 14.12	Senior Staff Houses	6,805,340.00	119,166,615.68	61,020,000.00
PS 14.13	Housing Fittings	3,402,670.00	29,044,915.75	54,153,789.50
PS 14.14	Equipment and Furniture	1,701,335.00	20,449,570.68	

- a. The second variation order was for the construction of the South Rukuru Bridge. As already indicated above, since the tendering of works was done using old designs, the bridge had to be redesigned by the new Consultant. However, old drawings were used by the Contractor at tender stage. When the new design was produced, there were significant changes in the quantities of the bridge. Hence the Contractor was requested to submit new rates for the new bridge design. It was observed that the total quotation for the contractors was six (6) times more than the original amount as in the BOQs. Below in table 4.3 is a comparison of the bridge amounts.

**Table 4.3: Comparison of Rates**

Item	Description	BoQ Original Rate (MK)	Contractor Revised Rate (MK)	Variation (MK)
6100 to 6600	Construction of South Rukuru Bridge	265,058,603.08	1,597,585,796.66	1,332,527,193.58

- ii. Variation of rates due to increase or decrease of BOQ quantities as per clause PCC 12.3 of the contract.

**Table 4.4: Increase or Decrease of BOQ Quantities**

Item	Description	BoQ Original Rate (MK)	Contractor Revised Rate (MK)
PS 3301a (i)	Fill compacted to 90%	1,701.34	2,024.59
PS 3301a (ii)	Fill compacted to 93%	2,041.60	2,432.20
3307	Removal of unsuitable materials	2,722.14	3,212.13
3310	Roadbed preparation	1,020.80	1,256.40
-	Lower selected subgrade (LSSG)	NA	2,607.64
PS 3401a (ii)	Selected layer	2,381.87	2,656.70
PS 3401c (i)	Sub base	2,722.14	3,015.30
4501 (a)	Double Surface Treatment	2,109.66	2,531.59

- iii. Claim on profit and 35% overheads on omitted works. Table 4.5 below shows the items.

**Table 4.5: Omitted Works**

Item	Description	Amount (MK)	35% Amount (MK)
1800	Day works	11,261,287.38	3,941,450.58
2100	Drains	7,656,030.00	2,679,610.50
2200	Prefabricated culverts	850,668.00	297,733.80
2300	Concrete Kerbing, channelling, etc.	22,423,614.92	7,848,265.22
2500	Pitching, stonework etc.	33,346,168.20	11,671,158.87
2600	Gabions	8,418,205.68	2,946,371.99
5000	Ancillary road works	66,556,660.20	23,294,831.07
6000	1 No. Box culvert	28,892,189.77	10,112,266.42
	<b>Total</b>	<b>179,404,824.15</b>	<b>62,791,688.45</b>

From the above tables of variations, it can be observed that the Contractor was not consistent on the rates which he was using to vary his rates. This caused delays in decision

making and affected the normal procedures of determining reasonability of rates as evidenced by involving other stakeholders such as Ministry of Lands to value houses which were already constructed within the project. This was due to the fact that the Contractor was not following procedures of first of all agreeing rates then proceed with the works.

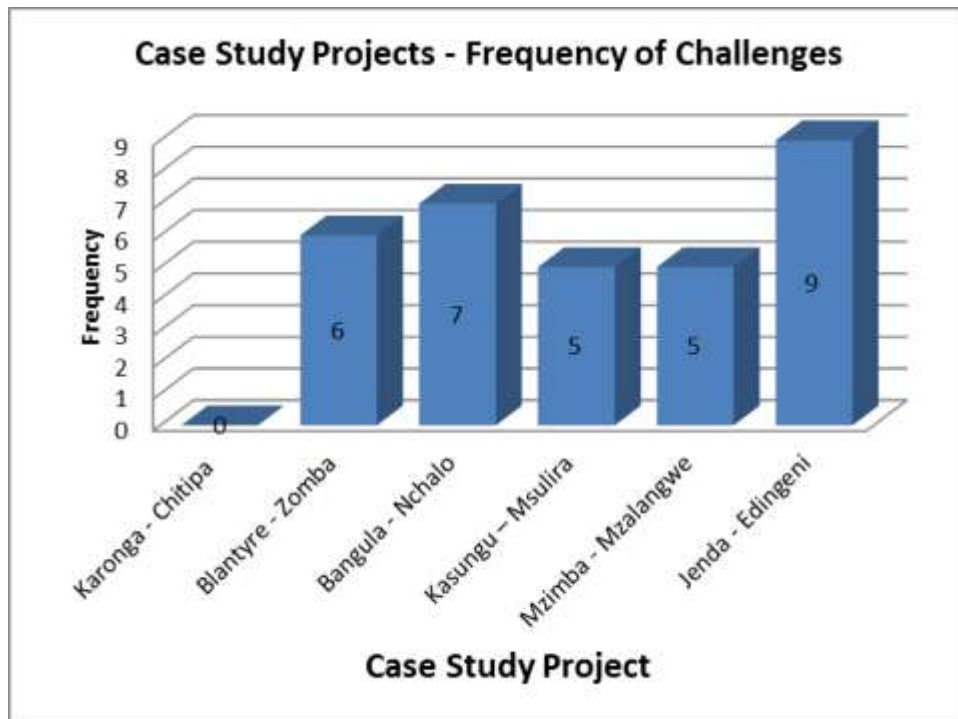
Considering Table 4.1 above, the Jenda – Edingeni Road Project had nine challenges. It can be analysed that five challenges were caused by the Client, two challenges by the Consultant and two challenges by the Contractor.

Therefore, considering challenges under each case study, it can be observed that decisions of a client has major impact on how smooth a project can be implemented. If proper planning and decisions are not made in time, this can cause a lot of challenges in the projects which can cause a lot of costs on the project.

### **4.3 Frequently Highlighted Challenges**

Therefore to further analyze the challenges, the frequency of each challenge has been looked into detail. Out of the total number of sixteen challenges as shown in Table 4.1, Jenda – Edingeni project had the highest number of challenges with nine in total, seconded by Nchalo - Bangula project with seven challenges and thirdly Blantyre – Zomba project with six challenges. Figure 4.2 shows the frequency of challenges for each project.





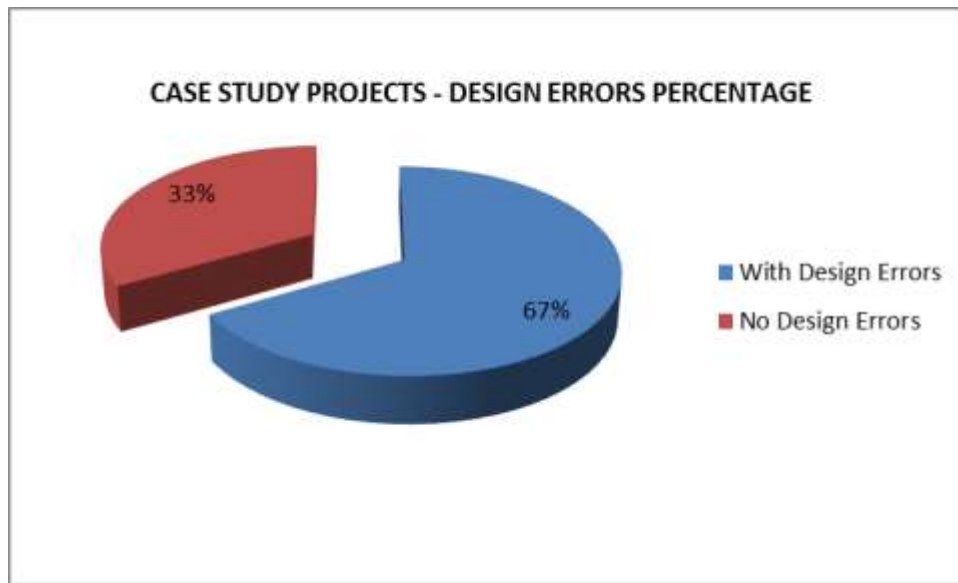
**Figure 4.2: Showing Frequency of Challenges for the Case Study Projects**

From the analysis of the case study projects, as shown in Table 4.1 above, the challenges which had a lot of frequency were five in number and these were:

- a. Design Errors,
- b. Design Change,
- c. Increased/Change in quantities,
- d. Devaluation of Malawi Kwacha Currency and
- e. Delayed or limited payments.

#### **4.3.1 Design Errors**

Design errors occurred in four case study projects out of the total of six case studies. The projects were Blantyre – Zomba Road, Nchalo - Bangula Road, Mzimba - Mzarangwe Road and Jenda-Edingeni Road. Figure 4.3 shows a chart showing the percentage of design errors for the case study projects.



**Figure 4.3: Chart Showing Percentage of Case Study Projects on Design Errors**

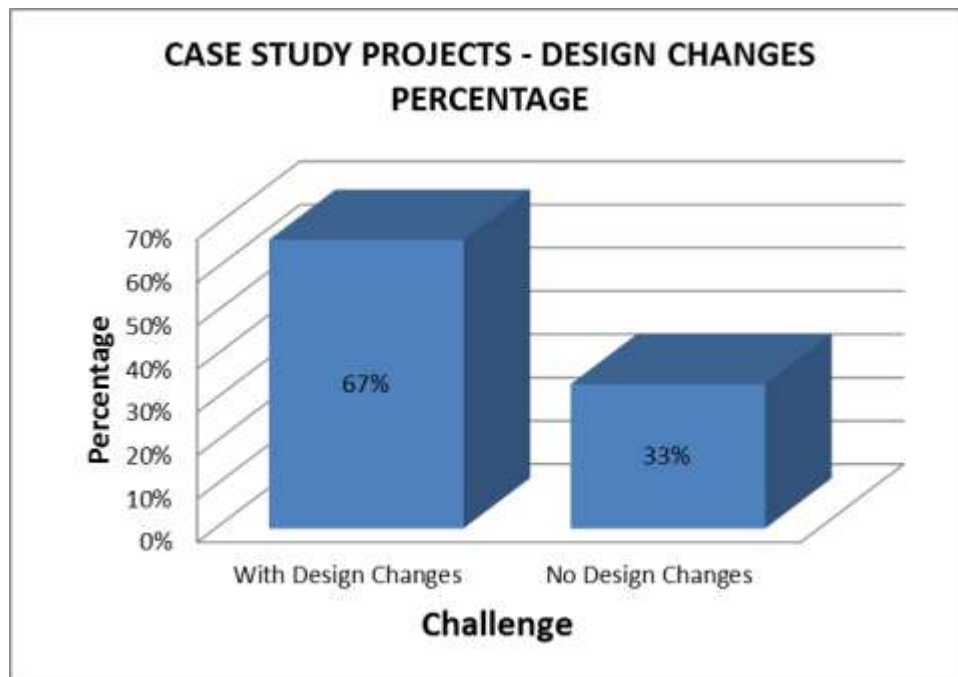
Apart from Blantyre – Zomba road, it was observed that all the other three case study projects had two design phases. The initial feasibility study and detailed design phase, and phase two: which was design review and construction supervision. It was at the second phase whereby design errors were discovered. Hence the new consultant had to carry out another detailed design which was time consuming and required more funds. Therefore, unless the process could be delayed, the design was carried out to ensure that the allocated resources which might be donor funded and are time bound are committed to the project. Other ways the situation of Jenda – Edingeni comes into reality whereby procurement of contractors was done using wrong designs, However, such practice ends up creating more challenges which end up even inflating the total project cost due to change of quantities after the revised design.

All consultants involved in the initial designs at phase one of these case study projects are local consultants which brings in another issue of capacity. Do these consultants have the required capacity to carry out such works. However for phase two of the five case study projects which had these challenges, only two consultants were international. Therefore, design errors could be due to non-sanctioning of consultants when they produce substandard output. This could be mitigated by sanctioning such consultants when design errors are discovered as well as ensuring that if a consultant carries out feasibility study and detailed design, they should be mandated to carry out construction supervision. This will ensure that any errors discovered at construction

phase could be rectified at the cost of the consultant. This recommendation would require that the Client should assure that designed projects are implemented within a specified period of time such as five years. Other ways, after such a period, it will be assumed that the designs are obsolete and a totally new design should be prepared before commencement of construction phase to avoid claims from the contractor.

#### 4.3.2 Design Change

Design change was observed in four case study projects and these are: Blantyre – Zomba Road, Nchalo - Bangula Road, Mzimba – Mzarangwe Road and Jenda – Edingeni Road. Therefore, this translates into sixty seven percent of the case study projects had design changes. Figure 4.4 below shows the percentage of design changes for the case studies.



**Figure 4.4: Chart Showing Percentage of Case Study Projects on Design Changes**

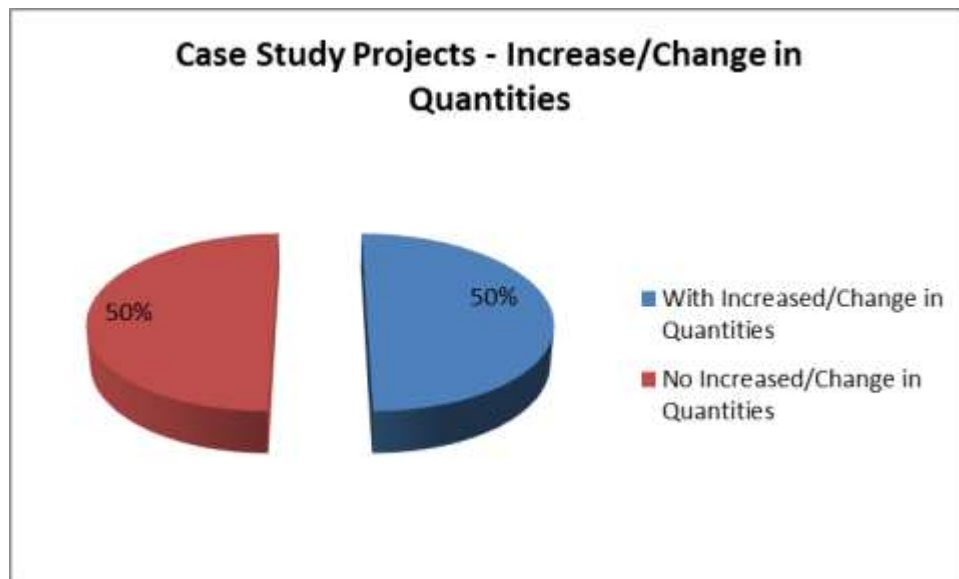
Just like in the previous challenge, apart from Blantyre – Zomba road, it was observed that all the other three case study projects had two design phases. The initial feasibility study and detailed design phase, and phase two: which was design review and construction supervision. It was at the second phase whereby design changes were carried out. From the case study projects, it can be observed that the design changes were caused due to different reasons. For Blantyre – Zomba and Mzimba – Mzaragwe Roads, the changes were due to financial constraints. However, for Nchalo

– Bangula Road, it was due to change of design parameters which were observed after the commencement of the project, and Jenda – Edingeni Road was due to design errors which were observed by the new consultant at design review and construction phase.

Hence all these changes can be attributed to poor planning by the client at the commencement of the project hence a lot of emerging issues disturbed the flow of the project.

#### 4.3.3 Increased/Change in Quantities

Increased/change in quantities was observed in three case study projects. These are: Blantyre – Zomba Road, Nchalo - Bangula Road and Jenda – Edingeni Road. Figure 4.5 shows the percentage of increased/change in quantities for the case study projects.



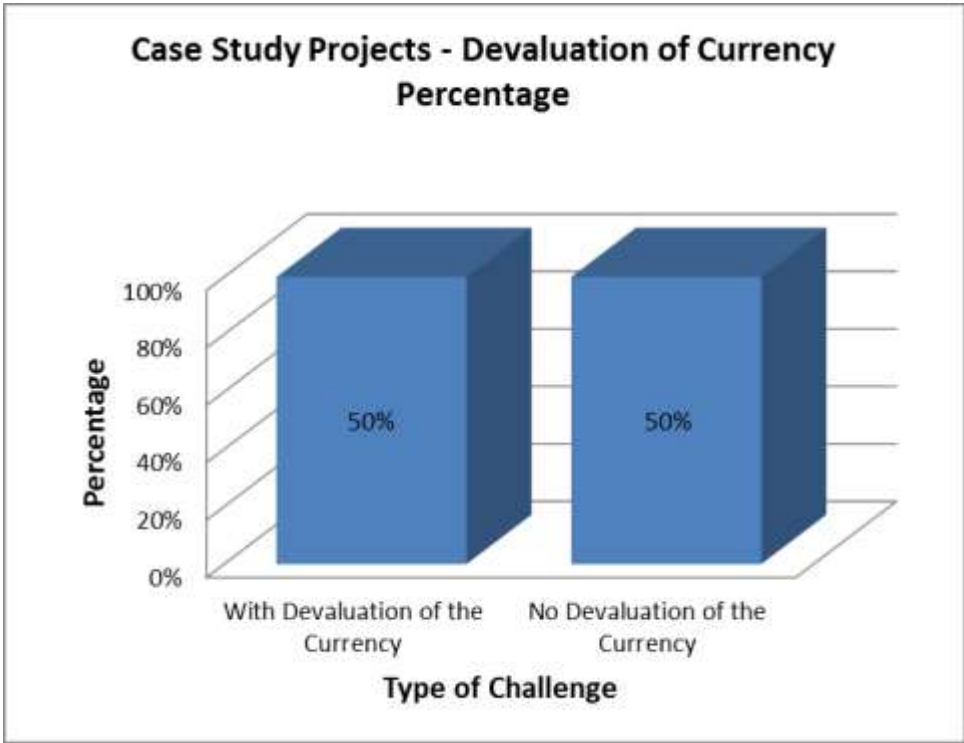
**Figure 4.5: Chart Showing Percentage of Case Study Projects on Increase/Change in Quantities**

In two projects, Blantyre – Zomba and Jenda – Edingeni Roads, the changes in quantities were due to design changes which occurred in the project. However, for Nchalo - Bangula Road, it was due to political directive to include some works which were emergency works on the on-going project. Since they were emergency works, the designs were done in a rush which ended up exceeding the allocated contingency funds of the project. Therefore, Government can avert such issues by properly planning the works and for emergency projects, funds should be earmarked for emergency works since such works are unavoidable. Ironically, the wash away of the Shire River

breakaway bridge (Mtayamoyo) had happened some three years prior to the time of the directive by the Government. Hence in normal circumstances, the works did not warrant to be categorized as emergency works. However, that period being a presidential election year, a directive was made for the reconstruction of a bridge.

**4.3.4 Devaluation of Malawi Kwacha Currency**

Devaluation of the Malawi Kwacha currency was observed in three case study projects. These are: Blantyre – Zomba Road, Nchalo - Bangula Road and Jenda – Edingeni Road. Figure 4.6 shows the percentage of the case study projects affected with devaluation of currency.



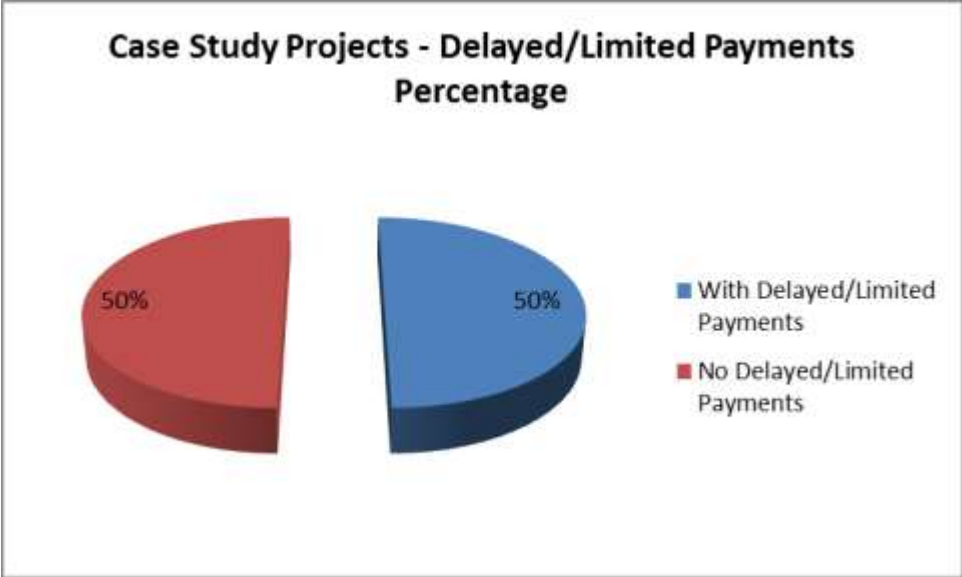
**Figure 4.6: Chart Showing Percentage of Case Study Projects on Effect of Devaluation of Currency**

All these three projects were partly donor funded projects with a percentage funded by Malawi Government paid in Malawi Kwacha. However, the Malawi Kwacha component was not tied to a dollar currency so that payment could be done in the prevailing exchange rate. Hence with the devaluation of the Malawi Kwacha in 2012 by more than 300%, this attracted a lot of claims from contractors.

Therefore, this can be avoided if the Malawi Kwacha is tied to a dollar at the time of signing a contract so that such claims are avoided.

**4.3.5 Delayed or Limited Payments**

Delayed or limited payments were observed in three case study projects. These are: Kasungu – Msulira Road, Mzimba – Mzlangwe Road and Jenda – Edingeni Road. Figure 4.7 shows the percentage of delayed or limited payments for the case study projects.



**Figure 4.7: Chart Showing Percentage of Case Study projects on Delayed/Limited Payments**

The common feature in two projects: Kasungu – Msulira and Mzimba – Mzlangwe Roads Projects was that both of them were fully Government of Malawi funded projects. Both of these projects were terminated due to delayed payments. For Jenda – Edingeni Project, the project was 40% funded by the Government of Malawi and 60% by Abdab Fund. As already indicated, the Government of Malawi component was the one which had problems of payment. Hence, it would be prudent for the Government of Malawi to plan projects properly to avoid claims due to delayed or limited payments. The best approach would be to implement a project in phases according to the availability of funds.

#### **4.4 Chapter Conclusion**

This chapter has presented the findings on the main challenges of the road sector projects. The findings looked at the case study projects, its main challenges during implementation; responsible stakeholder to manage the challenge and case study projects general performance.

The next chapter will present the analysis of feedback from key stakeholders who were involved in the case study projects. The analysis will mainly refer to the main challenges of the projects considering a project cycle, causes and how they could be managed. The results of chapter four will be analysed in line with results from respondents at implementation stage of a project cycle in consideration with the case study projects which have been analysed according to criteria set by Yin (2014).

## **CHAPTER 5**

### **UNDERSTANDING THE CAUSES OF THE CHALLENGES IN THE INFRASTRUCTURE PROJECTS: THE RESPONDENTS' VIEW**

#### **5.1 Introduction**

This chapter will present the analysis of feedback from key stakeholders who were involved in the case study projects.

First, the analysis will look at the composition of project respondents as outlined in Chapter 3. Secondly, the analysis will look into main project challenges *visa viz* project cycle. Then the causes of the challenges will be analyzed. The chapter will continue to analyze the performance of each case study project against project success determinants. At this stage, the results of chapter four were analysed in line with results from respondents at implementation stage of a project cycle in consideration with the case study projects. And finally the influence of major stakeholders in the success of the road sector projects.

The analysis of results will be on case study project bases and finally have a holistic view of the data from all the six case study projects.

#### **5.2 Number of Respondents**

Table 5.1 shows the number of respondents and their institution who were involved in the research.



**Table 5.1: Number of Officials Who Responded to the Questionnaire**

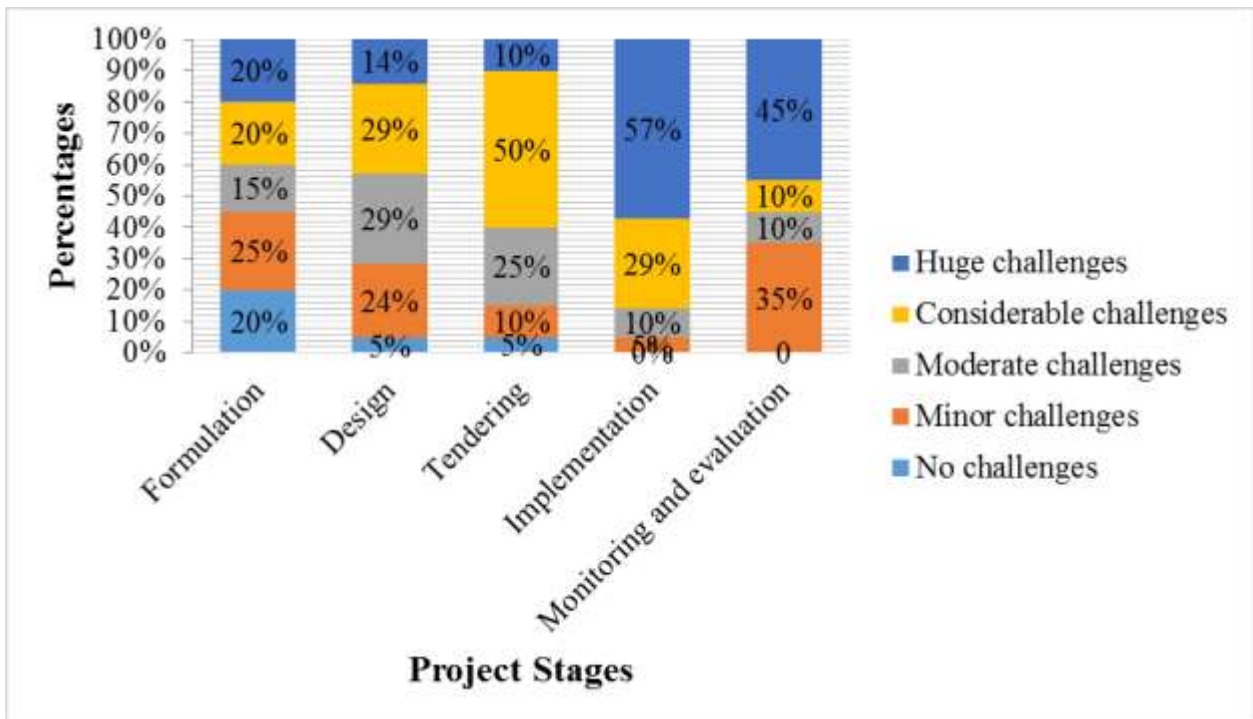
<b>Institution</b>	<b>Number of Respondents</b>	<b>Target</b>	<b>Response Rate (%)</b>
Contractors	5	6	83
Consultants	6	6	100
Roads Authority	6	6	100
Ministry of Transport	1	1	100
Ministry of Finance	1	1	100
Donor Community	2	2	<b>100</b>
<b>TOTAL</b>	<b>21</b>	<b>22</b>	<b>95</b>

As it might be observed from Table 5.1, there was a mixed group of respondents who were involved at various levels of project cycle. This was done so that all project stages could be evaluated in the research.

### **5.3 Analysis on Stages of Project and Challenges**

In project management, challenges can be at any level of the project cycle. This section would like to highlight at which level of project cycle encounter a lot of challenges. Respondents were asked based on their experience and knowledge to indicate at what stage of project cycle or level do road project encounter a lot of challenges. This was done using a scale of 1 to 5, with 1 having no challenges and 5 having huge challenges.

Figure 5.1 shows the results of the respondents on project stage challenges.



**Figure 5.1: Respondents on Project Stage Challenges**

From Figure 5.1 above, it can be observed that there are a lot of challenges at implementation stage (57%), seconded by at monitoring and evaluation stage (45%) and at project formulation stage (20%). The last two stages are design stage (14%) and tendering stage (10%). The reason for having a lot of challenges at implementation stage may be due to the fact that this is the stage where the project output is being produced and any mistakes in the previous stages are revealed.

#### **5.4 Main Challenges in Roads Sector Development Projects**

The respondents were asked the major challenges in projects in roads sector by using a scale of 1 to 5 as well, with 1 having no challenges and 5 having huge challenges.

In this section, the ten challenges were listed based on the project cycle, interviews with key respondents and as results from data analysis as outlined in chapter four. The list of the challenges were as follows:

- a. Poor Planning of Projects,
- b. Lack of expertise with consultants to meet the Client's needs,

- c. Limited/lack of funds for funding entire project,
- d. Mis-procurement by Client,
- e. Stringent procurement procedures by Funding Agencies,
- f. Political interference,
- g. Lack of proper project management skills by Clients,
- h. Lack of proper project management skills by Consultants,
- i. Lack of proper project management skills by Consultants and
- j. Lack of proper project management skills by Consultants

From the results of the study, mis-procurement of projects came first with 50%, corruption was second at 38% and limited or lack of funding for an entire project was third at 38%. Therefore, the analysis of the challenges will mainly dwell on the top three results. Table 5.2 shows the results for each of the challenges outlined above.

**Table 5.2: Main Challenges and the Level of Impact on Road Projects**

	No challenges	Minor challenges	Moderate challenges	Considerable challenges	Severe challenges	Total
Poor planning	0%	10%	43%	33%	14%	100%
Lack of expertise with consultants to meet client's needs	0%	10%	50%	25%	15%	100%
Limited/lack of funds for funding entire project	0%	10%	14%	38%	38%	100%
Mis-procurement by client	10%	15%	10%	15%	50%	100%
Stringent procurement procedures by funding agencies	10%	20%	30%	20%	20%	100%
Political interference	0%	19%	19%	38%	24%	100%
Lack of proper project management skills by clients	5%	10%	24%	43%	19%	100%
Lack of proper project management skills by consultants	5%	14%	29%	52%	0%	100%
Lack of implementing capacity by contractors	0%	0%	43%	48%	10%	100%
Corruption within the system	5%	14%	10%	33%	38%	100%

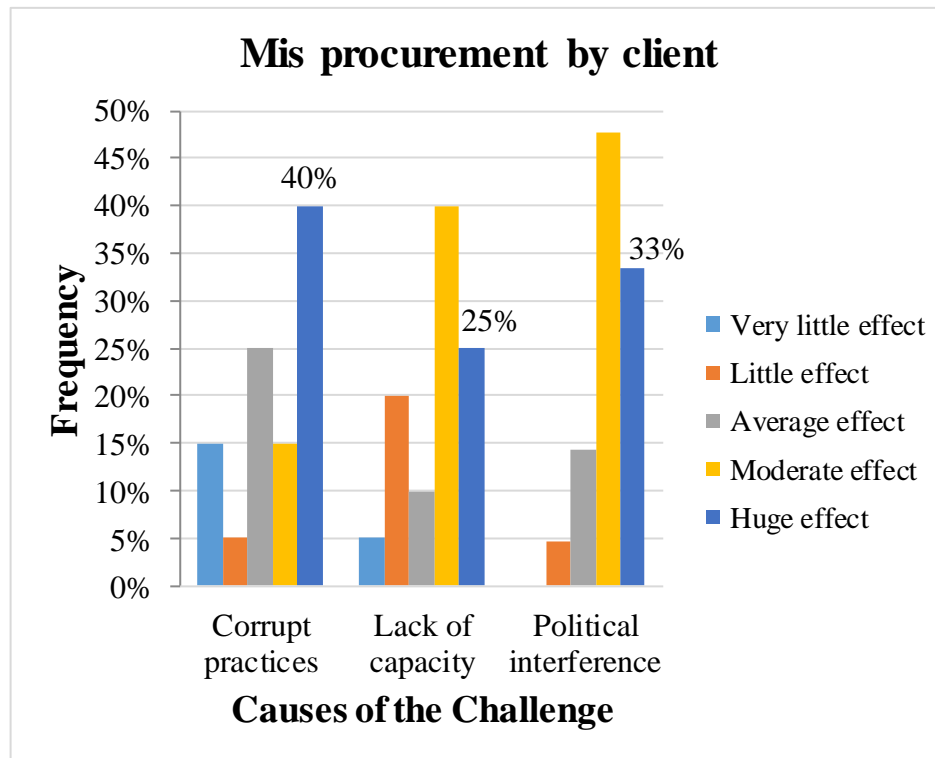
Considering the results in chapter four, the top three challenges were: design change which occurred in four projects, design errors in three projects and change in quantities in three projects. As it can be noticed, these challenges are at implementation stage since reports reviewed were for implementation stage of the projects. However, the questionnaire covered all the stages of the project cycle hence they were looking at all project stages.

Furthermore, causes of some of the challenges at implementation stage could have been due to some challenges in earlier stages of the projects such as mis-procurement. A typical example could be capacity of contractors which could be caused by laxity of checking the prequalification criteria of a contractor and this is done at procurement stage. Similarly design errors or indeed failure by a contractor to perform could be due to mis-procurement which could result in contracting a contractor or a consultant which does not have the required capacity to carry out such works.

### **5.5 Main Causes of the Challenges in Roads Sector Development Projects**

As a follow up question, the respondents were asked the causes of each of the ten challenges in projects in the roads sector. This was done using a scale of 1 to 5 as well on the possible causes. Considering mis-procurement by client which came out as the major challenge in the analysis of the results, the interviewees were asked to mention which main cause among the three probable causes. The choice was among the following causes: corruption, political interference and lack of capacity.

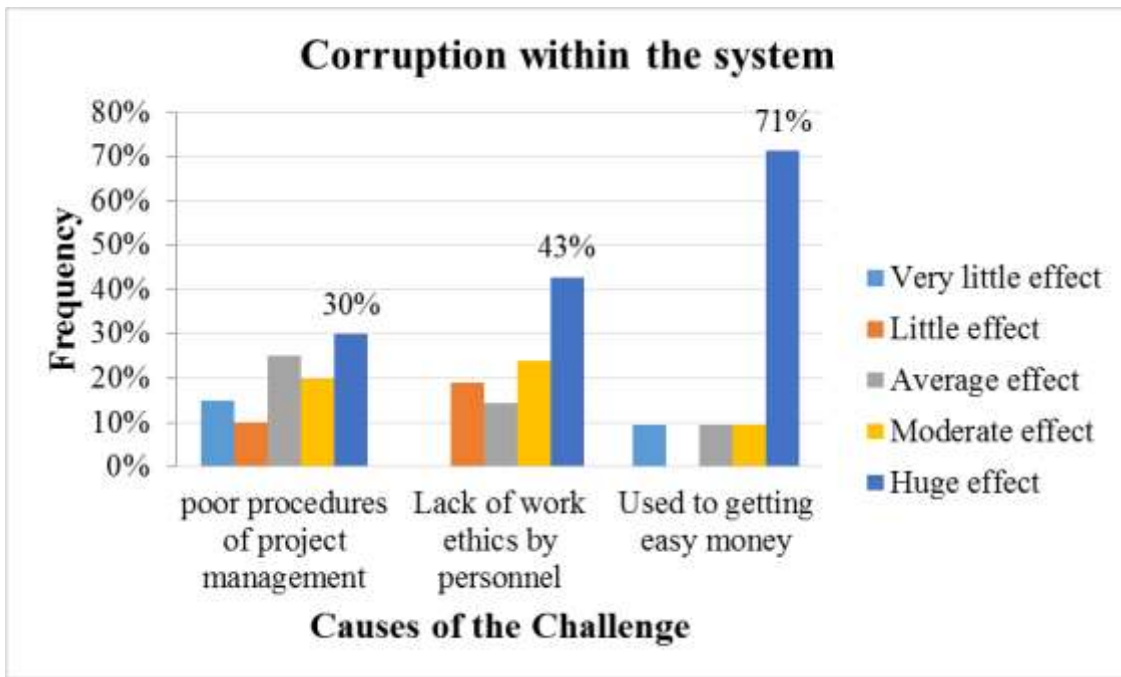
Figure 5.2 shows the results of causes of mis-procurement and the major cause was corruption, seconded by political interference and the last one was lack of capacity.



**Figure 5.2: Causes of Mis-procurement by Client**

In order to establish a root cause of the challenges, the interviewees were asked to choose the main cause of corruption in roads sector. Three possibilities were outlined and these were: poor procedures of project management, lack of work ethics by personnel, and used to getting easy money.

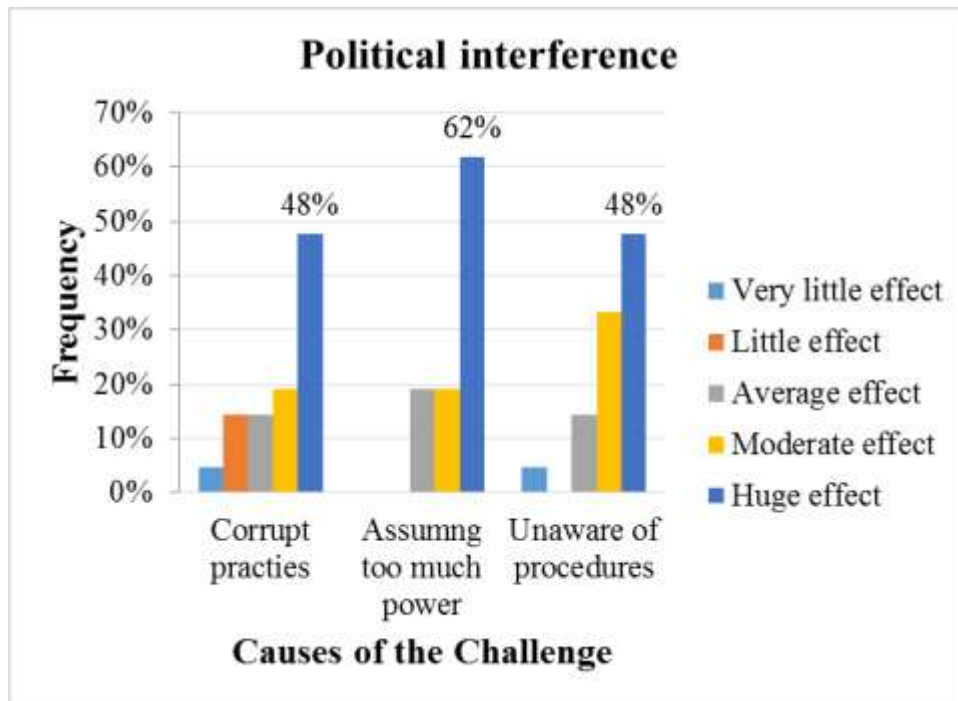
As shown in Figure 5.3 below, used to getting easy money came first, seconded by lack of work ethics by personnel and poor procedures of project management. This is a clear sign that corruption is more of mindset than lack of good procedures to guide personnel involved in projects. Hence the solution is mind set change which can come by sensitization of the evils of corruption and its effect on the economy of the country and its citizens.



**Figure 5.3: Causes of Corruption within the System**

Furthermore, the interviewees were asked to choose the causes of political interference. The three proposed causes were: corrupt practices, assuming too much power, and unaware of procedures.

Figure 5.6 below shows that assuming too much power came first, corrupt practices and unawareness of procedures tied at number two. As might be observed, assuming too much power is an altitude issue not rather a technical issue. Procedures can easily and properly be followed if the altitude of the people is right.



**Figure 5.4: Causes of Political Interference**

The third major challenge for road projects was limited or lack of funding for an entire project. This caused design changes, delay in site handovers, change in quantities, change of supervision consultant, and delayed payments as highlighted in chapter four.

Therefore, the interviewees were also asked to choose the main cause of this challenge. The proposed causes of limited or lack of funding for an entire project were: poor estimates of costs, phasing of projects and poor loan negotiation skills.

The results in Figure 5.5 showed that poor loan negotiation skills was first, and poor estimates of costs and phasing of projects got the same scores at position two. This could have been due to the fact that a lot of developments projects in the roads sector are donor funded, hence all this goes back to project planning. The major issue of ensuring that the designs are correct, and project estimates are done properly. This can easily be managed at implementation level is the planning of the project was done properly.



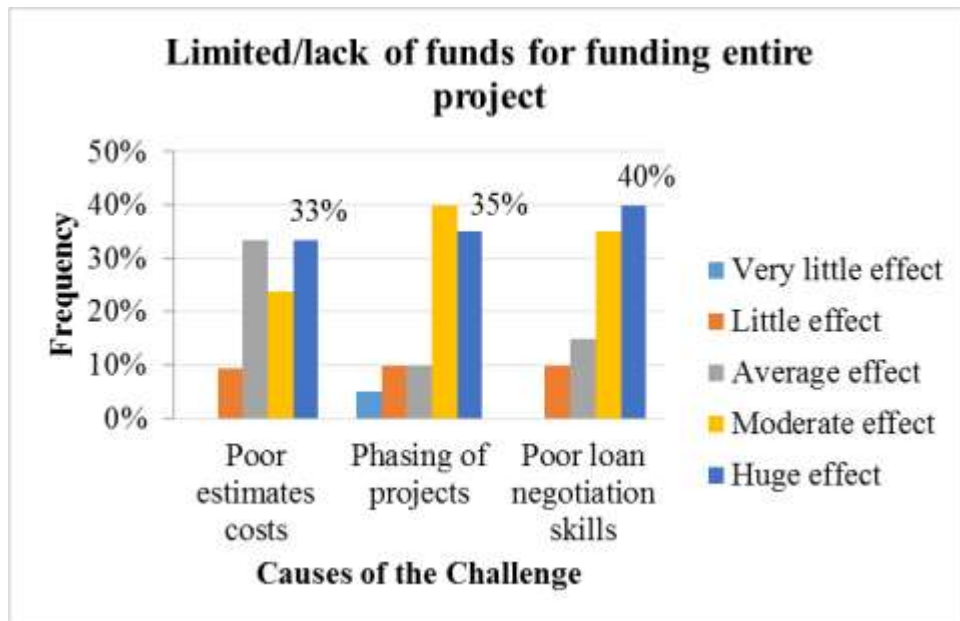


Figure 5.5: Causes of Limited/Lack of Funds for Funding Entire Project

### 5.6 Opinion on Whether Case Study Projects were Successful or not

For the case study projects, the respondents were asked to indicate whether a project was successful using the three project management indicators of cost, time and quality. This was done using a scale of 1 to 5 just like the other criteria. Figure 5.6 below shows the results of the responses.

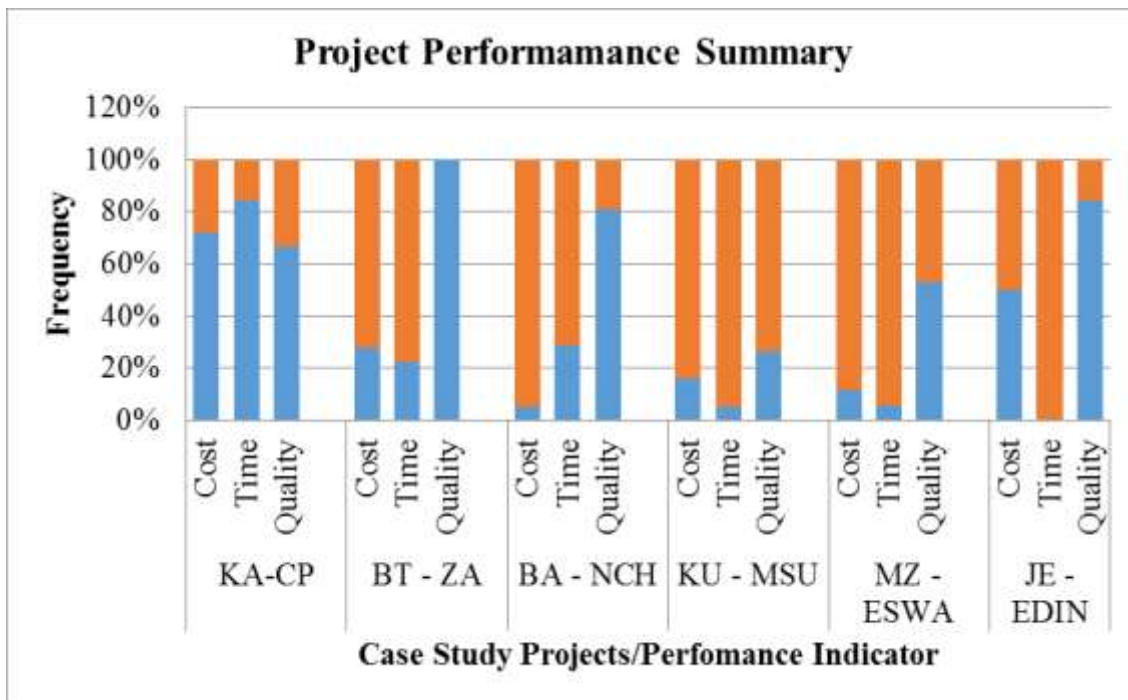


Figure 5.6: Project Performance Summary

It can be observed that the Karonga – Chitipa Road Project performed quite well in all the three indicators.

The Blantyre – Zomba Road did well in only quality whilst did badly in time and cost management.

Just like for Blantyre – Zomba Road, the Nchalo Bangula Road was good only in quality and very poor in cost and time management.

The Kasungu – Msulira Road performed badly in all indicators just like the Mzimba – Eswazini and Mzarangwe Road.

The Jenda Edingeni Road performed well only in quality but was very poor in time and fair in cost.

From the above outline of the results, it can be observed that a trend can be established based on the performance of the project and model of the project funding and management. The first category is wholly donor supported project which includes funding as well as implementation by a donor agency. The Karonga – Chitipa Road falls in that category which was a Chinese funded and implemented project without any local input. This was a turnkey project which was managed in a design build approach. Ironically, the performance of this project was the best among all the case study projects. This may be attributed to the fact that the team works as an entity without any diverse objectives of maximizing profits or indeed following complicated procedures of funding or procurement which results into opening doors of corruption or mismanagement.

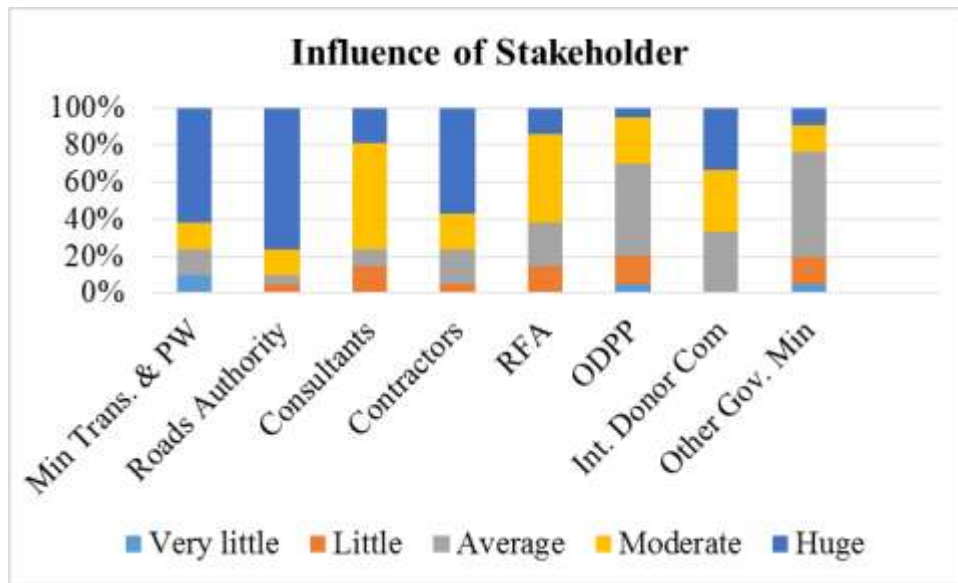
The second category is a donor funded but implemented using Government system of procuring a consultant and a contractor. Example of such projects are Blantyre – Zomba Road, Nchalo – Bangula Road and Jenda – Edingeni Road. It can be established that all these projects did well in quality. However, the performance in time and cost was generally poor. This could be attributed to the fact that since the objective of the contractor as a business entity is to maximise in profits, contractor would always like to find ways of doing that by raising claims which push the cost of

projects up or indeed by corrupt ways which affects procurement systems of the government. Costs could also be poorly managed due to poor planning as there could be a lot of under estimations of project costs which affect the implementation plan.

The third category is wholly Government funded and implemented project using a consultant and a contractor. It can be observed that these are the most poorly performing projects. The major reason could be poor funding and political interference. This is due to the fact that the government funding system of development projects depends on the general government account known as Account Number One instead of having dedication project/s account. Hence payments to project implementers thus contractor and consultant depends on government allocation of funds to various payment votes. This usually ends in delayed payments or indeed non-payment of project certificates. Therefore, this result into either accumulation of payments ending up in huge interests which pushes the project cost very high for those contractor with high liquidity or indeed in termination of the projects for contractors who cannot prefund project activities. Secondly, this could be caused by poor planning that Government due to political ambitions. It is not uncommon for politically motivated projects to start and run out of funds midway during implementation. From experience, Government could start a project but implement in phases so that the cash flow is easily projected due to the prevailing economic conditions. In so doing, huge delays, price escalations and interests or implementation failure could be averted. All these are some of the major challenges which were outlined in chapter four as well.

## **5.7 Level of Influence on Project Success of Various Stakeholders**

And finally, the interviewees were asked to rate the level of influence of major road sector stakeholders.



**Figure 5.7: Level of Influence by stakeholders**

From Figure 5.7 above, it can be observed that the Roads Authority has the biggest influence for road sector project success followed by the Ministry of Transport and Public Works, Contractors and the Road Fund Administration.

This is due to the fact that the Roads Authority as a Government implementing agency, has the driving authority and direct control of road sector projects. The Ministry of Transport and Public Works as a policy holder, provides overall guidance and links with Government vision of the sector. Hence this is the main stakeholder which has to manage the strategic direction of the Roads Authority. Contractors are in third place, since they have to construct the roads as per government requirement which is overseen by the Roads Authority. Hence the capacity of the Contractors has a huge bearing on how a project can be implemented. The Road Fund Administration is responsible for managing payments of running projects. However for development projects, the Road Fund Administration depends on government allocation which is through Treasury. Most of times, donor funded projects have their own procedures of payments once the payments are certified.

Finally, analyzing this in relation to the level of influence by stakeholders on main challenges which were outlined in Chapter 4, where the client was indicated to have a lot of influence, this agrees with the results as indicated above. Therefore, it can be observed that among all

stakeholders, the Client has the key responsibility to ensure that projects are successful in the roads sector.

## **5.8 Chapter Conclusion**

This chapter has presented the results of the research and its analysis from the key respondents' data which was collected. The results looked at the main challenges according to the project cycle then zeroed in on the main three challenges which were outlined. The causes of the challenges were also analysed in a root cause approach. Links with the challenges at implementation stage as outlined in chapter four were also analysed. Then the performance of case study projects and the level of influence of roads sector key institutions were analysed.

The next chapter will present conclusions and recommendations of the research. These will mainly refer to the results and analysis of the research which has just been presented.

## **CHAPTER 6**

### **CONCLUSIONS AND RECOMMENDATIONS**

#### **6.1 Introduction**

This chapter will draw conclusions from the study based on the aims of the research. The main aim of this study was to outline challenges in infrastructure development projects with specific focus in road sector projects. Further, the research was to identify causes of the challenges in the infrastructure development projects and describe methods of averting these challenges in these projects.

The study focused on six case study projects which were analysed based on three project management indicators of time, cost and quality. Methods of improving the performance of infrastructure projects have also been discussed and recommended.

Specific recommendations that have arisen from the study have also been included and the report will close by highlighting areas which would require further research.

#### **6.2 Main Conclusions**

This study has revealed that considering the project cycle, the main challenges in road sector projects are at implementation and at monitoring and evaluation stages. These challenges are mainly mis-procurement, corruption in the system and lack of funds for an entire project. The study further revealed that the major causes of these challenges are as follows:

- a. Mis-procurement – this is mainly caused by corruption, political interference and lack of capacity.
- b. Corruption – this is mainly caused by being used to getting easy money (greediness), lack of work ethics and poor procedures of project management.
- c. Political Interference – this is mainly caused by assuming too much power, corrupt practices and unawareness of procedures.
- d. Limited/lack of funds for entire projects – this is caused by poor loan negotiation skills, poor project estimates and poor phasing of projects.

The study also evaluated whether the case study projects which were chosen were successful in using the three project management success determinants of time, cost and quality. The study showed that wholly donor supported projects which include funding as well as implementation by a donor agency were very successful. The second category of a donor funded but implemented using Government system of procuring system registered good performance quality wise. However, the performance in time and cost was generally poor. Lastly the study also revealed that wholly Government funded and implemented projects were the most poorly performing projects.

Considering the actual case projects, the study has revealed that following issues are major challenges of projects:

- a. Design errors which lead to several reviews of the designs and end up raising project costs, and causing delays.
- b. Worsening conditions of existing roads earmarked for improvement due to long period between design and construction phases of the project, mainly due to delayed funding.
- c. Additional works which are usually due to emergencies and or political interference and this is common in wholly government funded and implemented projects.
- d. Change of supervision consultants due to change in funding arrangements as funding did not cover the entire project.
- e. Delayed and limited payments which directly affect actual implementation of the project.
- f. Non – availability of fuel and forex which happened between years 2010 and 2012.
- g. Shortage or non-availability of good construction materials such as base gravel.
- h. Tendering works before finalization of designs to secure funds mainly for donor funded projects and this ends up in huge variations at implementation stage.

The study has also indicated that the implementing agency in roads sector: Roads Authority has a huge role in successful implementation of projects. This was followed by the Ministry of Transport and Public Works, Contractors and the Road Funds Administration.

Hence good strategies, political will, proper funding mechanism and good management practice is prerequisite for successful projects in the sector. It is also concluded that a holist approach of

good project management practices should be mainstreamed in the project management cycle to ensure successful results.

Finally, the project has revealed that project reports produced by consultants can be depended on as a good source of project information. This was due to the fact that after triangulating the information which was collected from analysed project reports, unstructured interviews and questionnaires, there was convergence of results.

### **6.3 Recommendations**

From the analysis of the research above, the author would like to recommend the following in order to improve the performance of projects in the road sector. These recommendations have been categorised into general and specific to the roads sector.

#### **6.3.1 General**

- a. Continuous capacity enhancement in procurement of projects has to be planned for all main project stakeholders. This should cover all levels from the Board level for general knowledge as a governance issue and implementation staff
- b. Main streaming anti-corruption policy and drive in project implementing agencies and
- c. Implementing a phased approach in project implementation depending of available resources.

#### **6.3.2 Specific to the Road Sector Projects**

- a. Tendering of works should be done when designs are complete and even peer reviewed by another independent consultant.
- b. Good planning of projects should be done so that there is no big time gap between design and implementation. If there is any big time gap due to funding challenges, then a thorough design review should be done.
- c. Project implementation should be done in phases according to availability of resources rather than committing to a whole project when resources are not available.
- d. Any additional work should be done within available resources to avoid delayed payments.



- e. Continuous research in use of natural materials for road construction to replace or indeed improve qualities of these materials such as gravel which is gradually being depleted throughout the country.

#### **6.4 Research Limitations**

The following were the limitations of this research:

- a. It was not easy to get case study projects reports since most of them were not available at the Roads Authority Library. Therefore, reports had to be sourced from various consultants who were involved in the projects;
- b. Some anticipated key informants in the research were no longer available; some had returned home such as the Chinese Contractor for Chitipa - Karonga Road and could not be traced for recording of the information;

#### **6.5 Areas of Further Research**

From the results of this research, it could be observed that further research is required on how project management success determinants are used to assess project performance in developing countries like Malawi. This would improve project monitoring and evaluation skills in relevant institutions and enhance project delivery.

Specifically for the roads sector, there would be need to further assess project performance based on funding and implementation mechanisms. This would require analysing the methods and its effectiveness and ways of harmonising them. And another research could look into continuous research in quality improvement of natural materials such as gravel used for road construction in Malawi.

These research requirements would need both material and human resources apart from commitment from institutions that would be willing to participate in the studies. The current study results could be used as a basis for further research in the roads sector as challenges of project management in both governance and technical issues.

## **6.6 Chapter Conclusions**

This chapter has presented the conclusions and recommendations of the research. The chapter looked at the major conclusions that came from all the areas of the research. The recommendations were categorised into general to infrastructure projects and specific to roads sector. And in closing the chapter, areas of further research have been highlighted.

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## **APPENDICES**

### **Appendix A**

#### **Questionnaire**

QUESTIONNAIRE ON MAIN CHALLENGES OF INFRASTRUCTURE DEVELOPMENT  
PROJECTS IN MALAWI: A CASE STUDY OF THE ROADS SECTOR.

NAME OF INSTITUTION/MINISTRY :.....

NAME OF INTERVIEWEE: .....(Optional)

POSITION IN ORGANISATION:.....(Optional)

YEARS OF EXPERIENCE: .....

DATE:.....

#### **PREAMBLE:**

I am conducting a study on Main Challenges of Infrastructure Development Projects in Malawi: A Case Study of Roads Sector. The aim of the study is to highlight challenges in infrastructure development projects with specific focus in road sector projects. The research will study causes of the challenges in the infrastructure development projects as well as describe methods of averting these challenges to achieve efficiency and increase value for money for the projects.

A sample of on-going and completed projects will also be studied and observations made of these projects.

This questionnaire will take about 30 minutes to complete and thank you for accepting to take part in the research.

1. At what project cycle stage are you involved:

- a. Formulation  b. Design  c. Tendering  d. Implementation   
e. Monitoring and Evaluation

2. What is the annual turnover of your company:

**Clients:**

Not applicable

**Consultants:**

- a. Less Than K500 million  b. Between K500 mil to K1.0 Billion   
c. Between K1.0 Bil to K1.5 Bil  d. Between K1.5 Bil to K1.5 Billion   
e. Over K2.0 Billion

**Contractors:**

- a. Less Than K2.0 Bil  b. Between K2.0 Bil to K3.0 Billion   
c. Between K3.0 Bil to K4.0 Bil  d. Between K4.0 Bil to K5.0 Billion   
e. Over K5.0 Billion

3. What is your level of involvement with roads projects? (For ease of each case corresponding to your involvement give a rate of your understanding of your level of involvement on a scale of 1 to 5 where:

- 1 = Very Little Involvement                      2 = Little Involvement**  
**3 = Average Involvement                      4 = Moderate Involvement**  
**5 = Huge Involvement**

Stage of Project	Level of Involvement				
	1	2	3	4	5
Formulation Stage					
Design Stage					
Tendering Stage					
Implementation Stage					
Monitoring & Evaluation Stage					

4. According to your knowledge and experience, at what stage of project cycle do road projects encounter a lot of challenges? (For each project stage give a rate of level on a scale of 1 to 5 where:

- 1 = No Challenges**                      **2 = Small amount of Challenges**  
**3 = Average amt of Challenges**    **4 = Moderate amt of challenges**  
**5 = Huge amount of challenges**

Stage of Project	Level of Challenges				
	1	2	3	4	5
Formulation Stage					
Design Stage					
Tendering Stage					
Implementation Stage					
Monitoring & Evaluation Stage					

5. What do you think are the main challenges in projects in the roads sector? (For ease of rating each case, give a rate on a scale of 1 to 5 where:

- 1 = No Challenges**                      **2 = Small amount of Challenges**  
**3 = Average amt of Challenges**    **4 = Moderate amt of challenges**  
**5 = Huge amount of challenges**

Challenge	Intensity of Impact as a challenge				
	1	2	3	4	5
Poor Planning of Projects					
Lack of expertise with consultants to meet the Client's needs					
Limited/lack of funds for funding entire project					
Mis-procurement by Client					
Stringent procurement procedures by Funding Agencies					
Political interference					
Lack of proper project management skills by Clients					
Lack of proper project management skills by Consultants					
Lack of implementing capacity by Contractors					
Corruption within the system					

6. What do you think are the main causes of the challenges in projects in the roads sector? (For ease of rating each case, give a rate on a scale of 1 to 5 where:

*1 = Very little effect*

*2 = Little Effect*

*3 = Average effect*

*4 = Moderate effect*

*5 = Huge effect*

Causes of Challenges		Intensity of effect				
		1	2	3	4	5
a.	Poor Planning of Projects  <i>Causes:</i>					
	Lack of capacity					
	Lack of planning tools					
	Limited time for planning					
b.	Lack of expertise with consultants to meet the Client's needs  <i>Causes:</i>					
	Limited specialised experts					
	Limited understanding of assignment					
	Having too many assignments at once					
c.	Limited/lack of funds for funding entire project					

	<b><i>Causes:</i></b>					
	Poor estimates of costs					
	Phasing of projects					
	Poor loan negotiation skills					
d.	Mis-procurement by Client  <b><i>Causes:</i></b>					
	Corrupt practices					
	Lack of capacity					
	Political interference					
e.	Stringent procurement procedures by Funding Agencies  <b><i>Causes:</i></b>					
	Non uniformity of procedures with national guidelines					
	Delays in granting ‘no objections’					
	Micro management by funding agencies					
f.	Political interference  <b><i>Causes:</i></b>					
	Corrupt practices					
	Assuming too much power					

	Unaware of procedures					
g.	Lack of proper project management skills by Clients  <i>Causes:</i>					
	Lack of specialist					
	Corruption					
	Lack of motivation					
h.	Lack of proper project management skills by Consultants  <i>Causes:</i>					
	Lack of specialists					
	Corruption					
	Having too many projects					
i.	Lack of implementing capacity by Contractors  <i>Causes:</i>					
	Lack of training colleges of technicians					
	Corrupt practices					
	Used to doing sub-standard work					
o.	Corruption within the system  <i>Causes:</i>					
	Poor procedures of project					

	management					
	Lack of work ethics by personnel					
	Used to getting easy money					

7. In project management, a successful project has to be completed within the project budget, time and with good quality. From the list of the five projects below, can you please indicate whether the project was successful or not?

	Project Name	Successful	
		Yes	Not
a.	Karonga – Chitipa Road Project		
	Cost		
	Time		
	Quality		
b.	Blantyre – Zomba Road Project		
	Cost		
	Time		
	Quality		
c.	Bangula – Nchalo Road project		
	Cost		
	Time		
	Quality		
d.	Kasungu – Msulira Road Project		
	Cost		
	Time		



	Quality		
e.	Mzimba – Eswazini – Mzarangwe Road Project		
	Cost		
	Time		
	Quality		
f.	Jenda – Edingeni Road Project		
	Cost		
	Time		
	Quality		

8. From your knowledge and experience, could you please rate the influence of each stakeholder in roads projects success in Malawi. (For ease of rating each case, give a rate on a scale of 1 to 5 where:

- 1 = Very Little Influence      2 = Little Influence**  
**3 = Average Influence      4 = Moderate Influence**  
**5 = Huge Influence**

Project Stakeholder	Level of Challenges				
	1	2	3	4	5
Ministry of Transport and Public Works (Policy holder)					
Roads Authority (Government Implementing Agency)					

Consultant (various)					
Contractors (various)					
Road Fund Administration (Government Funding Agency)					
Office of the Director of Public Procurement					
International Donor Community (e.g. AfDB, World Bank, E.U, Badea, Kuwait Fund etc.)					
Other Government Ministries (e.g. Ministry of Finance, Economic Planning and Development, Ministry of Justice)					

THIS IS THE END OF THE QUESTIONNAIRE.

THANK YOU FOR YOUR TIME.