CHALLENGES FACED IN WATER INFRASTRUCTURE PROJECTS IMPLEMENTED BY THE ZAMBIAN GOVERNMENT

By

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DECLARATION

I, Marjorie Mwale, do hereby declare that this work is my own and it has not previously been submitted for a degree, diploma or other qualification at this or another University. I also declare that the works of other persons utilized in this dissertation have been duly acknowledged, cited and referenced.

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ABSTRACT

The Government of the Republic of Zambia (GRZ) has been undertaking water infrastructure development projects and programs at various levels in both rural and urban areas through the Ministry of Water Development and Sanitation (MWDS) and other line ministries. The implementation of these projects by the Zambian government has come with many challenges, which has led to the non-completion of some projects. In the past 10 years, a number of these projects have been abandoned at various stages of completion. However, no study has been conducted to investigate the cause of this. This study was undertaken to identify challenges that contribute to failures in fully implementing water projects implemented by the Zambian government. The general objective of this study was to establish challenges faced in implementing water infrastructure development projects by the Zambian government. The study was carried out by interviewing different officers from government and donor agencies involved in the water infrastructure projects at different stages, Non-Governmental Organizations (NGOs) and consultants, literature review of the various books and reports and also observation of selected water infrastructure projects. The results indicated that the major challenges of implementation were in the formation and operation of Project Management Teams, lack of financial resources and lengthy procurement process. It was therefore recommended that the Project Management Team should have fully dedicated team members to work solely on the project and must have no government interference, also government should completely fulfil its financial obligations to the projects and the procurement process to be revised to improve efficiency and effectiveness.

Keywords: Water infrastructure projects, project management team, government, challenges, implementation.

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LIST OF ABBREVIATIONS AND ACRONYMS

AfDB	African Development Bank
APDM	Alternative Project Delivery Methods
CIWA	Cooperation in International Waters in Africa
CMAR	Construction Management at Risk
DB	Design-Build
DBB	Design-Bid-Build
DWRD	Department of Water Resources Development
DWSS	Department of Water Supply and Sanitation
GEF	Global Environment Facility
GRZ	Government of the Republic of Zambia
IFA	Investment Focus Area
JWSESR	Joint Water Sanitation and Environment Sector Review
MoA	Ministry of Agriculture
MLGRD	Ministry of Local Government and Rural Development
MPSAs	Ministries Provinces Spending Agencies
MWDS	Ministry of Water Development and Sanitation
MWDSEP	Ministry of Water Development, Sanitation and Environmental Protection
NGO	Non-Governmental Organisation
NRWSSP	National Rural Water Supply and Sanitation Programme
NSC	North-South Carrier
NUWSSP	National Urban Water Supply and Sanitation Programme
PAP	Project Affected People
PMT	Project Management Team
SADC	Southern African Development Community

SADG-GMI	Southern African Development Community Groundwater Management Institute
SDG	Sustainable Development Goal
WB	World Bank
WV	World Vision
WRDP	Water Resources Development Project
WSID	Water Sector Institutional Development
ZIP	Zambia Water Investment Programme
8NDP	Eighth National Development Plan

CHAPTER ONE: INTRODUCTION

1.0 Background

Water is the most precious resource and abundant compound on the earth's surface covering more than 70 percent of the planet (Hossain, 2015). Water should be considered as an economic good, not only because of the large investments required by the water sector but also due to its severe use and effects throughout the economy as a whole (Bouhia, 2018).

It is a known fact that universal access to clean, safe and secure water resources is a basic human right as enshrined in Sustainable Development Goals (SDG) particularly goal number 6 and its importance in social economic development cannot be over emphasised (Brookes and Carey, 2015). Although there has been notable progress in increasing access to water and sanitation services globally, billions of people have been denied access to this basic right mostly in developing countries (WHO/UNICEF, 2014). This can be attributed to many problems encountered in the implementation of water and sanitation projects (Korir, 2013).

Water projects have been implemented throughout the world to develop the resource. The implementation of these projects has come with challenges, although little information is available on the same. Common challenges identified in implementing progressive design-build in projects in the different sectors such as water and wastewater sector include legislative restriction, lack of owner education, demand on owner resources, and lack of industry interest (Alleman and Tran, 2019). According to Onori et al. (2018), challenges identified in the implementation of green infrastructure projects were professional roles and relationships; planning and design; value to the school community; and engagement of the broader community.

In Nepal, India, the challenge of implementing water resources development projects was identified due to lack of technology and technicians; lack of adequate funding to complete projects; most water resources development projects being located in hilly places making the places unreachable in certain seasons; and ineffective water resources policy (GP Sir, 2021).

Research was undertaken in Gushegu District of Northern Ghana to uncover the main challenges in the implementation of water and sanitation projects. The study found the project staff had very minimal commitment in implementation of the project; the project beneficiaries did not participate in project planning and decision-making; some cultural beliefs were not considered when planning and executing the projects; inadequate financial resources on the part of Gushegu District Assembly; unpredictable funds flow from the development partners; as well as weak monitoring of the project implementation (Awini, 2015).

The Government of the Republic of Zambia (GRZ) has been undertaking water infrastructure development projects and programs at various levels in both rural and urban areas aimed at ensuring the country's water security especially in areas where water is not easily accessible (Chipuwa, 2019). GRZ has been undertaking these water projects through the Ministry of Water Development, Sanitation and Environmental Protection (MWDSEP) which was changed to Ministry of Water Development and Sanitation (MWDS) in August 2021. In order to compliment the Zambian government's efforts in the provision of water resources for multipurpose use, a number of water infrastructure development projects have been supported by cooperating partners such as the World Bank (WB), African Development Bank (AfDB), World Vision (WV) and many others. The implementation of these projects by the Zambian government has come with many challenges, which has led to the non-completion of some projects. This study has been motivated by the need to establish the challenges that contribute to non-completion of water development projects funded and implemented by the government.

1.1 Statement of the Problem

The Government of the Republic of Zambia has in the recent past been undertaking various water infrastructure projects through the MWDS and other line ministries with the view of accelerating the country's social economic development by ensuring easy access to water. The water infrastructure projects have been prioritized in the different sectors such as water supply and sanitation as well as water harvesting structures such as dams used in agriculture to increase social benefits and to promote food security and poverty alleviation. This has seen donor communities and governments in developed countries support the government by investing in the sector.

Although the government and donor communities have embarked on water projects, some of these projects have been abandoned or left incomplete posing a threat on investments as resources are wasted on these stalled projects, both human and financial resources. Further, this leads to derailment in suppling water to the communities.

In the past 10 years, a number of these projects have been abandoned at various stages of completion. However, no study has been conducted to investigate the cause of this. This study was undertaken to identify challenges that contribute to failures in fully implementing water projects by the Zambian government.

1.2. Research Objectives

The research objectives are outlined in the general objective and the specific objectives below.

1.2.1 General Objective

The general objective of this study was to establish challenges faced in implementing water resources development infrastructure projects by the Zambian government. The general objective was achieved through the following specific objectives:

1.2.2 Specific Objectives

i. To identify the water infrastructure projects implemented by government that have stalled in the past decade;

ii. To analyse the contracting process for the water infrastructure projects implemented by government that have stalled in the past decade;

iii. To analyse the implementation process of the government projects that have stalled in the past decade; and

iv. To design an appropriate implementation plan for effective implementation of water infrastructure projects by government.

1.3 Research Questions

i. Which water infrastructure projects implemented by government have stalled in the past decade?

ii. How is the contracting process of water infrastructure projects done by the government?

iii. What is the implementation process of the government projects that have stalled in the past decade?

iv. What would be the appropriate plan for implementing water infrastructure projects funded by government?

1.4 Scope of the Study

The research focused on issues related to implementation of water infrastructure projects in all provinces of Zambia implemented by the government. The study mainly focused on projects which have stalled in the past decade. The study further focused on highlighting the challenges faced in the implementation of water infrastructure projects by government in the last 10 years from 2012 to 2022.

1.5 Delimitations of the Study

The study did not get information on the actual use of water resources infrastructures or information from the actual beneficiaries of such projects.

1.6 Challenges of the Study

Some challenges of the study included government officials unwilling to avail the project completion reports to the researcher and some of the donor officials not being able to disclose certain information to the researcher due to confidentiality clauses in their organizations.

1.7 Ethical Considerations

The study was subjected to ethical considerations according to the University of Zambia research guidelines and the clearance and approval letter was given by the University of Zambia Ethics Committee (Appendix 1). The researcher, during the

entire research process, oriented the participants about the research objectives and scope. Participants were further assured that there would be maximum confidentiality on the data obtained and the sources of the information. Further ethical consideration regarding the participants included:

i. The participants being assured of their job protection, as the information obtained from them would not in any way jeopardize their jobs and that their jobs would be safe as the information would not be used against them;
ii. Protection of their personal and professional integrity and credibility, in that the sourced information would not in any way bring about any disrepute on their persona; and
iii. Assurance that the information obtained would not in any way disparage the organization that they work for, nor will that information harm the interests of the past, present and future water infrastructure projects.

The research proposal and other relevant research documents used in the study were subjected to clearance by the University of Zambia Ethics Committee. These were the guiding principles that helped the researcher to respect the interests of the respondents.

1.8 Definition of Terms

Groundwater: The water stored beneath earth's surface in soil and porous rock aquifers (Famiglietti, 2014).

Project Affected People (PAP): Anyone affected by land acquisition, relocation or loss of incomes associated with project-changes in use of land, water and other natural resources (Kulkarni, 2022).

Project Management Team (PMT): A group of people working together on a project with each team member accountable to a task that contributes in achieving the project objectives. The team comprises of different experts with various skills (Indeed, 2022).

Water Infrastructure: Includes water storage, supply and treatment as well as water-based transportation systems and water resources management (Spacey, 2017).

Water-supply Infrastructure: Consists of what is built to pump, divert, transport, store, treat and deliver safe drinking water (ASCE, 2021).

Water Security: The capacity of a population to safeguard sustainable access to adequate quantities of acceptable quality water for sustaining livelihoods, human well-

being, and socio-economic development, for ensuring protection against water-borne pollution and water related disasters and for preserving ecosystems in a climate of peace and political stability (ESCAP, 2013).

1.9 Organization of the Thesis

Chapter 1: Introduces the research

Chapter 2: Provides a review of literature critical to the study.

Chapter 3: Presents the methodological approach that was designed to address the set objectives of the study.

Chapteter 4: Presents the results of the study

Chapter 5: Presents a discussion of the results.

Chapter 6: Presents the conclusion and recommendations arising from the findings of the study.

1.10 Chapter Summary

This chapter provided a background to the areas of research and provided a clear research problem that required to be addressed. The chapter also provided research questions and objectives providing a contextual setting of the study. The layout of the subsequent chapters is as follows.

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

This chapter provides an extensive literature review concerning water infrastructure development across the globe, regionally and in Zambia. It starts by defining water infrastructure development and explains the types of water infrastructure development projects in Zambia, regionally and across the globe. It then concludes by giving an overview and relevant research works done by others on challenges encountered in implementing water infrastructure projects.

2.1 Water Infrastructure Development

The water resources infrastructure development projects serve several purposes including navigation, flood and storm damage reduction, hydropower generation, water supply for irrigation and municipal and industrial purposes, recreation, fish and wildlife mitigation and enhancement and soil conservation (Loucks and Beek, 2017).

Water infrastructure development is very important for economic development and poverty alleviation (Frone and Frone, 2012). In any nation, government projects including water infrastructure projects are extremely important to the residents and citizens of that nation as they contribute to national development (Eja and Ramegowda, 2019). Water infrastructure is needed by many developing countries to improve the livelihoods and quality of life of their citizens (Ruiters and Martji, 2016).

2.2 The Role of Water Infrastructure Development in Water Security

Bakker (2012) explains that poor water security is one of the major problems facing many countries globally. He further defines Water Security as, ‘‘an acceptable level of water-related risks to humans and ecosystems, coupled with the availability of water of sufficient quantity and quality to support livelihoods, national security, human health, and ecosystem services”. Water security is very cardinal in attaining SDG No. 6 particularly target number 6.4 and 6.5 (ESCAP (2017) which state as follows:

> *Target 6.4: By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to*

address water scarcity and substantially reduce the number of people suffering from water scarcity; and

Target 6.5: By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate.

Therefore, adequate water infrastructure facilities are very important in ensuring water availability without which access to clean, safe and secure water resources cannot be achieved (Molden et al., 2014). Further, adequate and well-maintained water infrastructure is a necessary condition for economic growth and poverty reduction. (Brookes and Carey, 2015) many countries especially in Africa have been investing in water infrastructure aimed at ensuring water security (Rodriguez et al., 2012; Ruiters, 2013).

2.3 Water Infrastructure Development at a Global Level

Planning and implementation of built infrastructure, including water infrastructure development has been growing at a large scale in the past decade all over the developed and developing world. Water infrastructure such as medium and small dams, groundwater recharge and storage, treatment plants, pipes and rainwater harvesting which are used for domestic, energy and agriculture are extremely necessary in subtropical regions than in countries in temperate zones (Tortagada, 2016).

Since time immemorial, globally many governments have undertaken water infrastructure development projects in order to increase people's access to water for multipurpose use. Dams have been developed in Japan for multiple uses in collaboration with different users to enhance investment efficiency (Water Partners and Nihon Suido Consultants, 2017).

Water services provide important economic, health and environmental benefits but are severely underfunded on a global scale. It is estimated that by 2025, water will make up the lion's share of global infrastructure investment (Rodriguez et al., 2012).

Obertreis et al. (2016) highlight that primarily privatization and globalization, have become another nucleus of research in water infrastructure. Water infrastructure is part of broader societal and environmental structures therefore understanding the societal constitution and workings of infrastructure is needed. It further states that most of the

research that has been covered for water infrastructure projects is that of Public Private Partnership (PPP).

2.4 Water Infrastructure Development at a Regional Level

Zambia belongs to a number of regional economic, socio-economic, political and security bodies. For the purpose of this study, the regional body that was deemed appropriate was the Southern African Development Community (SADC). This 16-nation regional body has appointed the SADC Water Division to oversee the polices on water and sanitation infrastructure and ensure their timely implementation in the region. This is because despite Southern African region having abundant water resources, there is insufficient water usage due to some water infrastructure constructed in wrong places and others poorly constructed.

One of the major water infrastture projects in Botswana, is the construction of the North-South Carrier (NSC). The project was launched in the mid 1990s and the construction to be done in two phases. NSC phase 1 which was completed in 2001 had the construction of the following; Lestibogo dam in the north-east of Botswana, about 360 kilometer pipeline to carry water to Gaborone, pumping stations, treatment plants and other infrastructure. The second phase once completed will carry water from Dikgathong Dam doubling the pipeline to Gaborone (ABB, 2018).

Following the water infrastructure damaged during the war in Angola, the Water Sectror Institutional Development Project (WSIDP) was launched and implemented through the Ministry of Energy and Water with support from WB. Some of the project outputs were that over 100,000 urban households to have water supply connections and over 1000km of pipeline installed or rehabilitated (WB, 2019b).

The Government of the Kingdom of Eswatini is implementing the Manzini region water supply and sanitation project. This project aims to expand the water supply system and improve the sanitation infrastructure and hygiene services in the Manzini region, which is the most populated area in Eswatini. This is stand alone project and is being implemented through the Eswatini Water Services Cooperation. The project is being funded by the AfDB and the Government of the Kingdom of Eswatini. The project is facing a budget overun due to high cost of tender outcome. This has resulted in adjusting the scope of works for the water supply system and the sewerage systems

being put on hold. The Government of the Kingdom of Eswatini might have to increase their support to the project in case the scope adjustment does not accomodate the bids. Further, the project is expected to end in 2023 but due to delays in implementation the Government will haave to seek for extenstion of implementation period from the Bank (AfDB, 2022a).

The Sustainable Rural Water and Sanitation Infrastructure Project is a rural water supply project implemented in Malawi by the Ministry of Irrigation and Water Development with support from AfDB. The implementation progress and results report indicates that the project is on course and expected to meet its objectives. This is because most of the project activities have been completed. One of the oustanding activities is the development of the catchment adapatation plans, which has been outsourced and the consultant has signed the contract. The Ministry has been urged to ensure that they closely monitor this contract and ensure that it is completed in time (AfDB, 2022b).

Namibia is implementing the Namibia Water Sector Support Programe (NWSSP) whose objective is to have a sustainable production and transfer of water resources resulting in improved access, quality and security to safe drinking water for human consumption and for industrial use in the urban and rural centres in the Central, Northern Central and Eastern areas of Namibia. The project is being implemented through the Ministry of Agriculture, Water and Forestry. The project is being financed by the Government of Namibia, AfDB and RWSSI Fund and expected to be completed in 2025. However, the project is behind schedule as the procurement for the consultancies for rural water supply and bulk water supply delayed. The three engineering consultancies to be procured were to prepare the designs, tender documentation and supervision of works. (AfDB, 2022c).

The Government of Tanzania is crrently constructing the Julius Nyerere Dam on Rufiji River in Dar es Salam at Morogoro area in Selous Game Reserve. Once completed, the dam will be 131m high and a length of 1025m with a capacity to impound 34billion cubic meteres of water. The dam is expected to be completed at the end of 2022. The implementing agency is the Ministry of Energy and the construction is through a joint venture of two contractors, JV Arab Contractors Company and Else Electric (Water Power magazine, 2021).

The Kunzvi Dam Development Project is being constructed in Zimbabwe. The project is funded through Public Private Partnership with an implementation period of 60 months. The dam site is 67km north east of Harare on Nyanguvi River. The dam is expected to supply water to Harare and also provide irrigation to surrounding communities (IDBZ, 2019). The dam is being constructed by Nanchang Engineering using the build, operate and transfer model (Geoengineer, 2021).

The Government of Mozambique implemented the Sustainable Land and Water Resouurces Management Project with funding from the AfDB, Climate Investments Funds and the Mozambique Government. The project covered five districts in Gaza Province where it constructed 21 small dams, boreholes and water troughs and also provided 56 irrigation kits. This is a stand alone invetment project. (AfDB, 2020).

2.5 Water Infrastructure Development Projects in Zambia

The development and management of water resources, provision of clean water supply and adequate sanitation is the responsibility of the MWDS implemented through the Department of Water Resources Development (DWRD) and the Department of Water Supply and Sanitation (DWSS). In an effort to respond to issues of increased water demand as well as in ensuring water availability for socio-economic development, GRZ together with its cooperating partners have been working closely to provide water both in rural and urban areas for multipurpose activities via different water projects in line with the National Urban Water Supply and Sanitation Programme (NUWSSP 2011-2030) and the National Rural Water Supply and Sanitation Programme (NRWSSP 2021-2030), (MWDSEP, 2021). These two programs are implemented through the DWSS. The development and implementation of the Water Resources Development Programme to compliment the NRWSSP and the NUWSSP in order to achieve the targets in the Seventh National Development Plan, is one of the recommendations of the Zambia Joint Water Sanitation and Environment Sector Reveiw report (JWSESR) of 2018 (MWDSEP, 2018a). One of the main functions of DWRD is to construct, rehabilitate and maintain water resources infrastructure in order to harness water resources for use (Nyundu, 2017). In the water and sewerage disposal infrastructure, priority areas are rehabilitation and construction of dams and water reticulation systems (Ngoma et al., 2014).

The GRZ launched the Zambia Water Investment Programme (ZIP) 2022-2030. The goal for the ZIP is to have a water security and sustainable sanitation by 2030 in line with the Vision 2030 and the Eighth National Development Plan (8NDP). There are 61 interventions in the ZIP which will be implemented through three investment focus areas (IFA) and nine components (Table 2-1).

Table 2-1 Investment Focus Areas for ZIP

IFA 1 – Water Investments to Support Economic Transformation	**IFA 2 – Enhancing Resilience through Water**	**IFA 3 – Water and Sanitation Governance and Institutional Strengthening**
Component 1 Water investments for productive use and economic growth. **Component 2** Enhance water resources management.	**Component 3** Sustainable water supply and sanitation for community resilience. **Component 4** Building climate resilience. **Component 5** Enhancing environmental sustainability. **Component 6** Gender equality and social inclusion.	**Component 7** Human and institutional capacity building. **Component 8** Financing water investments and resources mobilization. **Component 9** Strengthening Public-Private Partnerships and International Cooperation in Water investments.

Source: Zambia Water Investment Programme 2022-2030 (MWDS, 2022a)

The lead institution in the implementation of the ZIP is the MWDS while the other government ministries and institutions will be required to lead participate in specific components of the programme. For successful implementation of the ZIP, the financial requirement is about US$5.75 billion (MWDS, 2022a).

In many instances, water development in Zambia includes harnessing both surface and groundwater resource (Nkhuwa, et al., 2018). The water infrastructure includes boreholes, dams, weirs, reservoirs, water reticulation systems, drainage, irrigation systems and hydropower systems (Spacey, 2017). Some of the notable big projects are the construction of the Mwomboshi Dam, Kafulafuta Dam, and Kariba Dam; Rehabilitation Project, Itezhi-Tezhi Dam Upgrade, Kariba North Bank Upgrade, Millennium Challenge water and sanitation improvement project in Lusaka; and various water and sanitation projects across the country (Kopulande, 2021). Several infrastructure development projects have been undertaken by Government from 2011

to 2021 in the water sector due to increase in demand. The demand for water in Zambia, like in other sub-Saharan countries, has been increasing. This is attributed to many factors including population increase (Tena et al., 2021).

2.5.1 Surface Water Resources Infrastructure Development

Surface water is any body of water above ground, including streams, rivers, lakes, wetlands, reservoirs and creeks (AQUATECH, 2021). Soligno et al. (2017) define surface waters as those occasional recurrent accumulations of excess water from rains and melting snows which either stand in temporary ponds and puddles or drain off across the countryside until they reach a drain way, stream or lake, or are absorbed in the soil. The surface water harnessing includes mainly damming for various uses such as irrigation and water supply.

The Zambian government has been embarking on construction and rehabilitation of water harvesting structures. Dam infrastructure development is being undertaken by DWRD and the Irrigation Support Development Project (ISDP) under Ministry of Agriculture (MoA). Notable is the construction of multipurpose dams such as the Mwomboshi in Chisamba and Kafulafuta in Mpongwe; and rehabilitation of other dams such as the Kariba (Kopulande, 2021).

The WRDP was one of the projects that involved the development of surface water in order to address the challenges of water for productive use. The project was executed by the DWRD with funding from the WB. One of the project components was the construction and rehabilitation of 100 small-scale water resources infrastructure throughout the country (MWDSEP, 2018b).

2.5.2 Groundwater Resources Infrastructure Development

Groundwater is drawn from boreholes in both urban and rural areas. Groundwater resources play an important role to satisfy an increasing water demand, contributing in Lusaka to more than 60 percent of the water use. It is also threatened by pollution and overuse in urban and pre-urban areas (Nussbaumer, et al., 2016).

A number of projects for water supply in both rural and urban areas border on groundwater using wells or boreholes (Chande and Mayo, 2019). Mulenga and McGranahan, (2011), have postulated that a lot of people in peri-urban communities

supply themselves with water from wells because they are often unserved with improved water especially in Lusaka.

In Chongwe township for example, due to population growth and climate change, the community often struggles to access water (MWDSEP, 2019). As a result, government with support from Southern African Development Community, Groundwater Management Institute (SADC-GMI), successfully implemented a groundwater development project to address water shortages in Chongwe township. The project was financed by the WB through grants from Cooperation in International Waters in Africa (CIWA) and the Global Environment Facility (GEF), (MWDSEP, 2021).

2.6 Challenges of Infrastructure Development Projects

Infrastructure development projects face a lot of challenges during implementation. Governments, especially in developing countries, have experienced project failures in project implementation despite the causes, effects and consequences being different (Eja and Ramegowda, 2019). Some challenges in development projects are due to financial crises, the incentive system of civil service in developing countries, as well as incentives and planning processes of donors.

2.6.1 Challenges During Implementation

Samboma (2019), explains that challenges in implementation of infrastructure projects is at various stages, namely Project Initiation Stage, Project Planning Stage, Project Implementation Stage, Project Monitoring and Evaluation Stage and Project Closure Stage. He further explains that poor participation of stakeholders especially the youth in the Initiation Stage, implies that their views are not heard and this can cause a setback to development projects. The Planning Stage is very crucial in the success of any project, therefore enough human and financial resources should be sourced in advance before the execution of the project, otherwise it leads to failure. During the Implementation Stage as well as Monitoring and Evaluation Stages, there is lack of qualified and experienced technical staff to undertake the assignments, this is because most of them leave for greener pastures due to unattractive pay in the Local Authorities and Government. Politicians tend to abuse their offices at Project Closure Stage during the handover as they portray as though it is their personal money that was used in construction the project.

Some of the challenges in implementing government infrastructure projects are financial constraints, high costs of projects, and corruption (Roch, 2018). There is lack of commitment by governments to some of these infrastructure projects evidenced by slow and sometimes non disbursement of funds (Damoah and Kumi, 2018). There has been a lot of unexpected change in the project budget during implementation that has led to increasing the cost of projects, which has resulted in governments losing a lot of money (Cheng, 2014). Financial constraints are not limited to government alone, as some of the contractors engaged by government do not have the financial capacity to execute these projects (Eja and Ramegowda, 2019).

2.6.2 Specific Challenges Faced by Different Projects Across the Globe

The challenges to infrastructure development are many and these include technology for development, finance, maintenance, designs, and also the international requirements of projects to be sustainably developed and projects to meet the carbon emission standards set by international organisations (Oyedele, 2012). Gambeta (2018) highlighted the basic factors that hindered infrastructure development in Africa. These are bad development matrix, corruption, funding, inadequate policies, lack of PPP and lack of visionary leaders.

2.6.2.1 The Case of India

Sinha (2020), explains that infrastructure development in India is a key constraint to economic development. The major challenges to infrastructure development are poor financial support by government and land acquisition. Huge investments are required in infrastructure development projects, however funds from government alone are not enough to finance infrastructure development in India. Construction materials is on high demand in India for infrastructure projects such as dams, roads, housing etc., which has led to the import of aggregates from neighbouring countries leading to a high increase in the cost of construction (NBM&CW, 2021).

2.6.2.2 The Case of Indonesia

The main challenge of infrastructure development in Indonesia is funding. This is because there is lack of access to finances as there is a huge amount of money that is required to implement high quality infrastructure projects by government. Further, most of projects that are presented to donors or lenders are not viable and bankable

enough to be funded (NRF, 2017). Duffield, et al. (2018) penned that it is estimated that the Indonesian government is only able to cover 35 percent of the required funds. They also stated that other challenges are corruption, inefficient government bureaucracy, land acquisition and policy instability. Government procurement of infrastructure projects takes a long time as it can take a minimum of one year from the time the bid is tendered to the time of award and signing of contract, causing delays in implementation as the bid can endure changes in the law and prices of goods (NRF, 2017).

2.6.2.3 The Case of Nepal

In Nepal, the main problems that obstruct infrastructure development are lack of funds, corruption, lack of tools and technology, political instability, cultural and religious barriers, complex land terrain, lack of materials and frequent occurrences of natural disasters such as floods, earthquakes and landslide (Maharjan, 2019). Maharjan further explains that the major problems in infrastructure development projects are government coordination, management and accountability. Therefore, it is important to address the issues of project management to have successful infrastructure projects.

2.6.2.4 The Case of Nigeria

In Nigeria, some of the challenges in implementing infrastructure projects were due to inaccurate costing and corruption, poor financial capacity by the government, incompetence and lack of knowledge, poor contracting and contractor practices and political interference. This led to project failure which resulted in loss of revenue to the state and by citizens, project cost overruns, substandard infrastructure and low empowerment to the community (Eja and Ramegowda, 2019).

2.6.2.5 The Case of South Africa

A study on the provincial government of Kwa-Zulu Natal in South Africa in infrastructure delivery revealed that the South African government model of infrastructure delivery was not efficient. Some of the causes were poor planning and delayed payments, leading to budgetary overruns and delays in implementation of projects. All this led to backlog in service delivery (Khumalo, et al., 2017).

2.6.2.6 The Case of Zambia

Zambia has financial constraints making it difficult to maintain and provide new infrastructure. The Zambian government faced a lot of financial constraints in the implementation and maintenance of new infrastructure projects which led to the adoption of PPP as a delivery model (Ngoma, et al., 2014).

2.6.3 Challenges in Implementing Water Infrastructure Projects

There has been a lot of literature on challenges faced by governments in the implementation of infrastructure projects in general, although little has been studied and published on challenges on water infrastructure projects. There are a lot of challenges in the implementation of water infrastructure projects by governments. Some of these are financial, procurement processes and implementation models.

2.6.3.1 Financial

Finance seems to be a major problem in the water and sanitation sector, especially in developing countries. This is because of the less monies apportioned to the sector and also the high price of implementing these projects (Goh, 2012). In view of the above, governments implement water infrastructure projects using different financing models and these models come with different challenges. Ruiters and Martji (2016) identified three models of implementation based on financing. These are state model, hybrid model and private model with their differences highlighted in table in Table 2-2.

Table 2-2 Financial implementation models

Implementation Models		
State Model	**Hybrid Model**	**Private Model**
• State Funding (100%). • Infrastructure ownership by the State (100%). • Infrastructure operations and maintenance by the State. • Private sector employed only as consultants. • Government own skills base. • Private sector retains its own skills base to maximise revenue and financial sustainability. • Inefficient and prolonged projects (scope creep of projects). • Ineffective costing of projects – benefit to private sector or consultants.	• Mixed funding between the state and private sector. • Infrastructure ownership by the State. • Infrastructure maintenance outsourced. • There is knowledge and skills transfer between the private and public sectors. • Room for innovation and creativity. • State focuses on regulation of the private sector. • Operational efficiency and cost optimisation are achieved. • Projects are completed within scope, on time and within budget.	• Private Funding (100%). • Private ownership of the infrastructure (100%). • Private sector carries the full cost and risk of the project. • State plays an effective regulator in the interest of consumers and users (public interest). • Private sector retains skills to maximise revenue, profits and future business (sustainability). • Strategic social infrastructure, i.e., water, energy, sanitation, etc., are controlled by the private sector.

Source: Public-Private Framework and Models (Ruiters and Martji, 2016)

Public finance, which is the state model of implementation is very crucial in financing of water and sanitation infrastructure. Public finance are revenues from government mainly sourced from taxation and tariffs. However, there is limited allocation of public funds to finance water infrastructure because most governments prioritize other sectors such as Health, Education and Agriculture. Due to limited public funds, governments take on debt and PPP to finance large water infrastructure projects (IWA, 2018).

Ameyaw and Chan (2016) examined the allocation of five key risk factors related to PPPs in water supply infrastructure projects in developing countries. This study was based on the assessment on the importance of critical success factors for water infrastructure projects delivered under PPPs in developing countries. The key risk

factors were commitment of the partners; strength of consortium, asset quality and social support; political environment and national PPP unit. The study revealed that political environment has the highest impact on water project success. Political decisions aimed at government creating policies for a conducive investment environment are critical for water partnerships to succeed. Asset quality and social support is an important factor as it was ranked second. Asset quality includes quality water infrastructure and workforce, both attracts private investors, while social support looks at public acceptance and support of the project. Third in ranking was national PPP unit, fourth was strength of consortium and the fifth place in ranking was commitment of partners.

The national PPP unit ensures that the PPP policy is implemented and coordinates PPP projects. Therefore, a PPP water policy will ensure private investments are directed towards specific water infrastructure projects. The strength of consortium implies that the Project Management Team (PMT) should comprise of people who are qualified and with adequate experience thereby able to implement the project on time and within the budget. Further, a strong consortium will only undertake a water project that is profitable. Commitment of partners includes a well-coordinated government system and strong commitment from both the public and private partner.

Greer (2020) reviewed the portfolio of financing options that exist for public entities responsible for the construction and maintenance of water infrastructure in the United States, including the municipal bond market, state revolving loan funds, federal grant and loan programs, public–private partnerships, and recent financing innovations.

2.6.3.2 Procurement Processes

Government procurement is the purchasing from the private sector, goods and services that the government needs. To procure these goods and services, taxpayers money is used therefore, specific regulations and procedures need to be followed (GMP, 2021). The complex and lengthy procurement processes in the government leads to most of these water projects delaying in implementation and also increase in costs from the time of tendering. Further some of the projects that are funded by donors also require their procurement procedures to be incorporated. Procurement of water infratstructure projects is within the government procurement policy and within the available finances.

There are different project delivery methods in the water and wastewater sector leading to different procurement methods. The different project delivery methods are design-bid-build (DBB) which is the most common for water infrastructure projects. DBB is where the owner of the project designs the project and tenders it. The contractor only bids after the design is done and starts construction after the tendering process (Park and Kwak, 2017). There are also alternative project delivery methods (APDM) used in the water infrastructure projects such as construction management at risk (CMAR), and design-build (DB). CMAR is where the client chooses the Construction Manager early in the design stage (Huang, 2011). The DB is where the contractor designs and constructs the project (Park and Kwak, 2017). In the DBB the government or water utility has two separate contracts, one with the consultant and the other with the contractor. The contractor is only procured once the design is 100 percent complete, therefore the contractor is not involved in the design and this may lead to obstacles during implementation because a change in design during implementation will be handled as a change order.

In DBB, the contractor is selected based on low bid process. In CMAR, there are also two separate contracts, one for the consultant and the other for the contractor, however the difference is that here the contractors are involved earlier in the design phase leading to successful project delivery. In CMAR, the contractor is not just selected based on their bid but also on their qualifications and experience. In DB, there is only one contract with a single firm which acts as both the designer and contractor throughout the project. As in the CMAR, the award of contractor will be based on the qualification and experience (Feghaly, et al., 2020).

Risk of conflicts and constraints during both procurement and implementation can be avoided by using pre-procurement methods. These are pre-selection, pre-approval and pre-purchase of materials and equipment. Pre-procurement requires that construction bidding and contract documents are structured in a different way than the normal bidding process, because the procuring entity assumes the responsibility of the pre-procured item (Dudek, 2013).

Ambulkar (2019) explains that bid pricing is one of the major challenges in water and wastewater projects. Project costs are estimated during the planning stage with detailed drawing and specifications provided. However, during evaluation of tender, the

selected contractor might have a bid price that is higher than the allocated funds. This leads to government having to source for additional funds, or even reduce the project scope which eventually leads to project execution being delayed. He further states that documents such as drawings and specifications are the foundation for the construction works, therefore if low-quality documents are used in the bid documents, there will be selection of wrong materials, products, equipment leading to confusion on site and poor project quality.

There is limited competition in public procurement tenders in the water supply and sanitation sector because of the high technical complexity and the complex tender procedure. Based on public procurement for water supply and sewerage projects in developing countries, bidder entry is internal because it is based on the auctioneers bundling and unbundling strategy. Competition would be significantly reduced in water treatment plant and distribution network works if they were bundled in a single lot package (Estache and Limi, 2012).

2.6.3.3 Project Management Team

Project management is very critical in ensuring the success of water infrastructure development projects. Therefore, the competency of the PMT is very crucial in any water project. The PMT is headed by the project manager who is liable for the successful completion of a project and ensuring that the objectives of the project are achieved on schedule and within the budget (Villanova University, 2022).

There are different types of PMTs namely; functional, cross functional, matrix and contract. A functional team is composed of experts with specialized skills and education working together to achieve the goals and objectives of the project and is led by the project manager where all team members report to. A cross functional team is where members are selected from various departments to work together for a specific project and is split after the completion of the project. This is a difficult team to lead because the project manager has to align the goals of the project with those of the organizations where the members are coming from. The matrix team is where team members report to more than one boss. This is a difficult team because members have to report to their boss at work and also to the project manager, thereby creating a lot of confusion. The contract team is where government outsources the team members. Contracts are signed with each team member for the duration of their works on the

project and the team is dissolved at the end of the project, or a contract is signed with one consultancy firm with different experts (Wilson, 2021).

The PMT for the Zimbabwe Integrated Water Management Project is an example of a cross functional PMT as members were from the Ministry of Environment, Water and Climate, Marondera Municipality and National Government. The Technical Advisory Committee consisted of representatives from University of Zimbabwe, Ministry of Local Government, Public Works and National Housing, Global Water Partnership and Marondera Municipality (AfDB, 2021). The PMT for the WRDP in Zambia implemented through the MWDSEP had a matrix team as the team members did not only report to the team leader, but also to their superiors in the line of work, this contributed to the weak implementation capacity of the PMT (World Bank, 2019a).

Tortagada (2014) explained that in the delivery of water services, the most important problem to deal with is the infrastructure, its management and operation. This acknowledges the importance of the PMT in water infrastructure development.

2.6.3.4 Specific Challenges faced by different projects across the region

Water infrastructure development projects implemented by governments across the region have encouthered different challenges leading to the either the delay in completion of projects or abandoning the projects. Challenges faced by some projects implemented by goverments in South Africa, Kenya, Zimbabwe, Namibia and Zambia have beeen outlined below.

2.6.3.4.1 The Case of South Africa

Dithebe et al., (2019) highlighted that corruption, hostility, weak project structuring, high fiscal deficits by state government, cost recovery constraints, high credit risk for private financing and unreliable planning and procurement processes are major challenges affecting the success of financing water infrastructure projects in South Africa. The challenges in project implementation in South Africa are delay in project completion, cost over runs, poor quality of work, poor fund utilization, and poor service delivery (Aiyetan and Das, 2021).

2.6.3.4.2 The Case of Kenya

The Kenyan government has faced several challenges in the implementation of water and sanitation projects. The four major challenges are lack of political will to address the water problems, insufficient allocation of funds in water and sanitation infrastructure projects, delays and failures to conduct monitoring and evaluation of water and sanitation interventions to ascertain whether they are successful and sustainable and finally avoidance of applying new technological or implementation approaches such as applying conventional interventions without community involvement even when they are inappropriate for a specific environment and community needs (Korir, 2013).

2.6.3.4.3 The Case of Zimbabwe

The water infrastructure in Zimbabwe has deteriorated due to lack of maintenance and rehabilitation. The infrastructure for piped water in Harare was designed and developed for 300,000 people in the 1950s, however the population has grown to about 4.5 million and the water infrastructure has not been rehabilitated or expanded to cover the increase in population. Some of the challenges leading to the water problems are lack of finances, poor maintenance of the old infrastructure, corruption and political conflicts between national and local authorities (HRW, 2021).

2.6.3.4.4 The Case of Namibia

There is insufficient water infrastructure in Namibia to ensure long term access to bulk water supply and water demand for current and future demand at the mines because there is insufficient budget allocation towards development of new water infrastructure as well as maintenance of existing infrastructure (Kajimo-Shakantu, et al., 2014).

2.6.3.4.5 The Case of Zambia

The Zambia NRWSSP 2006-2015 project completion report indicates some challenges during implementation. There was high staff turnover of qualified staff in the rural districts; weak focus of gender mainstreaming activities as there was no gender focal point person at national level; there was no proper estimation costs for sanitation facilities and water schemes leading to less outputs achieved; and ineffective District

Water Sanitation Health and Education (D-WASHE) and Village Water Sanitation Health and Education (V-WASHE) due to high staff turnover (AfDB, 2018).

Kopulande (2021) states that most of the Government projects in Zambia implemented between 2011 and 2021 were either abandoned, rescoped downwards, or suspended due to non-payment of contractors and the only operational ones were those funded by cooperating partners and multilateral institutions. Despite some of the projects being funded by cooperating partners, challenges were faced as some were not completed. For example, the WRDP with funding from WB in which 100 dams were to be constructed or rehabilitated. From these 100 dams, 12 were tendered and only 10 were actually built or rehabilitated. However, there were no certificates issued of full completion (World Bank, 2019a).

The ISDP with support from WB constructed the Mwomboshi Dam in Chisamba, however the project incurred some financial challenges. At the time of project approval in April 2011, the loan amount was equivalent to USD115million, however by the end of November 2019, due to the loss in dollar exchange rate, the loan had a loss of USD10.5million. The project had other financial challenges as the actual cost of infrastructure exceeded the initial estimates leading to the irrigation infrastructure not being completed. GRZ also delayed to release the counterpart funding and cash compensation for the economic losses of Project Affected People (PAP). Further, some funds of the project were redirected to support the remedial dam safety works for the closed WRDP (WB, 2020).

Poor procurement procedures are also one of the challenges faced by the project implemented by the DWSS which is called, Transforming Rural Livelihoods in Western Zambia – National Rural Water Supply and Sanitation Programme II. The poor procurement has led to delays in the completion of some water and sanitation infrastructure (AfDB, 2022d).

2.7 Conclusion

In conclusion, there are a lot of challenges encountered by governments in the implementation of water infrastructure development projects. Therefore, the Zambian Government and stakeholders should consider comprehensive and integrated action so

as not only to deliver the projects on time, within budget but also to the quality expectations of all stakeholders.

2.9 Chapter Summary

This chapter reviewed literature relating to the scope of study. It revealed that infrastructure development projects are implemented by governments throughout the world. The review also showed the challenges encoutered during implementation of infrastructure development projects across the globe. The chapter gave an insight on the water infrastructure devlopment projects implemented at global, regional and at local levels. The chapter further revealed the challenges faced in implementing water infrastructure projects financed by governments across the globe. The ensuing chapter discusses the methodological approach that was designed to address the set objectives of the study.

CHAPTER THREE: METHODOLOGY

3.0 Introduction

In this chapter, various methods used in conducting the study are highlighted. The type of study design and the various data collection methods used are described. This is followed by defining the identification and selection of respondents; as well as the sampling techniques and concludes with data analysis.

3.1 Study Design

The descriptive survey design was used for this study. This is because the study needed information through interviewing using the interview guide to a sample of individuals, the questionnaires served the purpose of collecting primary data from the respondents. This descriptive research was used to analyse data as well as to identify any causal links between the factors or variables that pertain to the research problem. This enabled the researcher to go beyond merely describing the characteristics, but also to analyze and explain why or how something is happening.

3.2 Data Collection Methods

The data collection methods used in this study are presented in ensuing sections.

3.2.1 In-depth Interviews

In-depth interviews are qualitative research technique that involves conducting intensive individual interviews to investigate the experience of people in a particular situation and the meaning that they get from it (Granot et al., 2012). The in-depth interviews were used because the researcher was trying to capture the experiences of the participants in the water development infrastructure projects implemented by government so as to get detailed information. Further the in-depth interviews were conducted individually so as to enable the respondents give their views freely. The researcher conducted interviews with both top management officials and operational engineers at the MWDS, Ministry of Agriculture (MoA), Ministry of Local Government and Rural Development (MLGRD), water development sponsors, donors /financiers, as well other stakeholders like Non-governmental Organizations (NGOs) and consultants as shown in Table 3-1 The interviews were guided by the In-depth Interview Guides (Appendices II and III).

3.2.2 Observational Sites

The researcher visited four project sites to get a deeper understanding on selected Ministries Provinces Spending Agencies (MPSAs). This was done by observing the project structure, government role in the implementation and the project outputs. The project sites were selected from each of the Ministries namely, MWDS, MoA and MLGRD. Two sites were selected from MWDS, one from DWSS and the other from DWRD. The criteria for selection of the four sites were based on the researcher's initial observation of the number of sites available in addition to the information that was supplied by the various officials. Further, one site was selected based on funding, one that was fully funded by government, one partly funded by international donor agency, another partly funded by an NGO and the other partly funded by another government. The checklist for observations is presented in Appendix IV.

3.3 Identification and Selection of Respondents

The officers from the MWDS were selected because they are the implementers, supervisors and monitors of the projects whilst some projects are being implemented by the MoA. Water Supply and Sanitation projects are partially implemented through Local Authorities which fall under the MLGRD. Organizations such as NGOs and consultants were selected to get independent views from them since they are stakeholders in the water sector. Some NGOs finance and implement water infrastructure projects while the consultants work in these projects with both government and NGOs. A schedule of the respondents interviewed is presented in Table 3-1.

Table 3-1 Target Respondents

Institution	Target Respondent No.	Position of Respondents	Reasons for being Selected
Ministry of Water Development and Sanitation.	04 01 01 01 01	Project Engineer. Head Procurement. Director – Water Supply. Director – Water Resources Development. Director – Planning and Information.	Implementers of water development projects.
Ministry of Agriculture.	04 01 01 01	Project Engineer. Head Procurement. Director – Irrigation. Director – Planning and Information.	Implementers of water development projects.
Ministry of Local Government and Rural Development.	02 01 01	Project Engineer. Director – Infrastructure. Director – Planning.	Implementers of water development projects.
Ministry of Finance.	02	Officers dealing with Water Financed Projects.	Management of Government and Donor Finances.
World Bank.	02	Water Desk Officers.	Financiers of Water Development Projects.
African Development Bank.	02	Water Desk Officers.	Financiers of Water Development Projects.
Water Aid	01	Programme Officer	Stakeholder in the sector
SNV	01	Programme Officer	Stakeholder in the sector
Sight Savers	01	Programme Officer	Stakeholder in the sector
BCHOD	01	Consultant	Stakeholder in the sector
JP Consultants	01	Consultant	Stakeholder in the sector
Rankin	01	Consultant	Stakeholder in the sector

3.4 Sampling Techniques

For sampling, purposive sampling was used to select the project sites visited as well

as respondents which consisted of officers in the MWDS, MoA and other water development related sponsors, donors and financiers. These respondents were adequately rich in information relating to the research topic due to the fact that they were very experienced in the water project implementation sector, many had been attached to these projects over a long period of time, others had worked on such projects in different areas whereas a number had detailed documented information which was frequently referred to by both the respondents and the researcher. Therefore, descriptive data was used in response to the interviews.

3.5 Data Analysis

The methods of analysis of the data collected was through Narrative Analysis, Excel and STRATA. The main advantage of using Microsoft Excel for data analysis is its robustness and ease to use for sorting, error handling and omissions checking and structuring of data for qualitative analysis according to the research objective. Further, given that the study was based on information from officers working in government and donor organisations, as well as from independent stakeholders being the NGOs and consultants therefore, bias was removed as the officers held different positions in the organisations and in project implementation and hence results obtained were as given directly by the respondents and the observation.

3.6 Chapter Summary

This chapter provided an insight on the various data collection methods used in conducting the research. The chapter also provided a description of identification and selection of respondents as well as the sampling techniques and concludes with data analysis. The next chapter gives the results of the study.

CHAPTER FOUR: RESULTS

4.0 Introduction

This chapter presents the results of the study. It begins with the demography of the respondents followed by the results. The results are presented under each objective namely; to determine the water infrastructure projects implemented by government that have stalled in the past decade; to analyse the contracting process of the water infrastructure projects implemented by government that have stalled in the past decade; to analyse the implementation process of the government projects that have stalled in the past decade; and to establish, if any, appropriate models for implementing water infrastructure projects by government. The study targeted government officers in MWDS, MoA, MLGRD and MoF who are implementers, supervisors and monitors of water infrastructure development projects, officers from WB and AfDB who are financiers of some of these projects and officers from NGOs and Consultants as independent observers being stakeholders in the water sector.

4.1. Demography of the Respondents

This demography of the respondents in the study is presented below.

4.1.1 Gender of Respondents

The respondents were (n=21) from government and (n=10) from donors, NGOs and Cinsultants. Both sections had more male participants with the distribution of 71 percent male and 29 percent female participants from government and 75 percent male and 25 percent female participants from donors as shown in Figure 4-1 below.

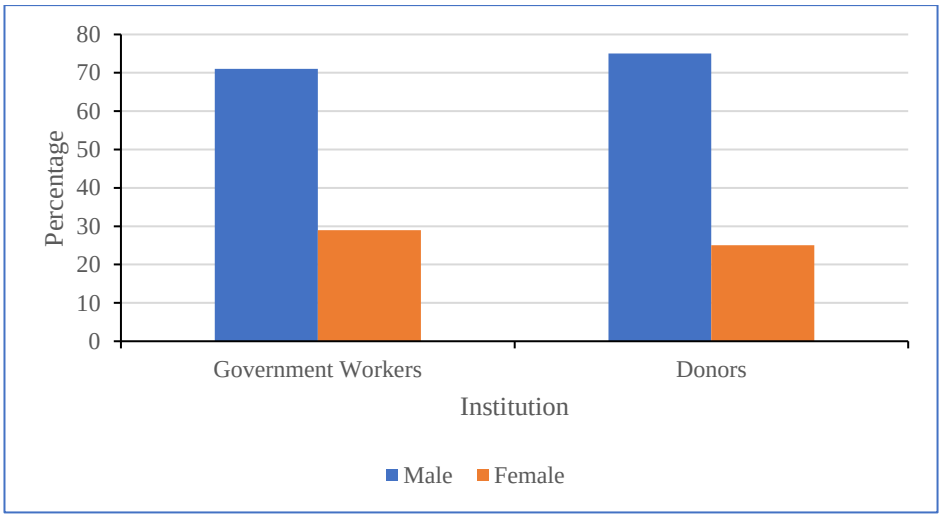

Figure 4-1 Gender of Respondents

4.1.2 Qualifications of Respondents

The government officers' distribution in terms of qualification indicated that from a sample population of twenty-one respondents, 14 percent had diplomas, 19 percent had bachelor's degrees, 57 percent had master's degrees and 10 percent had doctorate degrees. All the officers from donor, NGOs and Consultants, 30 percent had bachelor's degree and 70 percent had master's degrees as shown in Figure 4-2.

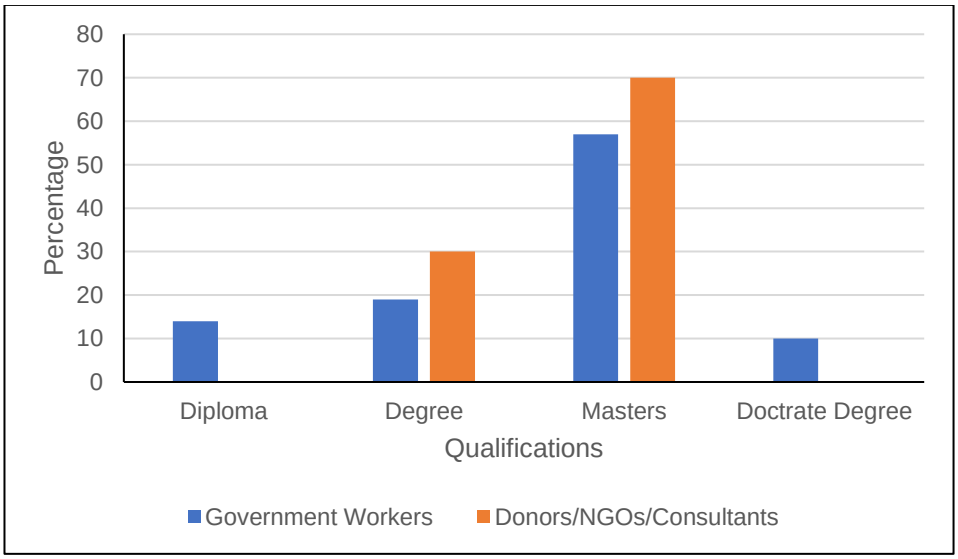

Figure 4-2 Qualifications of Respondents

4.1.4 Occupation of Respondents

In terms of occupation, 67 percent distribution of the government officers (n=21) were engineers, 19 percent were planners, 10 percent procurement and 5 percent others.

From the donors (n=4), 75 percent were engineers while 25 percent were procurement officers as shown in Figure 4-3.

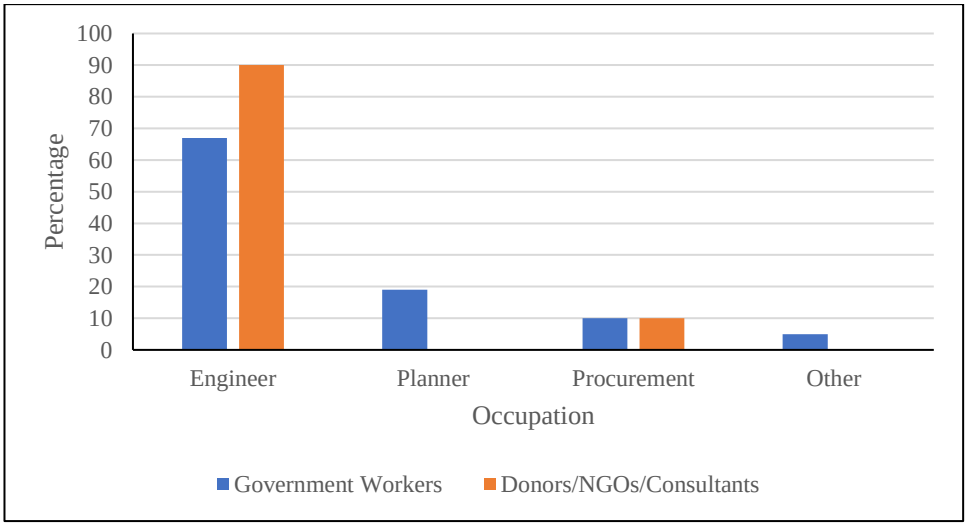

Figure 4-3 Occupation of Respondents

4.1.5 Years of Working

In terms of the number of years of working for government by participants (n=21), the following is the distribution: 0-5years, 14 percent; 5-10years, 34 percent; and over 10years, 52 percent. Whereas, for those participants working for donor agencies (n=10), the distribution is as follows: 0-5years 20 percent, 5-10years 30 percent and over 10years 50 percent. This is shown in Table 4-1.

Table 4-1 Years of working

Years of Working	Government Officers (%)	Donors/NGOs/Consultants
0 – 5 years	14	20
5 – 10 years	34	30
Over 10 years	52	50

Source: Author

4.2. Water infrastructure projects implemented by government that have stalled in the past 10 years

In terms of water development infrastructure projects implemented by the government departments in the past 10 years, showed that 7 projects were ongoing, 8 were successful and 9 had stalled .

4.2.1 Water infrastructure projects implemented by government in the past 10 years

The results below in Table 4-2 show the water infrastructure projects implemented by government, and those that have stalled in the past 10 years. It also shows the projects currently being implemented by government.

Table 4-2 Water infrastructure projects implemented in the past 10 years

No.	Name of Project	Financier	Location (Provinces)	Status	Year Commenced
1	Chiansi Irrigation Infrastructure project	ORIO/TA and GRZ	Kafue	Ongoing	2016
2.	Construction of 1200 boreholes	GRZ	Muchinga, Copperbelt, Southern, Western, Northern, Lusaka and Eastern	Stalled	2017
3	Climate Change Adaptation Project	NORDIC/GRZ	Western	Stalled	2017
4	Construction of 77 boreholes in 15 Chiefdoms in the Copperbelt Province of Zambia	GRZ	Copperbelt	Ongoing	May 2021
5	Drilling of 30 boreholes in Lusaka Province	GRZ	Lusaka	Stalled	Mar 2021
6	Ground water mapping and development in Chongwe.	SADC/GMI and GRZ	Lusaka	Successful	2018
7	Funzwe Dam Construction	GRZ	Lusaka	Stalled	Sept 2016
8	Integrated small towns water supply and sanitation programme	AfDB and GRZ	Luapula Northern Western	Ongoing	Nov, 2016

Table 4-3 Water infrastructure projects implemented in the past 10 years cont…

No.	Name of Project	Financier	Location (Provinces)	Status	Year Commenced
9	Irrigation Development Support Project	WB and GRZ	Lusaka, Central Copperbelt, Eastern, Luapula, Muchinga North-Western Southern, Western	Ongoing	June, 2020
10	Kafue Bulk Water Supply Project.	Chinese Government and GRZ	Lusaka	Successful	Oct, 2016
11	Kafulafuta Dam	Chinese Government and GRZ	Ndola	Stalled	October 2018
12	Katete dam construction	KfW and GRZ	Katete	Successful	2014
13	New Serenje Water Supply Project	GRZ	Serenje	Ongoing	2012
14	Rural Water Basket Funding	KfW and other partners	All provinces	Stalled	November 2016
15	Strengthening Climate Change in the Kafue Basin.	AfDB and GRZ.	Choma, Kalomo Namwala, Monze Mazabuka, Itezhi-Tezhi, Chibombo Mumbwa, Kafue Shibuyunji	Successful	May, 2014

Table 4-4 Water infrastructure projects implemented in the past 10 years cont…

No.	Name of Project	Financier	Location (Provinces)	Status	Year Commenced
16	Strengthening Climate Resilience in Agriculture Livelihoods in Agro-Ecological Region I and II	Green Climate Fund and GRZ	Eastern, Lusaka Muchinga, Southern Western	Ongoing	2018
17	Mwomboshi Dam.	WB and GRZ.	Central	Successful	March, 2016
18	Nkana Water Supply Project II	GRZ	Copperbelt	Stalled	2018
19	Nyabombwe Community Water Scheme	World Vision/GRZ	Lusaka	Successful	June. 2022
20	Nkana water supply and sanitation programme.	AfDB and GRZ.	Copperbelt	Successful	2009
21	Transforming Rural Livelihoods in Western Province of Zambia	AfDB and GRZ.	Western	Ongoing	2015
22	Water Resources Development Project	WB and GRZ.	In all provinces	Stalled	2013
23	Water Resources Management and Infrastructure Development Project.	AfDB and GRZ.	In all provinces	Stalled	2018
24	Water Sector Programme Support – Phase II.	Danida and GRZ.	Western, Lusaka and Luapula	Successful	2011

Source: Author

4.2.2 Water Infrastructure Projects that were visited

Four project sites were visited. Funzwe Dam in Kafue, Mwomboshi Dam in Chisamba, Kafulafuta Dam Project in Mpongwe and Nyabobwe in Chongwe. Table 4-3 shows the status of the projects at the time of visit.

Table 4-5 Status of current projects

No	Question	Funzwe Dam	Mwomboshi Dam	Nyabombwe Community Water Scheme	Kafulafuta Dam
1	Date Project Commenced	September 2016	March 2016	June 2022	October 2018
2	Project Completed	No	Yes	Yes	No
3	Date project Completed	-	November 2018	August 2022	-
4	Current Status.	Incomplete.	Good condition.	Good condition.	Incomplete.
5	Financier	GRZ	WB and GRZ	World Vision and GRZ	Chinese Government and GRZ
6	Is Project in Use?	No	Yes	Yes	No.
7	If not in use, why?	Not reached a status of use although animals drink from it.	-	-	Not reached a status of use.
8	If not completed, current status.	Part of embankment, training wall and spill way eroded.	-	-	Project not complete, and some tools and materials had been vanadalised.
9	Are tools, materials, equipement on site?	No	-	-	Yes
10	Is the contractor on site?	No	-	-	No
11	If No, when was the contractor last on site?	September 2018	-	-	March 2020

4.2.3 Stalled water infrastructure projects implemented by government in the past 10

The stalled water infrastructure projects and their financiers are tabulated in Table 4-4.

Table 4-6 Stalled water infrastructure projects in the past 10 years

No.	Name of Project	Financier
1	Climate Change Adaptation project.	NORDIC Development Fund/GRZ.
2	Construction of Funzwe Dam in Kafue District.	GRZ.
3	Construction of 1200 boreholes	GRZ
4	Drilling of 30 boreholes in Lusaka Province.	GRZ.
5	Kafulafuta Dam Project in Ndola.	Chinese and GRZ.
6	Nkana Water Supply Project Phase II	GRZ
7	Rural Water Basket Funding	KfW and other partners and GRZ
8	Water Resources Development Project.	WB and GRZ.
9	Water Resources Management and Infrastructure Development Project.	AfDB and GRZ.

Source: Author

4.3 Contracting process of the water infrastructure projects implemented by government that have stalled in the past decade

The results in section below show the contracting process for the consultants and contractors for the water infrastructure projects that have stalled in the last decade.

4.3.1 Contracting of contractors and consultants

For projects with contractors and consultants, it was indicated that 61 percent had the contractors and consultants contracted by the government while 39 percent had them contracted by the project financier as shown in Figure 4-4.

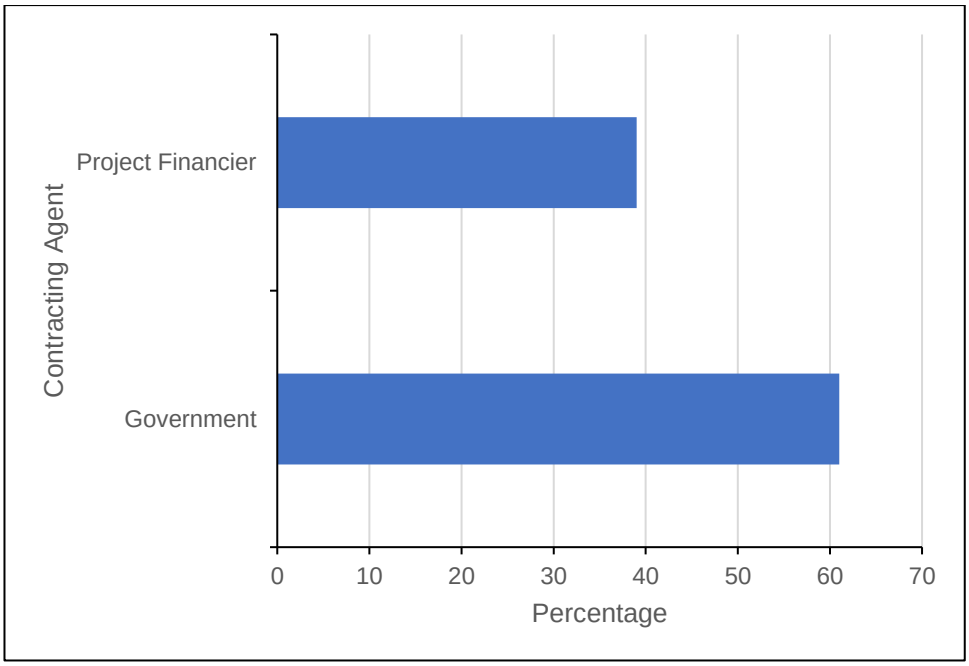

Figure 4-4 Contracting of contractors and consultants

4.3.2 Contracting of equipment and materials

The results from all the respondents indicated that all the procurement of equipment and materials was done by government with the donars just giving a no objection on the tender document and on the evaluation report before award of contracts.

The long procurement process is one of the major reasons for stalled water infrastructure projects in the past decade as well as one of the major challenges that is being encountered in the water infrastructure projects that are currently being implemented. Due to the long procurement process there is an increase in prices of requirements, leading to an increase the total project cost. Therefore, the estimated project is not able to cover everything.

4.4 Implementation process of the water infrastructure projects that have stalled in the past decade

The results below show the challenges that are being currently experienced in the implementation of projects. The role of government during the implementation of stalled projects as well the reasons for stalled projects is also presented.

4.4.1 Water Infrastructure Projects currently being implemented by Government that have challenges

On projects that are currently being implemented by government, 87 percent of the government officers (n=21) stated that there were challenges while 13 percent officers stated that there were no challenges (Figure 4-5).

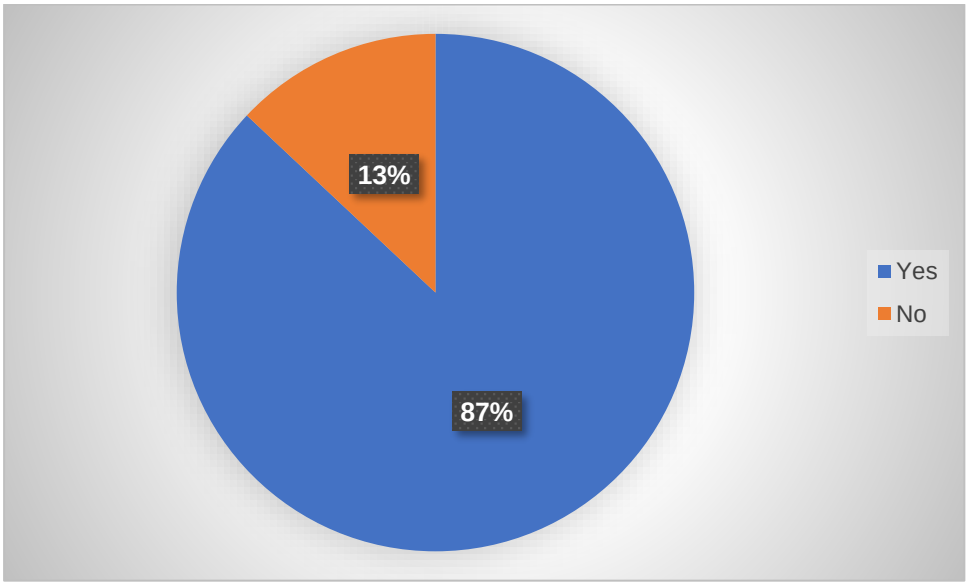

Figure 4-5 Officers stating that there were challenges in current projects

4.4.2 Government's role in the stalled projects

Figure 4-6 shows the different roles of government in the implementation of the stalled projects. The research found that monitoring and supervision was the major role for government. From the respondents, 100 percent indicated that the sole procurement of contractors and consultants as well as the procurement of materials and equipment, 80 percent indicated that government was sole PMT, 75 percent indicated that government was the sole financier, 45 percent indicated that government was part of the financiers and 57 percent that government was part of the PMT.

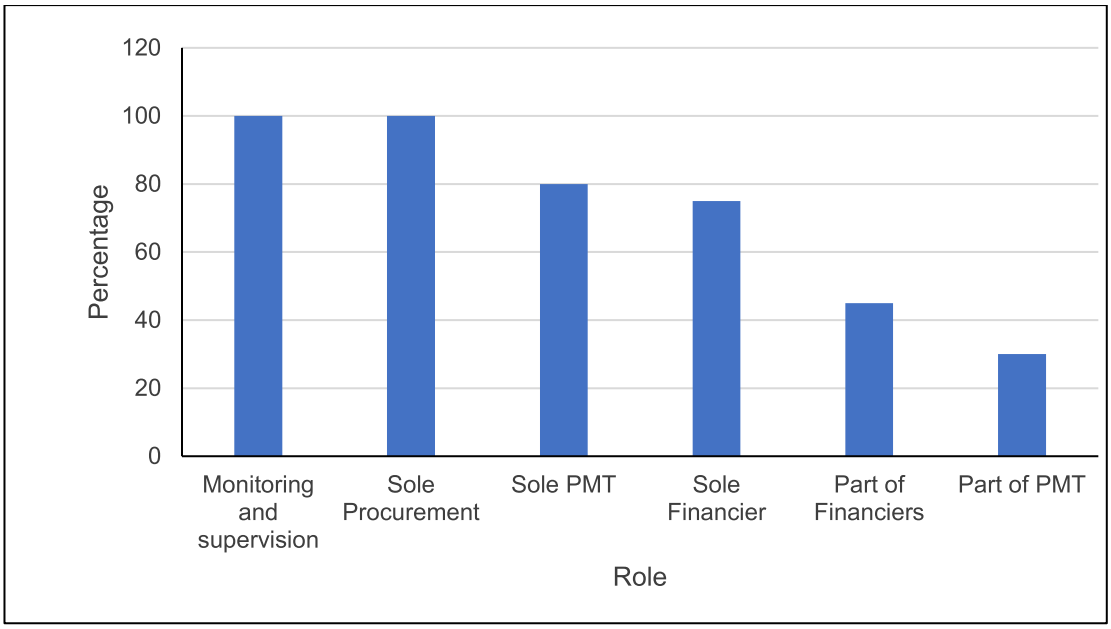

Figure 4-6 Role of government in stalled projects

4.4.3 Reasons for stalled projects

Figure 4-7 shows the different reasons leading to stalled projects by the respondents (n=31). The main reasons were long procurement procedures, lack of financial fulfilment, no dedicated PMT staff and interreference from senior government officials.

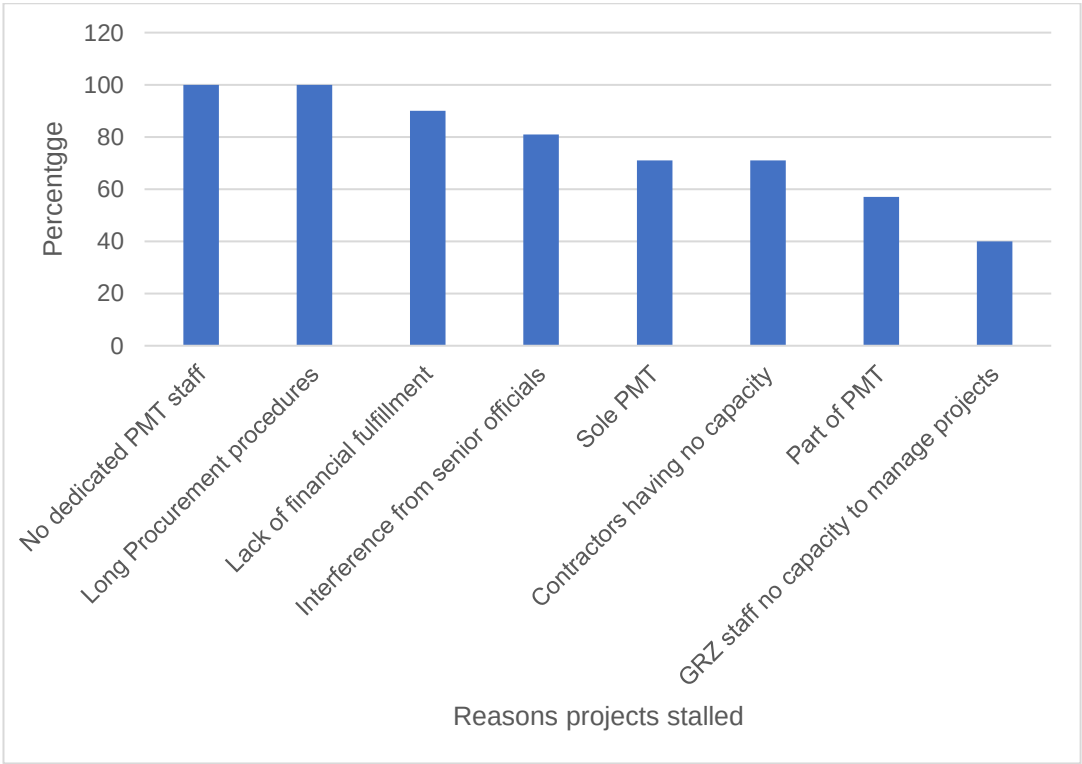

Figure 4-7 Reasons projects stalled

In at least two stalled water infrastructure projects, the Work Bank funded WRDP and the Chinese-funded Kafulafuta Dam Project in Ndola were cited as having stalled due to gross misuse of funds by the Zambian government which led to a high degree of controversy and mistrust from the World Bank and Chinese government.

4.4.4 Formation of PMT

The formation of the PMTs in stalled projects as stated by the government officers (n=21) in Figure 4-8, reveals that 11 percent indicated that they were outsourced, 65 percent had government officers only while 24 percent of the officers indicated that the PMTs had both outsourced and government officers.

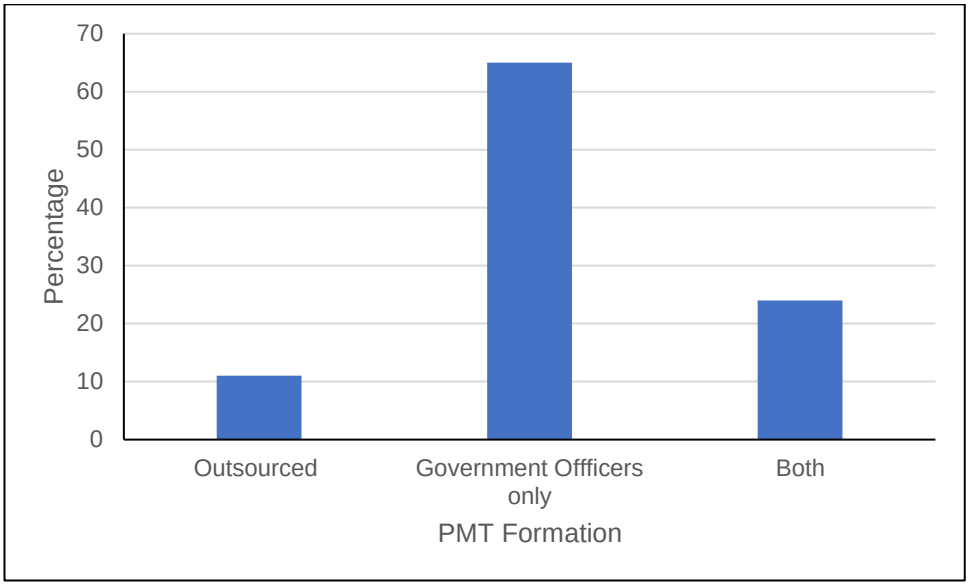

Figure 4-8 Formation of PMT

4.4.5 Government officers on PMT

From the PMTs that had government officers, 14 percent of the government officers were fully attached to the project while 86 percent were not fully attached to the project as shown in Figure 4-9.

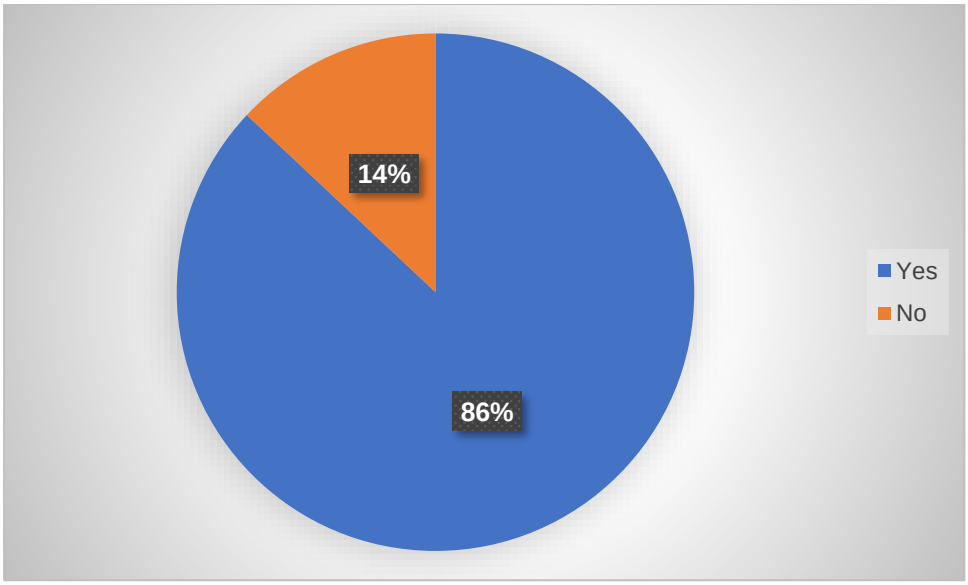

Figure 4-9 Government officers on PMT

The government officers mentioned during the interviews that PMT that consisted of government officers, were either appointed by the Permanent Secretary or the Director to work on the project.

4.4.6 Reasons for outsourcing PMT

The government officers indicated that the reasons for outsourcing the PMTs was that it was mainly a requirement of the donor/sponsor for the project and that requirement was clearly stated in the project agreement document. The other reason was that when the project derailed, the donors would require that other project management officers be outsourced to beef up the PMT. Some of the PMTs outsourced had people who had to apply individually or had to apply as a consulting firm.

4.5 Appropriate plan for effective implementation of water infrastructure projects by government.

The proposed plans for effective implementation of water infrastructure development projects by government is one that has the following: -

a) The government gives its full financial obligation

b) The PMT has officers that are dedicated to the project only and not involved with other government assignments. The PMT should operate independently from the government structure;

c) The implementation of the project has no interference from the superiors and leave the PMT to implement the project as described in the project implementation plan

d) The implementation of projects to be decentralized to provincial and district level.

e) There should be a separate entity to manage the implementation of water infrastructure projects like the Road Development Agency

f) The water utility companies to have one Company and have Regional Directors in the provinces so that it operates like the Zambia Electricity Company

The proposed procurement models for works and goods are presented in Table 4- 5 and Table 4-6 respectively.

Table 4-7 Proposed procurement plan for works

Ministry/ Department - Proposed Procurement Model WORKS																	
		Draft Bid Documents, including specs and quantities, draft SPN		Spec Proc Notice Advert	Bidding Period		Bid Evaluation				Contract Finalization			Contract Implementation			
Description*	Plan vs. Actual	Prep & Submission by Ex Agency	No-objection Date	On-line Nat Press	Bid Invitation Date	Bid Closing-Opening	Submission Bid Eval Rpt	GRZ Procurement Committee No-objection Date	Donor-objection Date	Plan vs. Actual	Contract Amount in ZMW	Date Contract Award	Date Contract Signature	Mobilization Advance Payment	Substantial Completion	Final Acceptance	Final Payment
Norm Duration of Proc Steps	Plan	4 - 7 wks	1 - 1.5 wks	1.5 - 2 wks	6 to	12 wks	2 - 3 wks	2 wks	1.5 - 3 wks	Plan		1 wk	1.5-3 wks	1.5-3 wks	13 wks	52 weeks	2 wks
	Actual									Actual							
List of Contracts																	
Name of Tender	Plan	16-Feb-23	26-Feb-23	12-Mar-23	19-Mar-23	3-May-23	24-May-23	7-Jun-23	28-Jun-23	Plan	-	5-Jul-23	26-Jul-23	16-Aug-23	20-Nov-23	19-Nov-24	3-Dec-24
	Actual									Actual							
Total Estimated Cost	Plan									Plan	-						
	Actual									Actual							

Table 4-8 Proposes procurement plan for goods

Ministry/ Department				Proposed Procurement Model GOODS									
		Draft Bid Documents, including specs and quantities											
Norm Duration of Proc Steps				Procurement Advert	Bidding Period		Bid Evaluation			Contract Finalisation		Contract Implementation	
Description	Plan vs. Actual	Preparation of solicitation document	MPC Approval	On-line Minstry website & Print media	Bid Invitation Date	Bid Closing-Opening	Submission Bid Eval Rpt	Ministry Procurement Committee approval	Plan vs. Actual	Date Contract Award	Date Contract Signature	Expected Date of Arrival of Goods	Inspection & Final Acceptance
Norm Duration of Proc Steps	Plan	1 - 2 weeks	1 - 1.5 wks	1.5 - 2 wks	1 - 2 wks	1 - 4 wks	1.5 - 3 wks	1-2 wks	Plan	1 wk	1.5-2 wks	1-20 wks	1-20 wks
	Actual								Actual				
List of Contracts													
Purchase of materials	Plan	16-Feb-23	23-Feb-23	27-Feb-23	27-Feb-23	11-Mar-23	15-Mar-23	19-Mar-23	Plan	22-Mar-23	26-Mar-23	15-Apr-23	15-Apr-23
	Actual								Actual				
Total Estimated Cost													

4.6 Chapter Summary

This chapter gave an analysis of the results of the research starting with the demography of the respondents from both government and donor organisations. The water infrastructure projects implemented by government is given starting with the current ones being implemented, stalled projects and the reasons. The PMT models being used and the proposed plans for implementation is also stated. The next chapter presents a discussion of the results.

CHAPTER FIVE: DISCUSSION OF RESULTS

5.0 Introduction

This chapter basicaly presents the discussion on the results of the study. It begins by analyzing the respondents and then the implementation of these government projects. This is followed by the summary of the chapter.

5.1 Demography of the Respondents

The respondents from the both government and donors (n=25) had more males than females. Males were at 73 percent while the females were at 27 percent. The qualifications for the government officers ranged from diploma holders to doctorate degree holders, while the donor only had masters' degree holders. The respondents from government were engineers, planners, procurement and others while for donors there only engineers and procurement officers. The years of working in the organisations ranged from 0 to over 10years in both government and donor organisation. The variety of respondents in gender, qualification and years of experience gave a better view of the results.

5.2 Water infrastructure projects implemented by government that have stalled in the past 10 years

The study revealed that water infrastructure projects were implemented through the MWDS and the MOA.

5.2.1 Water infrastructure projects implemented by government

The results show that there has been a 22 water infrastructure projects implemented by government in the past 10 years.

GRZ together with its cooperating partners has been implementing water and sanitation projects in line with the NUWSSP 2011-2030 and NRWSSP 2021-2030), (MWDSEP, 2021). Considerable amount of work has been undertaken in dam infrastructure development by DWRD and the ISDP (MWDSEP, 2018a). Further due to the increase in water infrastructure development in the region, SADC has appointed the SADC Water Division to oversee the polices on water and sanitation infrastructure and ensure their timely implementation in the region.

5.2.2 Stalled Water Infrastructure Projects

From the projects that have been implemented by government in the past 10 years, 32 percent of them have stalled. Most of the stalled projects were those that had full government financial support and also those where government did not give its financial obligation while the donors gave their obligation. This is in line with the findings of Damoah and Kumi, (2018) who also stated that the lack of commitment by governments evidenced by slow and sometimes non disbursement of funds lead to failure of government projects. The Construction of 1200 boreholes complete with handpumps with full funding and implementation by GRZ was scheduled to start in 2016 and end in 2017. However, due to delay in release of funds from government the project only commenced in 2017 and has stalled as only 345 boreholes were completed by the end of the first quarter of 2022. Considering that the contracts have expired, a formal closure report will be done and the remaining works will have to be retendered. (MWDS, 2022b). The Serenje Water Supply project which commenced in 2012 was halted for a year in 2016 as the contractor abandoned the site due to non-release of funds from government. However, the contractor resumed works after a year in 2017 when funds were released (Pressreader, 2017). There are huge investments required in water infrastructure development projects, however funds from government alone are not enough to finance the water infrastructure development in Zambia. There is limited funding in the construction and rehabilitation of boreholes as well as post infrastructure construction interventions (MWDSEP, 2018a).

Other projects failed because the PMT had government officers who had to undertake other government duties thereby not dedicating a greater amount of their time to these projects and therefore their commitment to the project was affected. Further, these projects also had a lot of interference from the superiors. This happened when the PMT made programs and decisions on the project including monitoring and evaluation of works, authority took long as the superiors would interfere and ask the PMT to do what the supervisors preferred and sometimes cancelled them completely. There was also financial misappropriation through misapplication of funds as the PMT were directed to spend the funds on things outside the project by government in some of these projects. The WRDP did not have dedicated full time PMT staff as the staff were civil servants with other duties. Further the PMT was understaffed because during

implementation specialised staff such as monitoring and evaluation, procurement and financial were missing most of the time leading to significant time lags (WB, 2019a). This is in line with Carroll (2022) who stated that the majority of failed projects was due to inexperienced project management and poor resource planning. She also indicated that most organisations do not prioritise project management. Further, if the PMT is not structured properly, there is poor communication and there is no support from top management to the PMT, the projects will fail (www.kantata.com).

5.3 Contracting process for water infrastructure projects

The results have revealed that the procurement of the contractors and consultants as well as the equipment and machinery for the projects was mainly done by government. The government procurement process is lengthy causing a delay in the implementation of projects. With projects that are co-financed, the procurement was delayed further as there was need to seek 'No Objection' from the partners at almost every stage. This was evidenced by the WRDP where the procurement process took long even during the preparation stage as only 3 percent of the Project Preparation Advance (PPA) was used. GRZ and World Bank signed a PPA of US$2,995,000 which was granted on 15 June 2012, eight months before the project approval in April 2013, however only 3 percent was used and the rest had to be reimbursed at the beginning of the project with only two activities being undertaken. Even during implementation, the procurement process was delayed further as all cost variations, decisions on contract management, and extensions were centralised with amounts above ZMW50,000.00 being approved by the Ministerial Procurement Committee. The other reason for non-use of the PPA was in incapacity as well lack of knowledge on the use of the PPA by the implementation team. (WB, 2019a).

As evidenced from the literature review, procurement processes are one of the major challenges in water infrastructure projects. Government procurement of water infrastructure projects in Indonesia takes a long time as it can take a minimum of one year from the time the bid is tendered to the time of award and signing of contract, causing delays in implementation as the bid can endure changes in the law and prices of goods (NRF, 2017). In Zambia, one of the challenges faced by Transforming Rural Livelihoods in Western Zambia – National Rural Water Supply and Sanitation Programme II Project implemented by the DWSS is due to long procurement

procedures that has led to delays in the completion of some water and sanitation infrastructure (AfDB, 2022d). Further, one of the reasons that led to failure of the WRDP implemented by DWRD was delayed procurement. One of the procurement issues was the delay in hiring the engineering consultant and individual consultant for supervision of the first 12 dams (World Bank, 2019a).

The procurement process of water infrastructure projects by government has highly contributed to the delay in the delivery of these projects leading to change in prices and projects not being completed as the allocated funds are not sufficient. This is because of the long bureaucracy of the government procurement process.

5.4 Implementation Process for government projects that have stalled

The challenges being faced by stalled projects is that the PMT had too much work as they had to undertake other government duties and there was also too much interference from the superiors. The formation of the government PMT was that of appointed by the Permanent Secretary or Director of the Department. Most of the successful projects had permanent staff on the PMT or the PMT was outsourced. In Zambia, according to World Bank (2019b), the capacity of the PMT was weak as it had high turnover of staff, did not have full time dedicated staff to the project and was also understaffed. As stated by Sitondo (2015), the government had a high rate of failed projects leading to loss of millions of Kwachas, therefore there was need to have a very strong Project Management Office to ensure that the projects are properly implemented, monitored and evaluated throughout leading to closure of the projects in time and within budget.

This was evidenced in the implementation of the WRDP. WB issued Partial Suspension in March 2018 and finally terminated the project in November 2018. According to World Bank (2019b), some of the challenges during implementation that led to termination were due to the following: -

a) Provincial Water Officers and District Water Officers were not able to supervise the projects as they lacked staffing and financial resources as supervision and operational funding ended in quarter 2 of 2015 and further

supervision by one consultant for contracts spread across the country was difficult.

b) The capacity of the PMT was weak as it had high turnover of staff, did not have full time dedicated staff to the project and was also understaffed.

c) The PMT did not use the Technical Assistance effectively during implementation as the engineering consultant and individual consultant were hired late therefore, they were not involved in the supervision of the first 12 dams.

d) There was weak contract management such as failure to address weak contractor performance on time; failure to complete works on time; failure to recover advance payment where contracts were terminated due to major foundation challenges.

e) The intended use for the 12 dams was livestock, irrigation, fisheries and water supply. However, there was weak inter-ministerial coordination at national, provincial and district level with ministries in charge of these sectors during implementation.

f) The Project lacked adherence to WB's safeguard polices. It also had poor procurement and contract management; as well as poor quality of works. WB issued a Threat of Suspension on January 8 2018, if GRZ did not apply the corrective measures.

The PMT is very important for the success of water infrastructure development projects. A fully dedicated PMT is very important for implementing successful projects because each team member is dedicated and puts in extra effort, projects are completed on schedule, and an efficient team contributes to a healthy work atmosphere. (Mchale,2019). The Strengthening Climate Resilience in the Kafue Sub-Basin project was a successful project with a strong PMT as it even won the African Water Change Makers (People's Choice) Award at the 2021 Climate Adaptation Summit. The project was launched in 2014 and the PMT was headed by a Project Manager who worked full time on the project despite being a government employee in the Ministry of National Planning. The project was coordinated by the Project

Coordinating Team by government workers at Provincial and District level (Lusaka Times, 2021; AfDB, 2013).

5.5 Appropriate model for effective implementation of water infrastructure projects by government

There were several models that were proposed and identified during the research. The most appropriate model is where the PMT has government workers fully dedicated to the project. These workers in the PMT should not be involved in other gvernment duties.

The proposed model for effective implementation of water infrastructure development projects by government is one that has the following: -

a) The government gives its full financial obligation

b) The PMT has officers that are dedicated to the project only and not involved with other government assignments. The PMT should operate independently from the government structure;

c) The implementation of the project has no interference from the superiors and leave the PMT to implement the project as described in the project implementation plan

d) The procurement process does not take long

Maharjan (2019) explains that for successful infrastructure projects the problems of government coordination, management and accountability needs to be dealt with. Therefore, the ideal implementation model for water infrastructure projects is one where the government workers are solely dedicated to the project and resume the other duties after the completion of the project. The models which have government officers who are involved with other assignments lead to officers not being dedicated to the project.

5.6. Summary

This chapter has discussed the results of the study based on the perceptions of government, donors, NGO and consulting firms officers towards the challenges encountered in the implementation of water infrsatructure development by

government. The study was based on the four objectives. The next chapter presents the conclusion and recommendations.

CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

6.0 Introduction

This chapter presents the conclusion and recommendations of the study.

6.1 Conclusion

The general objective of the study was to establish challenges faced in implementing water resources development infrastructure projects funded by the Zambian government. The four specific objectives of the study were; determining the water infrastructure projects implemented by government that have stalled in the past decade; analyzing the contracting process for the water infrastructure projects implemented by government that have stalled in the past decade; analysing the implementation process of the government projects that have stalled in the past decade; and designing an appropriate model for effective implementation of water infrastructure projects by government.

Further, the four study questions were as follows.

I. Which water infrastructure projects implemented by government have stalled in the past decade?

II. How is the contracting process of water infrastructure projects done by the government?

III. What is the implementation process of the government projects that have stalled in the past decade?

IV. What would be the appropriate model(s) for implementing water infrastructure projects funded by government?

The research objectives were achieved and the research question answered through researcher's physical interactions/observations, various stakeholder inputs, research results analysis and stakeholder recommendations. This was done by ensuring that the research questions were answered by fully engaging the senior management at directorate level, operational staff, cooperating partners/donors, private consultants engaged on these projects, document reviews and the researcher's site visits to various water infrastructure.

Based on the study, it was concluded that most of the projects that stalled were the ones under GRZ as the implementing agencies of these water infrastructure projects. The government procedure for procurement of goods and services was followed, however the time taken for each process and clearance was very long and time consuming leading to delays in implementation of the projects. This caused the projects to go beyond the project period. Further, the delayed and non-release of funds by government also contributed to the delayed procurement.

The implementation process of the government projects that have stalled in the past are mostly those managed by government officers and had PMT composed of government officers who still had other government duties and did not have specific roles defined for them in the implementation of the projects. These government staff in the PMT lacked incentives as they either supervised or were part of consultants that were highly paid compared to their salaries. Further, the project implementation plan was not followed as activities were done as prescribed by the senior government officers. The successful government projects are those have a PMT that is independent from other government duties and has no interference from senior government officers.

6.2 Recommendations

For successful government projects the following recommendations are given: -

a) The PMT should be independent and have government officers, who should be seconded full time to the project for continuity and ownership after close of the project.

b) When the government officers are seconded to the project, they should get salary equivalent to the consultants as the project pays them the difference between their government salary and the project salary.

c) The funds for the project from both the donor and government should be managed by the PMT.

d) Government to disburse its financial obligation on time and in the right amount.

e) There should be no government interference in the implementation of the project.

f) The procurement process to be revised to enable the projects to be implemented on time and within budget to avoid changes in prices.

6.3 Recommendations for future research

This, study looked at and addressed the challenges faced in implementing water resources development infrastructure projects funded by the Zambian government. This particular study did not address the exact reasons why those challenges were not being addressed by government. This particular study did not make use of or adapt a framework for the analysis of the motivations for challenges faced by government in implementing water resources development infrastructure projects funded by the Zambian government. Further research in using such a framework is likely to result in incremental contributions to existing literature.

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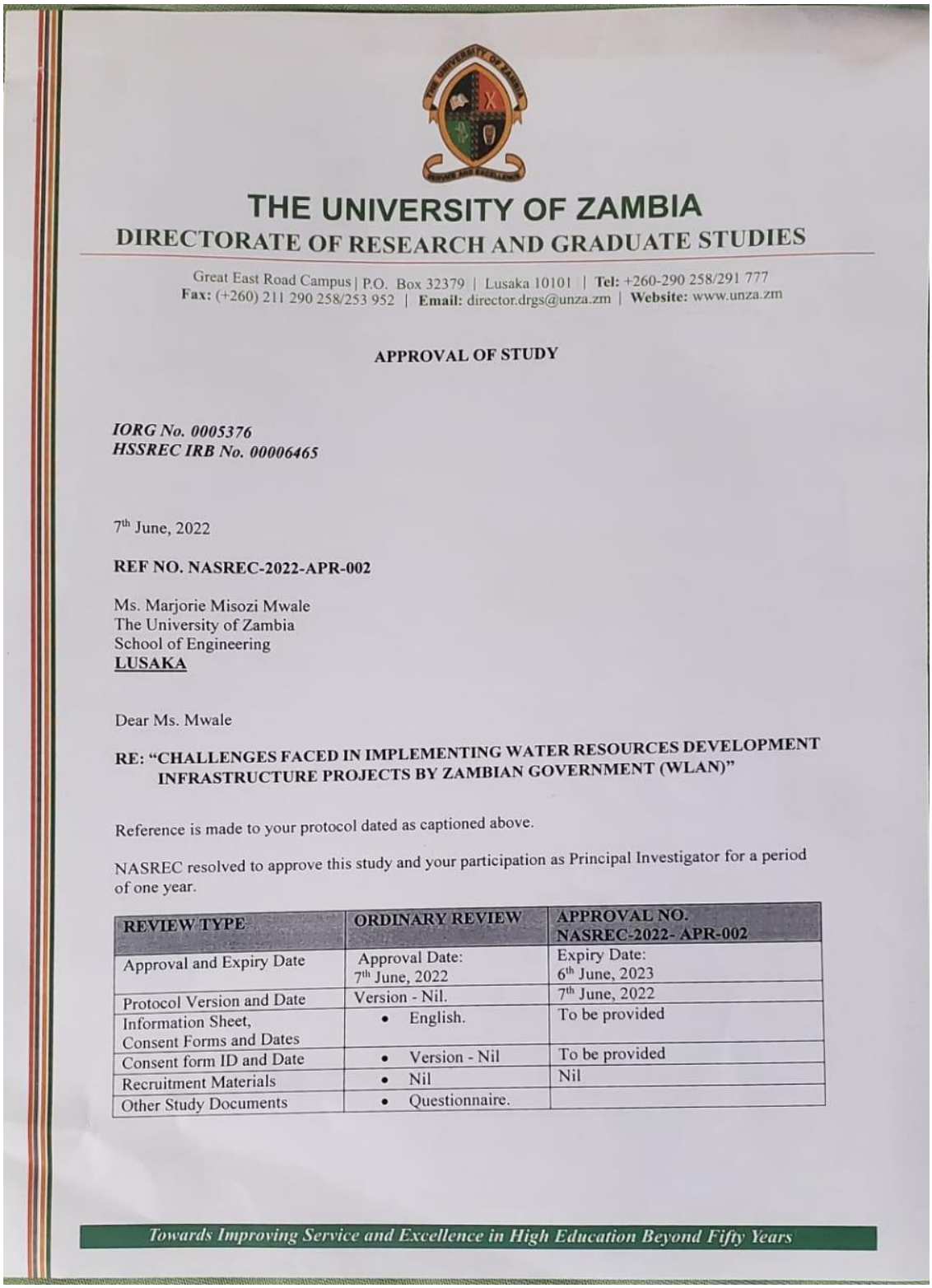
APPENDIX I – ETHICAL CLEARANCE APPROVAL



THE UNIVERSITY OF ZAMBIA
DIRECTORATE OF RESEARCH AND GRADUATE STUDIES

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APPROVAL OF STUDY

IORG No. 0005376
HSSREC IRB No. 00006465

7th June, 2022

REF NO. NASREC-2022-APR-002

Ms. Marjorie Misozi Mwale
The University of Zambia
School of Engineering
LUSAKA

Dear Ms. Mwale

RE: "CHALLENGES FACED IN IMPLEMENTING WATER RESOURCES DEVELOPMENT INFRASTRUCTURE PROJECTS BY ZAMBIAN GOVERNMENT (WLAN)"

Reference is made to your protocol dated as captioned above.

NASREC resolved to approve this study and your participation as Principal Investigator for a period of one year.

REVIEW TYPE	ORDINARY REVIEW	APPROVAL NO. NASREC-2022- APR-002
Approval and Expiry Date	Approval Date: 7th June, 2022	Expiry Date: 6th June, 2023
Protocol Version and Date	Version - Nil.	7th June, 2022
Information Sheet, Consent Forms and Dates	• English.	To be provided
Consent form ID and Date	• Version - Nil	To be provided
Recruitment Materials	• Nil	Nil
Other Study Documents	• Questionnaire.	

Towards Improving Service and Excellence in High Education Beyond Fifty Years

Specific conditions will apply to this approval;

As Principal Investigator it is your responsibility to ensure that the contents of this letter are adhered to. If these are not adhered to, the approval may be suspended. Should the study be suspended, study sponsors and other regulatory authorities will be informed.

Conditions of Approval

- No participant may be involved in any study procedure prior to the study approval or after the expiration date.
- All unanticipated or Serious Adverse Events (SAEs) must be reported to NASREC within 5 days.
- All protocol modifications must be approved by NASREC prior to implementation unless they are intended to reduce risk (but must still be reported for approval). Modifications will include any change of investigator/s or site address.
- All protocol deviations must be reported to NASREC within 5 working days.
- All recruitment materials must be approved by NASREC prior to being used.
- Principal investigators are responsible for initiating Continuing Review proceedings. NASREC will only approve a study for a period of 12 months.
- It is the responsibility of the PI to renew his/her ethics approval through a renewal application to NASREC.
- Where the PI desires to extend the study after expiry of the study period, documents for study extension must be received by NASREC at least 30 days before the expiry date. This is for the purpose of facilitating the review process. Documents received within 30 days after expiry will be labelled "late submissions" and will incur a penalty fee of K500.00. No study shall be renewed whose documents are submitted for renewal 30 days after expiry of the certificate.
- Every 6 (six) months a progress report form supplied by The University of Zambia Natural and Applied Sciences Research Ethics Committee as an IRB must be filled in and submitted to us. There is a penalty of K500.00 for failure to submit the report.
- When closing a project, the PI is responsible for notifying, in writing or using the Research Ethics and Management Online (REMO),both NASREC
- and the National Health Research Authority (NHRA) when ethics certification is no longer required for a project.
- In order to close an approved study, a Closing Report must be submitted in writing or through the REMO system. A Closing Report should be filed when data collection has ended and the study team will no longer be using human participants or animals or secondary data or have any direct or indirect contact with the research participants or animals for the study.
- Filing a closing report (rather than just letting your approval lapse) is important as it assists NASREC in efficiently tracking and reporting on projects. Note that some funding agencies and sponsors require a notice of closure from the IRB which had approved the study and can only be generated after the Closing Report has been filed.
- A reprint of this letter shall be done at a fee.

- All protocol modifications must be approved by NASREC by way of an application for an amendment prior to implementation unless they are intended to reduce risk (but must still be reported for approval). Modifications will include any change of investigator/s or site address or methodology and methods. Many modifications entail minimal risk adjustments to a protocol and/or consent form and can be made on an Expedited basis (via the IRB Chair). Some examples are: format changes, correcting spelling errors, adding key personnel, minor changes to questionnaires, recruiting and changes, and so forth. Other, more substantive changes, especially those that may alter the risk-benefit ratio, may require Full Board review. In all cases, except where noted above regarding subject safety, any changes to any protocol document or procedure must first be approved by NASREC before they can be implemented.

Should you have any questions regarding anything indicated in this letter, please do not hesitate to get in touch with us at the above indicated address.

On behalf of NASREC, we would like to wish you all the success as you carry out your study.

Yours faithfully,

Dr. M. Kaonda

VICECHAIRPERSON
THE UNIVERSITY OF ZAMBIA NATURAL AND APPLIED SCIENCES RESEARCH ETHICS COMMITTEE - IRB

cc: Director, Directorate of Research and Graduate Studies
Assistant Director (Research), Directorate of Research and Graduate Studies
Assistant Registrar (Research), Directorate of Research and Graduate Studies
Acting Senior Administrative Officerr (Research), Directorate of Research and Graduate Studies

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APPENDIX II - INTERVIEW GUIDE GOVERNMENT OFFICERS

Topic: "**Challenges Faced in Implementing Water Resources Development Infrastructure Projects by the Zambian Government**

Date:_____ Respondent# ☐

Ministry:_____

Department: _____

Questions

1. Sex: Male ☐ Female ☐
2. Age: _____Years
3. Position in Government _.....____
4. Highest qualification obtained ……
5. How long have you been working in the Government? **A.** 0-5 years **B.** 5-10 years **C.** Over 10years
6. How many water development infrastructure projects have been implemented by your department in the past 10 years? _____
7. How were the project management teams formed? _____ _____ _____ _____
8. How many of these projects had project management teams **A**. Outsourced _____ **B**. Government Officers _____ **C**. Both Outsourced and Government Officers _____
9. For the project management teams that had government officers, were they attached to the projects fully? **A.** Yes B**.** No
10. For the project management teams that had government officers, were they involved in other government assignments? **A.** Yes **B.** No
11. For the projects that had outsourced project team members, why were these officers outsourced? Please explain? _____

_____
_____
_____

12. For project with contractors and consultants, how was the contracting done?
_____
_____
_____

13. How many of these projects have been successfully completed?
_____

14. Please name the successful projects and all the financiers to the projects
_____
_____
_____
_____

15. How many of these projects have stalled?

16. Please name the stalled projects and all the financiers to the projects
_____
_____
_____
_____

17. What was Government's role in the implementation of the successful projects? Please explain.
_____
_____
_____
_____
_____

18. What was Government's role in the implementation of the stalled projects? Please explain.
_____
_____
_____
_____
_____

19. What could be the major reason of the stalled projects? Please explain
_____
_____
_____

_____
_____

20. On projects that you are currently implementing, are there any challenges? **A**. Yes **B**. No

21. If yes, what are the challenges you facing?
_____
_____
_____
_____

22. How do you think these challenges can be avoided/solved?
_____
_____
_____
_____

23. From your experience, what do you think is best approach to successfully implement water development projects?
_____
_____
_____
_____
_____

Thank you for your cooperation.

APPENDIX III – INTERVIEW GUIDE SPONSERS

Topic: "**Challenges Faced in Implementing Water Resources Development Infrastructure Projects by the Zambian Government**

Date:_____ Respondent# ☐

Organisation:_____

Questions

1. Sex: Male ☐ Female ☐
2. Age: _____Years
3. Position: _____
4. How long have you been working in the Organisation? **A.** 0-5 years **B.** 5-10 years **C.** Over 10years
5. How many water development infrastructure projects has the organisation financed in the past 10 years? _____
6. How many of these projects have been co-financed and implemented through government? _____
7. How many of the projects financed by your organisation have been successful? _____
8. Please name the successful projects and the implementing agency _____ _____ _____ _____
9. How many of the projects financed by your organisation have stalled? _____ _____
10. Please name the stalled projects implemented through Government _____ _____ _____ _____

11. What was Government's role in the implementation of the successful projects? Please explain
    _____
    _____
    _____
    _____
    _____
12. What was Government's role in the implementation of the stalled projects? Please explain
    _____
    _____
    _____
    _____
    _____
13. What could be the major reason of the stalled projects? Please explain
    _____
    _____
    _____
    _____
    _____
14. What could be the major reason for the successful projects? Please explain

15. From your experience, what do you think is the best approach in implementing successful water development projects by Government?
    _____
    _____
    _____
    _____
    _____

Thank you for your cooperation.

APPENDIX IV - CHECKLIST

Topic: "**Challenges Faced in Implementing Water Resources Development Infrastructure Projects by the Zambian Government**

Date:_____Project#

Name of Project:_____

Location: _____

Questions

1. Date project commenced _____
2. If project Completed, when was it completed _____
3. What is the current status of the completed project? _____ _____ _____
4. Is the project in use? A. Yes B. No
5. If no, why not? _____ _____ _____ _____
6. If not completed, what is the current status of the project? - _____ _____ _____ _____
7. Are the tool, materials and equipment on site? _____ _____ _____ _____
8. Is the contractor on site? A. Yes B No

9. If No, when was the contractor last on site?_____

APPENDIX V – MANUSCRIPT SUBMISSION

From: "Levy Siaminwe" <journals@unza.zm>
To: "Marjorie Misozi Mwale" <mwalemarjorie@yahoo.com>
Cc:
Sent: Mon, 15 May 2023 at 9:34 am
Subject: [JONAS] Submission Acknowledgement

Marjorie Misozi Mwale:

Thank you for submitting the manuscript, "Challenges Faced in Water Resources Development Infrastructure Projects Implemented by the Zambian Government" to Journal of Natural and Applied Sciences. With the online journal management system that we are using, you will be able to track its progress through the editorial process by logging in to the journal web site:

Submission URL: https://journals.unza.zm/index.php/JONAS/authorDashboard/submission/1002
Username: mmwale

If you have any questions, please contact me. Thank you for considering this journal as a venue for your work.

Levy Siaminwe

Journal of Natural and Applied Sciences

From: "Dr Joel Kabika" <journals@unza.zm>
To: "Marjorie Misozi Mwale" <mwalemarjorie@yahoo.com>
Cc:
Sent: Mon, 15 May 2023 at 9:55 pm
Subject: [JONAS] New notification from Journal of Natural and Applied Sciences

You have a new notification from Journal of Natural and Applied Sciences:

You have been added to a discussion titled "Pre-Review Comment" regarding the submission "Challenges Faced in Water Resources Development Infrastructure Projects Implemented by the Zambian Government".

Link: https://journals.unza.zm/index.php/JONAS/authorDashboard/submission/1002

Levy Siaminwe

Journal of Natural and Applied Sciences