

**A FRAMEWORK FOR PUBLIC INFRASTRUCTURE  
FINANCING IN ZIMBABWE**

**BY**

**T. KAPESA**

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**A FRAMEWORK FOR PUBLIC INFRASTRUCTURE FINANCING IN  
ZIMBABWE**

**BY**

**TONDERAI KAPESA (219359911)**

**SUBMITTED IN FULFILMENT OF THE REQUIREMENTS FOR THE DOCTOR  
OF PHILOSOPHY DEGREE (PhD) IN ACCOUNTING IN THE FACULTY OF  
BUSINESS AND ECONOMIC SCIENCES AT THE NELSON MANDELA  
UNIVERSITY**

**APRIL 2021**

**SUPERVISOR: PROF GIFT MUGANO**

**CO- SUPERVISOR: PROF HOUDINI FOURIE**

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## **DEDICATION**

This thesis is dedicated to my greatest team of supporters: Wife- Rumbidzai; Son- Emmanuel Anesu and Daughter- Ruth Anoshamisa, for their support and minimal disturbances when I had to focus on studying.

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## **ABSTRACT**

The Government of Zimbabwe is operating using the mantra: ‘Zimbabwe is open for business’. The notion of opening for business requires robust supporting economic infrastructure for enhanced productivity, in the form of reliable supply of electricity, accessible road/railway transport networks and availability of contemporary Information Communication Technology (ICT) infrastructure. The aim of the study was to develop a framework for making financing decisions for public infrastructure in Zimbabwe. The objectives of the study are to: determine the main sources of public infrastructure financing in Zimbabwe; establish innovative finance’s capacity to close the public infrastructure financing gap in Zimbabwe; assess the role played by public-sector accounting in attracting appropriate and efficient mechanisms to finance public infrastructure in Zimbabwe; and ultimately to develop and recommend a framework for selecting suitable and efficient mechanisms to finance public infrastructure in Zimbabwe.

According to literature reviewed, public infrastructure is broadly financed by public sector entities using their own resources (internally financed) or through private sector investments and innovative financing instruments (externally financed). When infrastructure is internally financed, the study is theoretically guided by the Public Goods Theory and the Theory of Public Finance and Public Policy. When externally financed, the Risk Return and Pecking Order theories are important. There are many instruments used to finance public infrastructure and one project may be financed using one or more instruments. Therefore, considerations are given to the need for a framework that helps improve the efficiency of the financing decision.

The study was designed as a multiple case study that focused on four sectors of economic infrastructure, that is, transport, energy (electricity), ICT as well as water and sanitation. The research used synchronous mixed methods to achieve the objectives of the study. Qualitative research methods addressed the following objectives: a) to determine the main sources of public infrastructure financing in Zimbabwe; b) to establish innovative finance’s capacity to close the public infrastructure financing gap in Zimbabwe ; and c) to assess the role played by

public-sector accounting in attracting appropriate and efficient mechanisms to finance public infrastructure in Zimbabwe. Whilst to develop and recommend a framework for selecting suitable and efficient mechanisms to finance public infrastructure in Zimbabwe the study combined qualitative and quantitative research methods. Qualitative data was collected through interviews conducted with officials and staff from government ministries, government departments, as well as parastatal enterprises dealing with the four infrastructure types. The same respondents were asked to complete a survey questionnaire used to address part of the objective that developed a framework for public infrastructure financing. Interview data were triangulated using secondary data extracted from reports and financial statements. Some of the secondary data was collected from the World Bank's development indicators online repository. Qualitative data analysis was done using RQDA, an open-source computer-aided data analysis software.

Findings from the study revealed that the main sources of finance for public infrastructure in Zimbabwe are the government through budget appropriations, and concessionary loans from the China Export-Import Bank. There was also finance obtained from multilateral financial institutions such as the Development Bank of Southern Africa and the African Export-Import Bank. The study revealed that there is currently very limited use of innovative financing instruments such as PPPs in financing public infrastructure in Zimbabwe, despite the country having legislation to support such financing arrangements. The innovations in financing observed in the study entail the use of conventional financing mechanisms in unconventional ways. However, there is scope for improving the financing of public infrastructure using innovative financing mechanisms and significantly mitigate the financing gap.

Public sector accountants in Zimbabwe are mainly active in financial reporting, although the financial statements for most ministries, government departments and parastatal enterprises had qualified audit opinions from the Auditor General's office. Public sector accountants are not active in financial management and cost and management accounting responsibilities. As a result, public sector accountants are not adding value to public money through offering advisory services in the efficient investment of public money, as well as financing public infrastructure assets using the most efficient financing mechanism. There is no uniformly



applied framework when making financing decisions for public infrastructure in Zimbabwe. Therefore, a framework was developed and is recommended for use by this study. The developed framework entails eight steps that are interrelated and interconnected. Use of the proposed framework requires availability of data about infrastructure projects that have been done in the past.

The study recommends that Zimbabwe should ensure a robust framework for protecting private sector investments, which can be achieved by ensuring policy consistency; creating and implementing a legal framework that protects private capital; and having economically viable infrastructure sectors, that are liberalised to allow private sector participation. The Government of Zimbabwe must take deliberate actions that ensure variety of financing options at the disposal of the public sector to lower costs of financing public infrastructure. It is also important to fully operationalise the legislation and policies designed to facilitate the participation of the private sector in financing public sector projects. Such operationalisation entails a decentralisation of the regulations and policies to the provincial and municipal levels.

**Key Words:** Public Infrastructure, Zimbabwe, Innovative Financing, Framework, International Public sector Accounting Standards (IPSAS), Accountability, Public Sector.

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## **LIST OF ACRONYMS**

4G LTE (LTE) – Fourth Generation Long Term Evolution

ACBF- African Capacity Building Foundation

ADB- Asian Development Bank

AfDB- African Development Bank

AMCOW- African Ministers' Council on Water

ASCE- American Society of Civil Engineers

BNDES- Banco Nacional de Desenvolvimento Econômico e Social

CAAZ- Civil Aviation Authority of Zimbabwe

CAPM- Capital Asset Pricing Model

CBA- Cost Benefit Analysis

CECA- Civil Engineering Contractors Association

COVID 19- Corona Virus Disease of 2019

CSR- Corporate Social Responsibility

DBSA- Development Bank of Southern Africa

DCP- Department of Civil Protection

DFID- Department of International Development

DDF- District Development Fund

EC- European Commission

ECA- Economic Commission for Africa

Exim Bank- Export and Import Bank

EY- Ernst and Young (Ernst and Young Global Limited)

FDI- Foreign Direct Investment

G20- Group of Twenty

GDP- Gross Domestic Product

IARS- Information Asymmetry Risk Score

ICA- Infrastructure Consortium for Africa

ICTs- Information and Communication Technologies

IDBZ- Infrastructure Development Bank of Zimbabwe

IFAC- International Federation of Accountants

IPSAS- International Public Sector Accounting Standards

MCA- Multi-Criteria Appraisal

MDGs- Millennium Development Goals

MoFED- Ministry of Finance and Economic Development

NRZ- National Railways of Zimbabwe

ODA- Official Development Assistance

OECD- Organisation of Economic Cooperation and Development

OLS- Ordinary Least Squares

PAP- Priority Action Plan

PFI- Private Finance Initiative

PIDA- Programme for Infrastructure Development in Africa

POTRAZ- Postal and Telecommunications Regulatory Authority of Zimbabwe

PPP- Public Private Partnership

PRS- Project Risk Score

PSIP- Public Sector Investment Program

SADC- Southern African Development Community

SDG- Sustainable Development Goals

SIBs- Social Impact Bonds

SSA- Sub-Saharan Africa

TCRS- Transaction Costs Risk Score

UNCTAD- United Nations Conference on Trade and Development

UNDESA- United Nations Department of Economic and Social Affairs

UNECA- United Nations Economic Commission for Africa

UNECE- United Nations Economic Commission for Europe

UNEP- United Nations Environment Programme

UNDP- United Nations Development Programme

UNFPA- United Nations Fund for Population Activities

UNICEF- United Nations Children's Fund

USF- Universal Service Fund

WEF- World Economic Forum

WHO- World Health Organization

ZESA- Zimbabwe Electricity Supply Authority

ZETDC- Zimbabwe Electricity Transmission and Distribution Company

ZERA- Zimbabwe Energy Regulatory Authority

ZimFund- Zimbabwe Multi-Donor Trust Fund

ZIMREF- Zimbabwe Reconstruction Fund

ZINARA- Zimbabwe National Roads Administration

ZINWA- Zimbabwe National Water Authority

ZPC- Zimbabwe Power Company





# CHAPTER ONE

## INTRODUCTION AND BACKGROUND TO THE STUDY

### 1.1 Introduction

Investments in infrastructure consist of three fundamental components, namely funding, financing, and delivery (Ernst and Young, 2011; van der Ploeg, 2011). Funding is the generation of resources to recoup expenditure or repay financing, whilst financing refers to the upfront provision of financial resources for the development of infrastructure. Delivery, on the other hand, involves the approaches of constructing and operating such infrastructure. The study focuses on infrastructure financing, which is usually on a pay-as-you-go basis, thus applying revenues to the construction process or by borrowing (Henn, 2015). Zimbabwe has substantial financing requirements for infrastructure, yet the economy has been performing poorly. Therefore, Zimbabwe could address these infrastructure financing requirements by resorting to innovative sources of finance to complement scarce financial resources. The study assesses the main sources of finance for public infrastructure development in Zimbabwe between 1990 and 2018, with a view to developing and recommending a framework for selecting appropriate and efficient financing mechanisms.

This chapter presents a background to the problem where the public infrastructure gap is showcased, as well as the framework for the selection of public infrastructure financing. At that time, the research problem is precisely stated. Thereafter, the objectives, hypotheses and significance of the study are presented. The significance of the study shall be outlined based on the contributions observed in the background to the study where reference shall be made to the methodology and the geography of studies on how public infrastructure financing gaps may be closed. Finally, a synopsis of the chapters of the thesis is provided.

### 1.2 Background to the study

Public infrastructure is fundamental in any modern-day economy. According to Strickland (2016), it provides the means for people to move from one place to another; it buttresses commercial activities; it facilitates technological development; and it offers the necessities

with which society develops and advances. Correspondingly, the Organisation of Economic Cooperation and Development reinforces this, stating that public infrastructure is at the core of economic and social development (OECD, 2006). It provides the basics for nearly all modern-day economic activity; constitutes a major economic sector; and contributes highly to improving living standards and the quality of life (OECD, 2006).

There is an established relationship between the level of investment in public infrastructure and the level of economic productivity in a country. Aschauer (1989) observed the correlation between levels of public capital expenditure and the deterioration in productivity in countries, including Japan and the United States of America. While these inferences are controversial according to Gramlich (1994), it is apparent that the under-investment acknowledged in the paper by Aschauer (1989) has not stopped and has grown to become a major global economic challenge. Thus, the World Bank (2011) submits that nearly US\$1 trillion is required to be invested in public infrastructure in low and middle-income countries. There are different estimates for public infrastructure financing gaps, as shown in Table 1.1:

**Table 1.1: Infrastructure Financing Gaps-major studies**

<b>Institution (Authors)</b>	<b>Region</b>	<b>Infrastructure financing gap</b>
United Nations (2015)	Developing countries	US\$1trillion to US\$1.5 trillion annually
AfDB (2015)	Africa	US\$67.6 billion to US\$107.5 billion annually
ADB (2017)	Asia	US\$459 billion to US\$907 billion annually
Bhattacharya, Oppenheim, and Stern (2015)	Global	US\$5 trillion to US\$6 trillion annually.
WEF (2013)	Global	US\$3 trillion to US\$5 trillion annually

**Source:** United Nations (2015); AfDB (2015); ADB (2017); Bhattacharya, Oppenheim and Stern (2015) and WEF (2013)

Following the works of Aschauer (1989), contemporary studies indicate that the widening infrastructure gap and on-going financing deficits have negatively affected growth in the global economy and in economic productivity. Consequently, the Civil Engineering Contractors Association (CECA) notes that the UK lost 5 percent of potential Gross Domestic Product (GDP) between the years 2000 and 2010 due to considerable deficits in infrastructure (CECA, 2013). Similarly, the American Society of Civil Engineers of the USA also states that if the levels of investment in public infrastructure are not improved between 2012 and 2020, this will cost the USA economy more than US\$3 trillion in GDP and an additional US\$1 trillion in forgone total trade (ASCE, 2013). It is noteworthy that these figures could have increased with the passage of time.

Combined with the dawn of an innovative infrastructural pattern, policymakers, the public, businesses and investors face a predicament about the financing of new and/or enhanced public infrastructure and at whose cost. This led Henn (2015) to suggest that the decision about the financing instruments should not be hidden in a 'black box' which is only unveiled after the planning phase of the infrastructure investment decision has been concluded. Due to the continued challenges with public finances, conventional ways of financing public infrastructure, such as using project revenues on a 'pay-as-you-go' basis, have failed to avail the required finance to close the infrastructure gap (Henn, 2015).

Henn (2015) further notes that analysts have realised that the method of financing a project influences both the future costs of servicing the source of finance and the associated contingent liabilities borne by taxpayers. The method of financing also influences the accomplishment of projects (Henn, 2015). Moreover, economic, and fiscal crises have also led to the need to earnestly explore new and innovative models of financing public infrastructure. This has led to the evolution of a form of financing known as innovative finance for development. Innovative is a concept that has no universally agreed definition and some of the leading institutions to define innovative finance includes the World Bank, the OECD, the Rockefeller Foundation, the Leading Group on Innovative Financing for Development and the UN Department of Economic and Social Affairs.

Accordingly, the World Bank defines innovative as,

*“Innovative financing involves non-traditional applications of solidarity, public private partnerships, and catalytic mechanisms that (i) support fundraising by tapping new sources and engaging investors beyond the financial dimension of transactions, as partners and stakeholders in development; or (ii) deliver financial solutions to development problems on the ground”* (World Bank, 2009:1).

Innovative finance entails collaboration between the private sector, non-profit organisations, and governments in merging private capital with public systems in a manner that promotes the common good, that is, the achievement of public objectives whilst making money for investors (Keohane & Madsbjerg, 2016). Thus, the study focuses on the development of a framework for assessing how to finance infrastructure, including innovative finance to close the infrastructure financing gap in Zimbabwe.

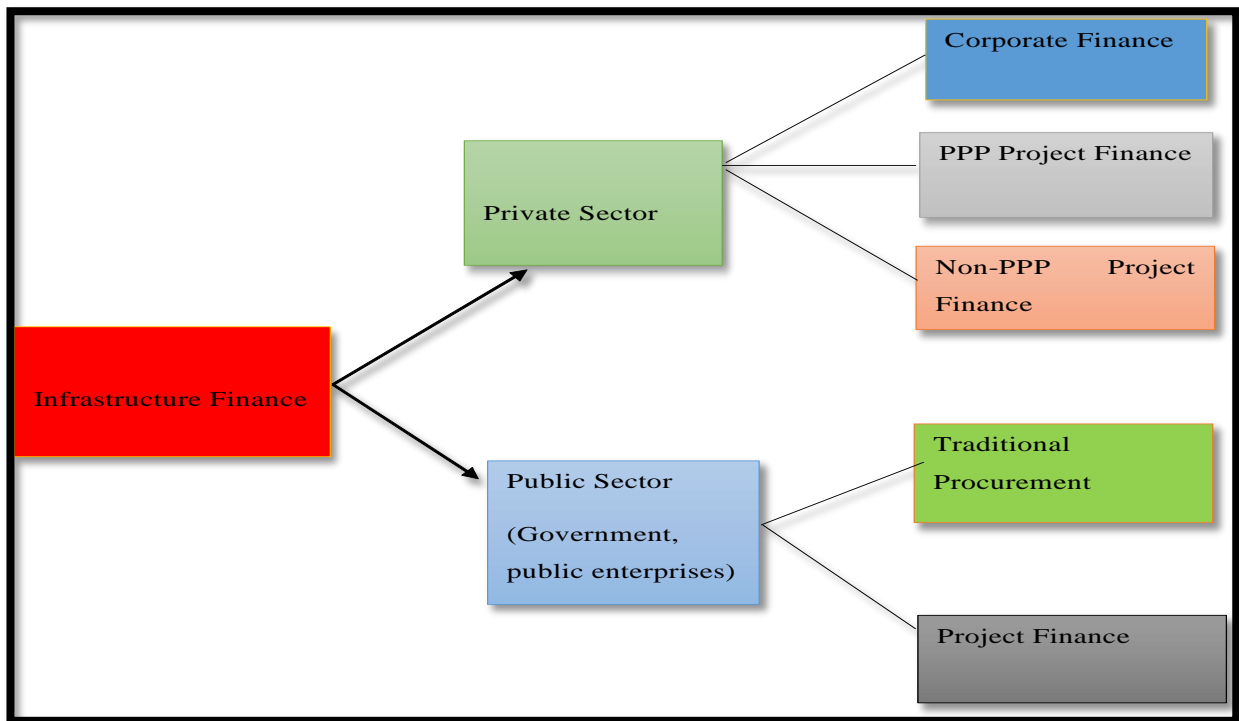
### **1.2.1 Public Infrastructure Financing**

The concept of infrastructure financing is defined by Chan, Forwood, Roper and Sayers (2009) as the actions associated with obtaining and appropriating the financial resources required to implement investments in infrastructure projects. The same authors also explain a closely related concept of funding as the source of financial resources to repay the finance used in the project, that being reliance on either user charges or taxes for the settlement of infrastructure development and operation costs, that is, principal and interest payments (Chan, et al., 2009). Infrastructure, like many assets, requires financing. Wagenvoort, de Nicola and Kappeler (2010) notes that there has been a long historical imbalance in the financing, ownership, and operation of infrastructure assets. Historically, infrastructure was financed privately during the Greek and Roman ancient empires, but this changed in the twentieth century when there was an expansion of the public sector’s role in financing and operating public infrastructure assets (Wagenvoort, et al., 2010).

However, the second half of the twentieth century saw the resurgence of private infrastructure finance and operation, as noted by Wagenvoort, et al. (2010), due to technological developments which have reduced transaction costs, greater political acceptance that users must pay for infrastructure not taxpayers, as well as fiscal constraints faced by many

governments (Välilä, Kozluk and Mehrotra, 2005 and Engel, Fuscher and Galetovic, 2010). Moreover, Gbadegesin and Aluko (2014) note that due to the prominence placed on the need for vitality in the approaches used to finance infrastructure motivated by the desire to minimise budget deficits by the government and given the ageing infrastructure, this has resulted in the resurgence of alternative financing initiatives which incorporate private sector players. The result is the provision of infrastructure finance by both private and public sectors. Figure 1.1 shows the composition of instruments for infrastructure finance by the major sources of finance:

**Figure 1.1: Components of Infrastructure Financing sources**



**Source:** (Wagenvoort, et al., 2010)

Ngowi, Pienaar, Akindele and Iwisi (2006) observe that during the prior three decades most infrastructure was controlled by the state (public sector) through the ownership of precipitously combined utilities and other infrastructure entities, whilst in cases of private ownership, it was a regulated monopoly. However, as depicted in Fig 1.1, there are now a variety of financiers taking part in public infrastructure finance. Usually, public infrastructure financing is a key determinant of the direction towards which global savings are channelled

for the long-term. The importance of public infrastructure finance has been a global subject at several forums, such as the G20 and the Asia-Pacific Economic Cooperation. Della Croce and Yermo (2013) observe that the G20, in February of 2013, created a study group entitled “Financing for Investment” which had the responsibility of exploring opportunities for the G20 to promote long-term investments and guarantee the availability of finance for infrastructure projects. The following section outlines the financing of infrastructure in developed countries.

### **1.2.2 Infrastructure financing in developed countries**

Every year, the USA spends more than US\$400 billion on public infrastructure (Shirley, 2017). This amount seems high, but this is usually not enough to meet the key maintenance requirements and has led to the deterioration of the country’s infrastructure assets (Shirley, 2017). In the United States, investment decisions that consider both the investor’s financial needs and societal concerns, known as Socially Responsible Investing (SRI), reached US\$2.15 trillion in assets, or about 10 percent of the total invested capital assets by 2008 (World Bank, 2009). In the 2017 Infrastructure Report Card, the American Society of Civil Engineers (ASCE) projected that inadequate public infrastructure spending could cost the USA almost \$4 trillion in GDP, leading to a loss of 2.5 million jobs up to 2025 (ASCE, 2017). While determining the gross infrastructure needs of the USA is a challenge, chronic under-investment has created inefficiencies in large segments of the economy (Shirley, 2017). The ASCE’s 2017 report card graded USA infrastructure at "D+" (deficient) and further estimated that the country requires a further \$2.1 trillion in investments between 2018 and 2025 to meet its needs and reduce negative impacts on the economy (ASCE, 2017).

A study by Hutchison, Squires, Adair, Berry, McGreal and Organ (2016) found that there is growth in innovative real estate infrastructure finance products used in large-scale mixed-use projects in Europe. Innovative finance is financial blending made up of primarily equity finance by domestic and foreign consortiums with access to institutional funds, together with private debt financiers, utilizing a mixture of large-scale multi-bank finance (Hutchison, et al., 2016). The OECD estimates that global average investments required for infrastructure approximates 4.2 percent of world GDP (Égert, et al., 2009). The European Union and China

devote 3.1 percent and 9 percent of their GDP respectively to infrastructure development (Égert, Kozluk and Sutherland, 2009). Both Europe and the USA experienced fiscal deficits with long-standing implications and circumstances are anticipated to worsen the financing gap for infrastructure renewal. Therefore, innovative financing proffers novel tools and mechanisms for financing public infrastructure projects that compliment established mechanisms and expand the resources available to public agencies for investment in the development of infrastructure (Annamalai & Hari, 2016). Financing of public infrastructure in developing countries is briefly discussed in the following section.

### **1.2.3 Financing infrastructure in developing countries**

The African Union's Strategic Plan for 2009-2012 identified public infrastructure as a key priority for promoting integration, socio-economic development, and cooperation on the continent (WEF, 2013). This led to the Programme for Infrastructure Development in Africa (PIDA) which obtained the approval of the African governments' leadership and heads of state during their January 2012 summit held in Addis Ababa, Ethiopia (United Nations, 2015). This indicated ultimate political support as well as ownership of the programme. PIDA therefore called for innovative models of collaborating governments, corporates as well as donors for the implementation of the 51 identified projects in the Priority Action Plan (PAP) (WEF, 2013). The collaboration amounted to innovative financing of public infrastructure.

The PAP projects and programmes included power generation and transportation, as well as water and telecommunications, requiring about US\$68 billion of capital investments between the years 2012 and 2020 (WEF, 2013). Furthermore, the Infrastructure Consortium for Africa (ICA) reports total infrastructure financing in 2016 of US\$62.5 billion from African national governments, development finance institutions, state funders in Asia as well as private sector investments (ICA, 2017). This was the lowest amount since 2012. ICA (2017) submits that this was largely a result of the decline in Chinese investments from US\$20.9 billion to US\$6.4 billion. Several African countries have used innovative finance of public infrastructure to various extents and levels of success.



Several African countries continue to face challenges in using innovative finance for closing their infrastructure requirements gaps, as noted by Badu, Edwards, Owusu-Manu, and Brown (2012) in Ghana and Mawejje and Munyambonera (2017) in Uganda. Badu, et al. (2012) observe some of the potential impediments inherent in the innovative financing of infrastructure in Ghana as including the dearth in investment capacity, implementation, and revenue mobilisation incapacities. Mawejje and Munyambonera (2017) similarly note the existence of opportunities to mobilise more resources domestically to improve efficiencies in public investments. There are also opportunities to leverage innovative external sources for financing development, such as private financing and the likelihood of using natural resource sectors (Mawejje & Munyambonera, 2017). Therefore, challenges for effectively using innovative finance are akin for many Sub-Saharan African countries, continuing to worsen their infrastructure deficits.

Further complications in infrastructure finance in Africa are due to the under-development of African (excluding South Africa) financial systems, with a dearth of diversity in financial institutions (Frankish, 2017). Due to the acute lack of long-term finance, there is an evident constriction of economic growth in infrastructure. The African Development Bank estimates that Africa requires US\$93 billion to finance infrastructure annually for the 10 years between 2010 and 2020 (Gutman, et al., 2015). Without adequate public infrastructure such as universal access to electricity, improved roads, ports and airports, Africa cannot be competitive globally. The African Development Bank further estimates that poor infrastructure curtails productivity by 40% and reduces continental economic growth by at least two percentage points annually (AfDB, 2015). However, Africa is not short of bold ambition, but resources to finance her infrastructure ambitions.

#### **1.2.4 Highlights of Infrastructure Financing Gaps**

Infrastructure is fundamental for both the development and growth of economies as it is a significant factor of production which influences the productivity of other factors (Brown, et al., 2015). In addition to the infrastructure financing gaps noted in Table 1.2, the following regional gaps are shown in several studies:

**Table 1.2: Regional Infrastructure Financing Gaps**

<b>Author(s)</b>	<b>Region</b>	<b>Infrastructure financing gap (2010-2020)</b>
Gutman, et al. (2015)	Sub-Saharan Africa	US\$93 billion per annum
Estache, et al. (2013)	Middle East and North Africa	US\$106 billion per annum
Whitefield (2014)	Latin America	US\$170 billion per annum
Bhattacharyay, (2010)	Asia	US\$750 billion per annum

**Source:** (Gutman, et al., 2015; Estache, et al., 2013; Whitefield, 2014 and Bhattacharyay, 2010)

It is apparent from the gaps showcased in Table 1.2 that infrastructure financing gaps are insatiable from government/public sector sources of finance as there are requirements for new infrastructure, as well as for the operation and maintenance of existing infrastructure (Fay & Yepes, 2003). However, since the study focuses on Zimbabwe, the next section disinters the infrastructure financing situation within the study context, the Zimbabwean context.

### **1.2.5 Zimbabwe’s infrastructure financing requirements**

Zimbabwe’s National budget in 2016 allocated US\$315 million (about 2.1 percent of national GDP) towards infrastructure development. This amount was earmarked to be invested in power supply (energy), transport and communication, water and sanitation (dam construction, rehabilitation and upgrading), roads as well as information technology (MoFED, 2016). However, the Government of Zimbabwe indicated that US\$2.7 billion was required to finance the development of infrastructure in 2016 and there was an expectation for the private sector to play an important role in fulfilling these financing requirements. Thus, the financing gap was about US\$2.4 billion (MoFED, 2016). In terms of the overall quality of infrastructure, Zimbabwe ranked 129 out of 141 countries globally in 2019, which was a further decline from 121 out of 140 in 2015 (WEF, 2017). Selected rankings in infrastructure-related indicators for the years 2010, 2015 and 2019 are summarised in Table 1.3:

**Table 1.3: Zimbabwe’s Infrastructure rankings by the World Economic Forum**

<b>Indicator</b>	<b>Rank/139</b>	<b>Rank/140</b>	<b>Rank/141</b>
Year	2010	2015	2019
Overall quality of infrastructure	116	121	129
Quality of roads	94	98	122
Internet users (% of adult population)	99	102	115
Mobile telephone subscriptions/100 pop	134	115	114
Quality of air transport infrastructure	99	115	123
Overall ICT adoption	133	104	112
Quality of electricity supply	130	132	104

**Source: World Economic Forum (2010, 2015, 2019)**

As shown in Table 1.3, the quality of railroad infrastructure was the highest ranked in 2010, but significantly deteriorated to become one of the least ranked in 2019, second after quality of air transport infrastructure/connectivity (WEF, 2019). Considering the poor rankings above, this could be pointing to the existence of huge infrastructure financing gaps, across all economic infrastructure sectors. The AfDB (2011) estimated that about US\$14.2 billion is required to close Zimbabwe’s infrastructure gap between 2010 and 2020. The Infrastructure Development Bank of Zimbabwe indicates the breakdown of the US\$14.2 billion as transport (\$5.6 billion), power generation (\$4.3 billion), water supply and sanitation (\$4.2 billion) and Information Communication Technology (\$0.1 billion) (IDBZ, 2016). For the two decades from 2012 to 2032, the AfDB (2011) estimates the infrastructure gap to require US\$40 billion.

Against this background, the Government of Zimbabwe has been allocating minimal resources for infrastructure development, with approximately 11% of the national budget (\$156.9 million for 2017) being allocated for capital development (MoFED, 2018). The 2018 national budget statement stated that US\$1.7 billion was to be expended towards public infrastructure, yet government budget appropriations amounted to US\$492.2 million (MoFED, 2018).

### **1.3 Problem Statement**

Financing public infrastructure is a global challenge where demand is estimated at approximately US\$4 trillion annually, with a financing deficit of at least \$1 trillion yearly (WEF, 2016). For Sub-Saharan Africa, the estimated infrastructure financing gap between 2010 and 2020 was US\$93 billion every year (Gutman, et al., 2015). As noted by the African Development Bank, US\$40 billion is needed to close Zimbabwe's infrastructure gap between the years 2012 and 2032 (AfDB, 2011). Given the outlined financing gap, the Government of Zimbabwe heavily relied on Official Development Assistance (ODA) support for non-wage spending in social sectors, which in 2015 contributed US\$712.53 million whilst capital budget allocations averaged US\$442.11 million (UNICEF, 2016). Given the US\$40 billion financing requirement highlighted by AfDB (2011) over the two-decade period (2012 to 2032), Zimbabwe is expected to invest at least US\$2 billion annually into public infrastructure. The government can only budget for 22% of this amount (UNICEF, 2016), thus leaving a financing gap (deficit) of US\$1.56 billion annually.

Where the fiscal space for public infrastructure financing is constrained, Badu et al. (2012) note that innovative financing can be used to support public sector entities in improving their cash flow, increasing their revenue, improving accountability and economic sustainability as well as several other policy objectives, a view supported by several authors (Ploeg and Casey, 2006; Ploeg and Casey, 2008; Mor and Sehrawat, 2006; Nichol, 2007; Slone, 2009 and Moszoro, et al., 2015). Accordingly, the Government of Zimbabwe, local authorities (municipalities and councils) and parastatals deployed several innovative finance instruments for their infrastructure projects. Some of the innovative financing mechanisms used include taxes and levies such as the AIDS levy, carbon tax, road toll fees, health levy and presumptive taxes for informal businesses (Zhou and Chilunjika, 2013; Bhat, et al., 2016 and MoFED, 2016).

Whilst the Government of Zimbabwe has also financed public infrastructure such as roads through public private partnerships (PPPs), the use of other innovative mechanisms such as crowdfunding, diaspora remittances and diaspora bonds has not been empirically evaluated and the contributions of innovative finance to finance public infrastructure in Zimbabwe is

elusive (Dube & Chigumira, 2010). Given the public infrastructure financing gap and the resource constraints exhibited, it is imperative to assess the contributions of innovative finance towards financing public infrastructure in Zimbabwe. Thus, there is need for a framework to use when deciding on the appropriateness and efficiency of financing mechanism for public infrastructure. Consequently, the absence of a suitable framework for infrastructure financing leads to the inefficient deployment of public funds in the development and management of public infrastructure. The thesis answers the questions presented hereunder.

#### **1.4 Research Questions**

In view of the foregoing discussion, the following research questions emerge:

- a) What are the major sources of public infrastructure financing in Zimbabwe?
- b) To what extent has the Government of Zimbabwe contributed finances for public infrastructure requirements?
- c) Which innovative finance mechanisms are used to finance public infrastructure in Zimbabwe?
- d) What is the role of public sector accounting in financing of public infrastructure?
- e) How have public infrastructure financing decisions been evaluated?

The objectives to address these questions are presented below.

#### **1.5 Objectives of the study**

The study aims to identify the crucial mechanisms, assess their efficiencies, and recommend a conceptual framework for selecting options to finance public infrastructure in Zimbabwe.

Specific objectives of the study are:

- a) To determine the main sources of public infrastructure financing in Zimbabwe,
- b) To establish innovative finance's role in public infrastructure financing in Zimbabwe,
- c) To assess the role played by public sector accounting in attracting appropriate and efficient mechanisms to finance public infrastructure in Zimbabwe, and
- d) To develop and recommend a framework for selecting suitable and efficient mechanisms to finance public infrastructure in Zimbabwe.

## **1.6 Significance of the study**

This study, which seeks to explore how decisions to finance public infrastructure in Zimbabwe are taken and ascertain the effectiveness of these financing decisions, aims to contribute towards a better understanding of the public infrastructure financing process and, in so doing, seeks to address a series of gaps in extant literature. Moreover, the study will uncover the role(s) played by public sector accountants in the consideration of the various financing mechanism for public infrastructure. Further contributions of the study are presented below.

- a) There is huge debate on the role of the private sector in financing public infrastructure. Some traditionalists believe that the private sector should not finance public goods or services (infrastructure) as they have an objective to maximise profits, even at the expense of poor citizens (Calitz and Fourie, 2010; Fay and Morrison, 2005). Yet the government does not have the capacity to meet all the infrastructure requirements. The study therefore develops and recommends a framework for financing public infrastructure, recognisable in public sector budgets. Insofar as the researcher attempted to establish the existence of such a framework in current use in public infrastructure financing in Zimbabwe, the search was futile.
- b) The research is expected to develop a better understanding and draw lessons from regional and international experiences on the use of various forms of innovative finance in closing the infrastructure financing gap (Badu, et al., 2012; Gutman, et al., 2015; Hutchison, et al., 2016 and Mawejje and Munyambonera, 2017). The result is to promote the effective use of innovative finance by the Government of Zimbabwe and other public entities such as municipalities and parastatal entities to address infrastructure requirements where there are fiscal constraints to financing public infrastructure.
- c) Infrastructure stock is directly affected by the financing available and therefore innovative finance has become a major source of finance for the expansion and maintenance of infrastructure (Estache, 2012), which depends on financial sector development levels (Frankish, 2017). Preliminary searches by the author came across isolated and uncomprehensive literature on the use of innovative finance in Zimbabwe in general and particularly to financing infrastructure development by the public sector. The study therefore endeavours to fill the gap in literature about the role of

innovative finance in closing infrastructure financing gaps in developing countries, focusing on Zimbabwe.

- d) The demand for public infrastructure and services provision and regeneration has been growing over the years, resulting in unsustainably straining public resources, which has in turn resulted in the need for the participation of the private sector to a greater extent. However, the success of privately financed projects depends on the financing package's structure (Moyo, 2009; UNCTAD, 2008; and Foster, et al., 2008). Given the dearth of capacity for national budgetary resources to finance public infrastructure, there is need to consider innovative finance as a complementary or supplementary source of public sector financial resources.
- e) Most of the research on innovative finance has been undertaken by body corporates, including donor agencies and development agencies such as the UN, UNECA, UNDP, IMF, and others. The studies are mostly working papers and/or position papers and this study evaluates the contributions of several innovative finance mechanisms in a developing world set-up in addressing infrastructure requirements. Thus, the results of this empirical study have implications for other developing countries in terms of the best deployment of innovative finance to close their infrastructure financing gaps.
- f) International public sector accounting standards, including the Conceptual Framework for General Purpose Financial Reporting by Public Sector Entities, clearly outlines the role of financial reports, which are a major source of information when making economic decisions. This has resulted in private sector accountants playing a pronounced role in both financial reporting and managerial accounting, but the roles of accountants in supporting the financing of public capital projects and investments is not clear. The study will contribute to the clarification of the roles that public sector accountants in Zimbabwe should play to facilitate public entities closing public infrastructure financing gaps.

### **1.7 Layout of the thesis**

The thesis is organised as follows: Chapter 1 introduces the entire study by providing information on the overview of the study. Chapter 2 showcases the current state of public infrastructure against the national demand for purposes of clearly showing the gap between

the supply and demand of economic infrastructure. Chapter 3 illustrates the trends in infrastructure finance success stories, from the global and regional perspectives as well as the history of infrastructure finance in Zimbabwe. Chapter 4 reviews the theories underpinning the financing of public infrastructure from various perspectives, including the public sector, private sector as well as innovative financing instruments. Chapter 5 provides evidence from literature on how infrastructure has been financed from the public sector as well as from the private sector, or combinations of the two. The review of the related theoretical and empirical literature is done in this chapter. Chapter 6 presents the methodology used in this research. Results of the study are presented in Chapters 7 to 10, with each chapter focusing on results for each of the four objectives of the study. Lastly, Chapter 11 sums up the study by linking various components of the study and providing the conclusions and recommendations to policymakers on the framework useful for making decisions for public infrastructure financing.

### **1.8 Chapter Summary**

The chapter articulated the challenge of public infrastructure financing with supporting statistics of the total global requirements, regional and national requirements for Zimbabwe. There is however no consensus on the total financing requirements to close the public infrastructure financing requirements globally, with the World Economic Forum estimating that total financing requirements are between US\$3 trillion and US\$5 trillion globally (WEF, 2013). Low-to-middle income countries, on the other hand, require US\$1 trillion to cover gaps in public infrastructure requirements.

Specifically, Zimbabwe has annual financing shortfalls for public infrastructure amounting to US\$2.4 billion in relation to the infrastructure requirements estimated by the African Development Bank of about US\$40 billion for the two decades from 2012 to 2032 (AfDB, 2011). Evidence shows that Zimbabwe on average can provide for an average of 22% of the requirements, leaving a gap of nearly 78% to be financed by official development assistance and private sector investments. However, the selection of the financing mechanism appears to have no framework in place to guide the selection of the source of finance.



The chapter has therefore outlined the background to the study and presented the problem under study. Further to that, the objectives of the study have been outlined, as well as the hypotheses. The significance of the study has also been presented after the literature survey. There appears to be no framework in place to assess and evaluate the financing of public infrastructure projects. Therefore, the study contributes to the Zimbabwean context on the establishment of a framework for assessing instruments for financing public infrastructure. The following chapter presents the prevailing situation in the public infrastructure in Zimbabwe, particularly focusing on economic infrastructure, that is, transport, energy/power, information communication technologies (ICTs), as well as water and sanitation.

## CHAPTER TWO

### OVERVIEW OF THE STATE OF ZIMBABWE'S PUBLIC INFRASTRUCTURE

#### 2.1 Introduction

The chapter showcases an overview of the state of public infrastructure in Zimbabwe. Showcasing the status of public infrastructure in Zimbabwe helps substantiating the case for the existence of a need for investing into public infrastructure hence the need for developing a framework for making the financing decision. As guided by literature, the major types of infrastructure showcased are classified as economic infrastructure and includes transport, information communication technology, energy, water and sanitation. The other types of public infrastructure that have not been incorporated in most empirical studies since they are regarded to be social are education and health. The chapter presents the current capacity against the desired levels of infrastructure, thus showcasing the gap in terms of demand against current installed capacity. To contextualise the gap, a comparison is made with other countries in Sub-Saharan Africa to show the relative expanse of the gap and how Zimbabwe compares.

The chapter is structured to firstly define and classify infrastructure to contextualise this study which focuses on infrastructure classified as economic infrastructure. The chapter also highlights the state of the four infrastructure sectors classified as economic infrastructure, that is, transport, water and sanitation, information and communication technology, as well as energy/electricity. Each of the infrastructure sectors and subsectors are compared with the sub-Saharan African (SSA) region to see how comparable Zimbabwe is in relation to other countries in the SSA region.

#### 2.2 Definition of Infrastructure

Infrastructure is a widely discussed subject in both theoretical and empirical literature. Despite this wide discussion, there is still no universally accepted definition of what infrastructure is. For Hirschman, infrastructure is very broad and includes:

*“all public services from law and order through education and public health to transportation, communications, power and water supply as well as agricultural overhead capital such as irrigation and drainage systems” (Hirschman, 1958:58).*

The World Bank’s World Development Report on infrastructure defines infrastructure more broadly as:

*“An umbrella term for many activities referred to as ‘social overhead capital’, but also qualifies this definition by adding that infrastructure encompasses activities that share technical features, such as economies of scale and economic features, for instance spill overs” (World Bank, 1994:2).*

Some scholars attempted distinguishing the key universal characteristics of infrastructure and came up with the following features (Fourie, 2006; Baldwin and Dixon, 2008):

- It requires huge and intensive capital outlays for construction and has varied degrees of monopolistic features depending on its type since market power generates economies of scale.
- It requires long-term, lasting, and irretrievable investments.
- The Infrastructure facilities constructed do not have substitutes in the immediate and medium-term timelines; and
- Infrastructure is to some extent regarded as public goods, leading to some types of infrastructure being non-excludable and non-rivalry in their use. On the other hand, the development and use of infrastructure facilities creates some undesirable outcomes which include pollution to the environment as well as the displacement of some people.

Given the characteristics of infrastructure, literature further distinguishes between two categories of infrastructure, namely economic and social infrastructure (Fourie, 2006; Baldwin and Dixon, 2008). The first type of infrastructure is economic infrastructure which refers to those facilities used to promote economic activities that sustain other factors of production and includes facilities such as telecommunication, transport, power, as well as water and sanitation (Fourie, 2006; Baldwin and Dixon, 2008). The second type of infrastructure is social infrastructure which refers to those amenities that promote social

objectives and includes hospitals, schools, museums, libraries, and amusement parks (Fourie, 2006; Baldwin and Dixon, 2008). There is a possible overlap between these two infrastructure types since some infrastructure is not clearly differentiated as being established either for economic or social purposes. An example of such infrastructure is water and sanitation, which serves both economic and social purposes (Fourie, 2006; Baldwin and Dixon, 2008).

It can be argued that the key feature of infrastructure is its assorted and highly disputed nature. Weber and Alfen (2010) note that the term infrastructure, when initially used, described ‘military assets’ including caserns and airfields, amongst many others. As time passed, there has been an evolution of this category of infrastructure and its meaning has also been stretched and been categorised to include a wide variety of diverse notions. These categories of infrastructure evolved to now include ‘hard infrastructure’, which was later branded ‘economic infrastructure’ and includes facilities such as power supply, digital communication, transport facilities, flood protection, as well as water and waste management services (HM Treasury, 2010; Strickland, 2016). There is also ‘soft infrastructure’, now known as ‘social infrastructure’, which includes structures supporting cohesion in the community as well as the advancement of society, including such services as police services, education, health facilities and legal services (Strickland, 2016 and Vickerman, 1990). Marshall (2013) also adds a third category called ‘green infrastructure’, which is meant to sustain and care for the natural environment.

Strickland (2016) notes that from the neoclassical economic perspective, there has been preference in the usage of the terms ‘public good’ or ‘collective consumption good’ for infrastructure, as highlighted by Samuelson (1954). The implication is that infrastructure is defined as the public capital outlays made by governments to address market failures. This view further asserts that infrastructure investments create natural monopolies (O’Neill, 2010; Sharkey, 1982). Moreover, the key features of the consumption of infrastructure are that there is no competition, and no user can be segregated and be excluded (Deneulin & Townsend, 2007). However, there has been some extrication of these natural monopolies through processes such as privatisation and financialization, as noted by Graham and Marvin (2001). This has resulted in the neoclassical economic perspective of infrastructure becoming

progressively more outmoded. The contemporary view cannot exclusively typify infrastructure as being a public good excepted from suffering competition (Strickland, 2016). These developments, nonetheless, do not override the view that infrastructure investments are a 'sunk cost' as originally observed by Clark and Wrigley (1995), as well as requirements for huge capital outlays as noted by the Organisation for Economic Co-operation and Development (OECD, 2012). These notions remain very relevant in the evolution of the definition of infrastructure.

Lately, there has been a development of a multiplicity of meanings for infrastructure, which are fashioned by a boundless network of discussions and views. Strickland (2016) observes that some define infrastructure through its physical manifestations. As a result, the meaning of infrastructure includes: "roads; gas and electricity supply; water supply; drainage and sewer systems; bridges; harbours and river transportation systems; slaughterhouses; irrigation systems; and marketplaces" (Hansen, 1965). Additionally, others define infrastructure in terms of its function and the services it renders, e.g., infrastructure is "an enabler of the supply chains and divisions of labour needed for expanding markets" (O'Neill, 2013). This perspective conforms to both the neoclassical growth model and the Marxist view (Strickland, 2016). The neoclassical view advocates that infrastructure's major role is the maximisation of productivity, as submitted by Arrow and Kurz (1970). On the other hand, the Marxist view construes infrastructure to be a facilitator of production, consumption, capital accumulation as well as resolving 'over accumulation', since it helps in the absorption of surpluses in capital and labour through temporal displacement in times of crises (Harvey, 1985).

Strickland (2016) further notes that another perspective to understanding infrastructure can be in terms of its ability to be transferred across diverse categories, as well as its capacity to surpass both the material and abstract worlds. For example, instead of defining infrastructure by its physical materialization, infrastructure can as an alternative be defined to be a financial asset or security. As noted by Solomon (2009), infrastructure could be recognised as financial security signifying a premium investment for a continuing orientation to the generation of constant income and returns with potential to relatively increase in a way not correlated to stock markets and/or fluctuations in the business cycles but at the same time directly related

to changes in inflation. Thus, Strickland (2016) summarises infrastructure in present-day economies as having the characteristics of: tradability, exchangeability, fungibility, as well as liquidity.

Therefore, instead of attempting to define infrastructure as a distinctive concept or form, it is better to define infrastructure based on relational features: that is, the perspective that infrastructure is a component of an arrangement or structure wherein one part of the infrastructure is unable to independently exist without the other/s:

*“infrastructure is the physical assets and processes of the inter-related systems that provide the resources and services essential to sustain or enhance economic growth and quality of life at a range of scales”* (Strickland, 2016).

Besides the above definition by Strickland (2016), several other scholars and corporate authors have also defined infrastructure, thereby highlighting certain key features of infrastructure which either concur with, buttress, or expound on the earlier definitions. A few other definitions are Ernst and Young (2015) view infrastructure as being made up of roads, airports, railways, power generation plants and transmission grids, ports, communication facilities, water and waste, together with social infrastructure, such as hospitals, schools and housing.

The same view of infrastructure is given by Inderst (2010) , who expounds upon the definition for infrastructure by outlining that it is an investment that characteristically comprises both economic and social infrastructure and provides a comprehensive list of what makes up economic and social infrastructure (Inderst, 2010). Similar sentiments on the classification of infrastructure into economic and social infrastructure are given by Chen and Bartle (2017). Therefore, there is convergence on the classification of infrastructure into economic and social infrastructure (Chen and Bartle, 2017; Inderst, 2010; Council of Economic Advisers, 2016; Ernst and Young, 2015; HM Treasury, 2010; Fourie, 2006; Baldwin and Dixon, 2008; Otto and Voss, 1994; Strickland, 2016).

Given the popularity of the economic-social classification of infrastructure more than other classifications over time, this study adopts this classification of infrastructure. From the two categories of infrastructure, this study focuses on economic infrastructure only. Specifically, the classification of infrastructure in this study follows the priorities of the Program for Infrastructure Development in Africa (PIDA) (PIDA, 2017). This includes the following infrastructure types: transport (air, maritime, rail, and road), information and communication technologies (ICTs), power generation and distribution, as well as water and sanitation (PIDA, 2017). The focus of the study is on closing the national infrastructure financing gap for Zimbabwe.

The study addresses infrastructure financing issues and it is therefore imperative to understand the assortment of factors likely to shape the funding and financing of infrastructure in a modern-day global economy. This is particularly so because infrastructure has been defined as including a multifaceted organised system of systems. Given the diversity of disciplines and perspectives of infrastructure discussed above, this study summarises the definition of infrastructure to interconnected physical elements that require huge amounts of capital outlay with many flexible meanings and forms meant to facilitate the growth of economic activities and the development of capital. The definition of infrastructure has been given, but it is equally important for the study to provide a definition of infrastructure in the context of public infrastructure since that is the focus of the study.

### **2.3 Classification of infrastructure**

This study focuses on the development of a financing decision-making framework for economic infrastructure. It is therefore imperative that after defining and outlining the key features of infrastructure to locate economic infrastructure from the literature perspective. Thus, other classifications are given and the reason for focusing on economic infrastructure given. The definition of infrastructure also clearly results in the need to clearly demarcate the classification of infrastructure as provided in literature. Several authors have classified infrastructure differently. In the diversities of the classification, there is some convergence in the classifications. The following scholars have classified infrastructure: Buhr (2003), Buchner et al. (2008), Torrisi (2009), Inderst (2010), Ernst and Young (2015) and Chotia

(2017), amongst many others. The various classifications of infrastructure are presented hereunder, which include the personal, institutional and material classification, economic vs social infrastructure, core vs non-core classification as well as the network vs nucleus infrastructure classifications.

### **2.3.1 Personal, institutional, and material infrastructure**

Jochimsen (1966) classifies and distinguishes between three classes of infrastructure, namely personal, institutional, and material infrastructure. In the distinction, personal infrastructure is construed as representing “the number and qualities of people in the market economy characterized by the division of labour with reference to their abilities to contribute to increase the level and degree of integration of economic activities” (Jochimsen, 1966). An example of personal infrastructure is human capital, which refers to the technical know-how, expertise, abilities, and other features personified in people that buttress the formation of welfare for individuals socially and economically (Healy and Cote, 2001).

Similarly, institutional infrastructure refers to the structures which guide economic agents to articulate their economic plans and their subsequent implementation in collaboration with others (Jochimsen, 1966). Thus, institutional infrastructure can be viewed as the real execution of the models on the institutional foundation of the market economy (Buhr, 2003). Material infrastructure on the other hand provides an economic arrangement categorised by two main qualities, namely fulfilment of economic and social needs, as well as large-scale production. Fulfilment of economic needs highlights the achievement of fundamental needs for human life. Based on this inference, material infrastructure could be re-defined as entailing goods and services with the ability to satiate the human physical and social needs of economic agents. An example of material infrastructure is the satisfaction of a need for drinking water that is available in a reservoir, which is the material infrastructure.

### **2.3.2 Economic and Social infrastructure**

A study by Hansen (1965) resulted in the distinction and/or division of infrastructure into two prime categories: economic and social infrastructure. From Hansen’s (1965) viewpoint, infrastructure is named as local public Overhead Capital (OC), which is then divided into



“Social Overhead Capital (SOC)” and “Economic Overhead Capital (EOC)”. Accordingly, EOC encompasses all items or sectors which support the productive activities and move the economic goods directly. On the other hand, SOC sectors or items may also increase productivity, but they do so in an indirect manner when compared to EOC and hence come under the category of SOC. Thus, economic infrastructure directly advocates for productive economic activities and consists of road highways, airports, marine transport, fuel supply networks, sewerage networks, electricity supply networks, networks for water distribution, aqueducts, irrigation plants and structures and many others. On the other hand, Social infrastructure refers to those sectors which are basically established to aid in social comfort and security and to increase economic productivity. SOC on the other hand entails hospitals, schools, sport facilities, green fields, public safety facilities, waste disposal plants and others (Hansen, 1965).

### **2.3.3 Core and non-core infrastructure**

This classification includes the core infrastructure which comprises public transport, highway roads, airports, electricity, and fuel (power supply) networks, water supply and sewerage networks (Aschauer 1989). On the other hand, not-core infrastructure refers to the remaining components (Aschauer, 1989). A similar categorization is employed by Mastromarco and Woitek (2006) who also separate public capital into core and non-core components. The same principles are applied by Sturm, Jacobs, and Groote (1995) in their research when they distinguished and classified infrastructure into basic and complementary. The basic category of infrastructure comprises railways, roads, canals, harbours and docks, and many others; whilst complementary infrastructure refers to light railways, tramways, fuel, electricity, water supply and local telephone networks (Sturm, et al., 1995).

### **2.3.4 Network and nucleus infrastructure**

Another classification is given by Biehl (1991) who classified infrastructure into network infrastructure and nucleus infrastructure. Network infrastructure, as the name suggests, is comprised of road networks, railway networks, communication system networks, power, and water supply networks (Biehl, 1991). Biehl (1991) distinguishes network infrastructure as being those sectors whose use is only possible in the territories in which the infrastructure is

present and there is a sense of mobility. Whilst on the other hand, nucleus infrastructure includes schools, hospitals, and museums, which are relatively described by a certain degree of immobility, indivisibility, non-interchangeability, and similar kinds of features.

This study adopts the economic versus social classification of infrastructure, which was conceptualised by Hansen (1965) and further refined by other scholars such as Fourie (2006), Baldwin and Dixon (2008), Inderst (2010) and Ernst and Young (2015). However, this study focuses on the infrastructure classified as economic infrastructure only. The focus on economic infrastructure is motivated by the need to be in synchronicity with the national vision of Zimbabwe of becoming an upper middle-income economy by 2030 (AfDB, 2019). This vision can be achieved if there are enablers in place for economic growth, and economic infrastructure is one such enabler (WEF, 2019).

After having clearly contextualised the classification of infrastructure adopted for the study, it is important to review literature that assesses the state of economic infrastructure in Zimbabwe. The following sections present the state of economic infrastructure in Zimbabwe to clearly delineate the gap for the study. The state of the economic infrastructure is reviewed on a sector-by-sector basis. It is noted that there are no recent statistics on the state of the economic infrastructure due to a dearth in research on the subject.

#### **2.4 State of Transport infrastructure in Zimbabwe**

Transport is a requisite component of any country's infrastructure stock necessary for countries to develop both economically and socially (Osei-Kyei & Chan, 2016). Transport infrastructure opens a country's economic activities and trade to actors within the country and across the borders. Thus, transport facilitates the movement of goods and people, which are the agents of economic activity and growth. Transport infrastructure simplifies accessibility to local, regional and international markets. Zimbabwe is positioned strategically as a gateway to the Southern African Development Community's (SADC) regional markets. Zimbabwe is a landlocked country whose transport sector, according to the AfDB (2019), is made up of roads, railway lines and airports/strips, with limited to no use of inland water transport. There are both private and public players in the provision of transport infrastructure in Zimbabwe,

but the major player is the government and other public enterprises, state enterprises and parastatal entities, collectively called the public sector.

#### 2.4.1 Road Transport

The total classified road network in Zimbabwe is about 88 100 kilometres, of which 19.8% is paved and 5% is classified as primary (AfDB, 2011; Doran, 2009). The comprehensive breakdown of the road network is shown in Table 2.1:

**Table 2.1: Road Network breakdown for Zimbabwe**

Road Type	Road Length	Percentage
State Roads	18,500 km	21%
Urban Roads	8,200 km	9.3%
Rural district council tertiary roads	36,400 km	41.3%
District Development Fund (DDF) tertiary roads	25,000 km	28.4%
Total	88,100 km	100%

**Source:** Department of Roads (2016)

Further analysis of Zimbabwe’s road network shows that 2 235 kilometres were classified as primary roads, 12 474 kilometres were secondary roads, 8 200 km are roads in urban areas, 62 923 km are classified as tertiary roads (Department of Roads, 2016).

In terms of road density, Zimbabwe ranks relatively well in comparison to her neighbours with a total road density of 100 kilometres per 1000 square kilometres (km<sup>2</sup>), which is almost double that of Zambia and triple that of Mozambique (Pushak & Briceño-Garmendia, 2011). Zimbabwe’s road density of 0.23 km per km<sup>2</sup> is observed by the African Development Bank (2011) as being relatively better than most developing countries and comparable to road densities for lower middle-income countries and high-income countries which are not part of the OECD. The relatively high road density has also translated into a comparatively high rural accessibility index of 46 percent, a figure which is above the regional averages (Pushak & Briceño-Garmendia, 2011). Zimbabwe’s rural accessibility index almost doubles the indices for most of the neighbouring countries. A pictorial depiction of Zimbabwe’s road network is provided in Figure 2.1:

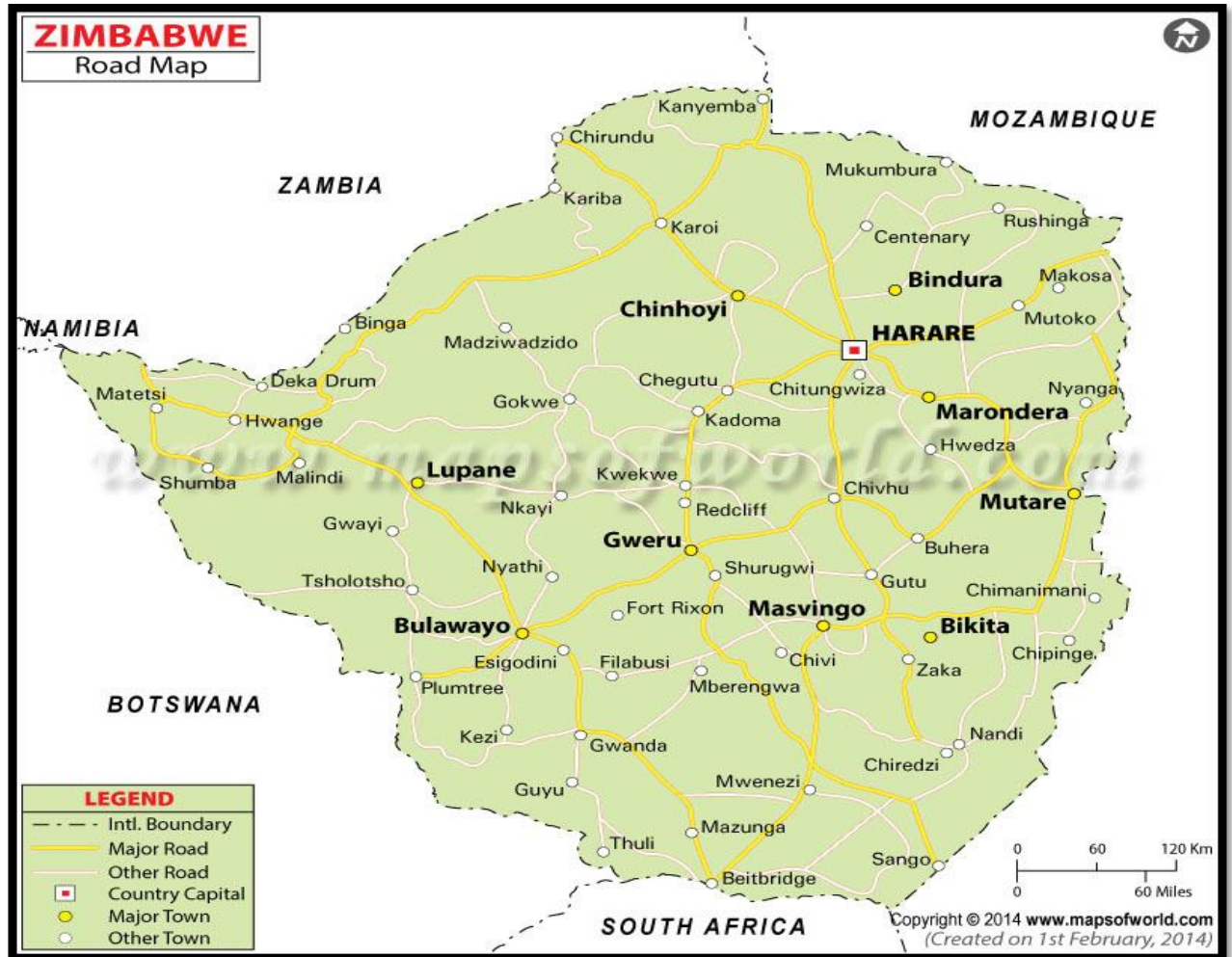


Figure 2.1: Zimbabwe’s Road network (Source: [www.mapsofworld.com](http://www.mapsofworld.com))

Most of Zimbabwe’s road network as depicted by Figure 2.1 is made up of other roads. Roads classified as major roads in Figure 2.1 represents primary roads and regional corridors. When isolated from the entire country’s road network, it does not depict an extensive interconnectivity of Zimbabwe. Figure 2.2 below isolates the major roads from the rest of the road network.



Figure 2.2: Major roads in Zimbabwe (Source: [www.mapsofworld.com](http://www.mapsofworld.com))

Figure 2.2 shows a Zimbabwe which is not connected, and which can be viewed to be inaccessible. This shows the potential for improvement and hence the need to develop the secondary and tertiary roads into prime roads. This requires financing and hence the motivation for this study.

The state of Zimbabwe’s road network is not precisely well-known, but during the 1980s and the early 1990s, the road network in Zimbabwe ranked amongst the best in Africa, which significantly contributed towards the economic growth realised in the country (AfDB, 2011). Its maintenance was because of intensive research, good experience and the availability of expertise in Zimbabwe. Generally, paved trunk roads in Zimbabwe managed by the

Department of Roads in the Ministry of Transport and Infrastructure development were maintained in good working order during the decade between 1995 and 2005. The state of primary roads was maintained well, with a slight decline of 10% from 90% to 80% being rated as good. By 2005, the World Bank (2006) reported that only 24% of the entire network was rated as good, whilst 40% were ranked as poor. Moreover, secondary unpaved roads had depreciated the most, with 55% being regarded as poor. The AfDB (2011) also notes that nearly 70% of the road network was regarded to be poor in 2010, up from 40% in 1999 and 24% in 1994.

**Table 2.2: Estimated Nature of Zimbabwe’s roads by the Department of Roads in 2016**

Nature of Roads	Road Management Authority				Total	
	Department of roads	Urban Councils	Rural District Councils	District Development Fund	KM	%
Paved roads (km)	8,900	8,164	356	-	17,420	19.8
Gravelled (km)	7,577	26	33,988	21,500	63,091	71.6
Earth (km)	1,985	4	2,133	3,500	7,622	8.6
Total	18,462	8,194	36,477	25,000	88,133	100

**Source:** (Department of Roads, 2016)

As shown in Table 2.2, most of the roads were gravelled (71.65%), which makes the roads prone to the vagaries of the weather and could easily be affected by natural disasters such as cyclone Idai which made some parts along Zimbabwe’s border inaccessible (IFRC, 2020). Only 19.8 percent of Zimbabwe’s road network was paved in 2016 as reported by the Ministry of Transport and Infrastructure Development’s Department of Roads (Department of Roads, 2016). However, a literature search by the author found that no national evaluation of the roads was done since the World Bank’s Zimbabwe Road Condition Survey done in 2010. Therefore, the state of the entire road network could have deteriorated further after these observations. There were also disasters such as cyclone Idai which damaged roads (IFRC, 2020). There has been no published state of the road network, yet Zimbabwe’s major mode of transport is road.

The deterioration of local and central government revenue sources since the early 2000s suffocated the source of finance for routine maintenance of the road network. The World Bank's Zimbabwe Road Condition Survey (2010) corroborated the status of the road network and reported a further deterioration, with only 14% of the road network being regarded as good, whilst 34% of the total classified roads were regarded as fair. The World Bank's Zimbabwe Road Condition Survey (2010) further alludes that the state of paved roads was relatively better than gravelled and earthen roads, with more than 50% of the paved roads being classified as poor. By 2009, the entire classified road network required refurbishments which the Government of Zimbabwe estimated would require not less than US\$2.9 billion (World Bank's Zimbabwe Road Condition Survey, 2010).

Furthermore, Zimbabwe's road network requires an upgrade to modernity as well as expansion to cater for increased traffic and transport demands. In terms of road traffic growth, the Central Vehicle Registry (2009) reported a total of 828,395 registered motorcycles and vehicles. However, due to vehicle registration database deficiencies, information regarding the increase in the total vehicle fleet is not available. Accordingly, the fleet is forecast to grow to about 1.6 million vehicles by 2020. The growth in the fleet requires a corresponding investment in the expansion of road networks, as well as the repair and maintenance of the existing road infrastructure. The AfDB (2019) notes the unavailability of resources for such expansion and maintenance works due to a lack of fiscal space.

There are insufficient financial resources for both maintenance and expansion of Zimbabwe's road network, to meet the growth in demand for transport services either for economic or social activities. Moreover, the country's road network is substantial in relation to Zimbabwe's gross domestic product (GDP). Accordingly, the road network assets' replacement value is projected to be almost US\$10 billion, an amount three times bigger than the GDP for the country (AfDB, 2011). The ratio indicates the extent of the economic burden that Zimbabwe has for the maintenance of its road network. Resources required to repair and/or maintain the road infrastructure assets is huge. At the same time, the finance required for investment in new road infrastructure is also massive (AfDB, 2019).

A study on how such assets may be financed by the Government of Zimbabwe appears long past due. This is against the backdrop of the criticality of transport in enhancing market access by traders of all sorts and sizes. Road is the main mode of transport used in Zimbabwe and other landlocked countries. It is therefore important to have a reliable road network that enhances the competitiveness of Zimbabwean products in the international markets. The current state of the road network may not help the Government of Zimbabwe in achieving its vision of becoming an upper middle-income economy by 2030. In the context of the study the financing decisions for transport infrastructure must ensure efficiency and hence the need for having a framework that helps in the financing decision making.

#### **2.4.2 Zimbabwe's Railway Network**

Zimbabwe has a railway network connection with all her four neighbours, namely South Africa, Mozambique, Zambia, and Botswana (Odero, 2018). This network is a major national asset for enabling trade and economic activity within the Southern African Development Committee (SADC) region. Locally, the railway network also connects the major centres for primary economic activities such as mining and agriculture, as well as heavy industrial sites across the country (Odero, 2018). The railway also provides transport to overseas markets by linking Zimbabwe to seaports in South Africa and Mozambique. Using railway transport also improves road safety and eliminates challenges such as road damage and traffic congestion.

In Zimbabwe, the main rail transporter is a parastatal entity- the National Railways of Zimbabwe (NRZ). The NRZ provides rail transport services through a railway network covering 2 627 km, 1067mm gauged track of which about 9 percent is under caution (AfDB, 2019). Effectively, the NRZ is the singular carrier of goods and passengers in Zimbabwe through rail transport. Additionally, 385 km of railway network is under concession to Bulawayo-Beitbridge Railway Private Limited Company (AfDB, 2019). A small portion of the total railway network measuring 313 km and stretching from Dabuka to Harare was once electrified, but has since been fully wrecked and vandalised, hence the entire network requires electrification (AfDB, 2011). Concurrently, infrastructure on the rail tracks such as signals equipment and communication systems have depreciated drastically over time due to vandalism and the inability to regularly maintain and repair the equipment. Moreover, there



are portions of the railway network that are regarded unsafe based on the Infrastructure Condition Index (ICI). The NRZ classified as unsafe the Bulawayo to Victoria Falls (468 km), Gweru to Masvingo (199 km) and the Gweru to Shurugwi (38.5 km) railway lines (AfDB, 2019). Taking inventory of other key infrastructure necessary for the efficient operation of the railways as a reliable mode of transport revealed the following, as outlined by the NRZ in Table 2.3.

**Table 2.3: State of NRZ’s railway infrastructure**

<b>Item of inventory</b>	<b>Total available</b>	<b>Number functional</b>	<b>Comment on status</b>
Locomotives	168	60	Functional- low reliability
Wagons	7 153	3 512	Functional- low reliability
Passenger coaches	283	108	Functional- low reliability
Cabooses	47	15	Functional- low reliability

Source: (NRZ, 2019)

The state of the tracks is also stated as needing refurbishment as the track infrastructure has the following hazards, notably branch lines life expired. The signalling over the entire network also relies on manual signalling which is prone to accidents. As shown in Table 2.3, most of the key infrastructural components require refurbishment or replacement. An analysis on the statistics given in Table 2.3 indicates that more than half of the key railway infrastructure inventory is not functional. The NRZ estimates a capitalisation requirement of approximately US\$400 million for the institution to realise profitability (NRZ, 2019).

Work by the Government of Zimbabwe of attempting to renovate the railway infrastructure commenced in 2011 through a disbursement of US\$15 million under the auspices of the Public Sector Investment Programme (PSIP). Using these resources, the NRZ made significant progress in the railway track rehabilitation, as well as system cautions removal. The African Development Bank estimates that US\$1.6 billion is required for the rehabilitation of the rail sector in Zimbabwe. Moreover, there is expectation of the construction of new infrastructure

and the modernisation of intercity rail, metro, light- and high-speed rail infrastructure (OECD, 2017). This refurbishment work is meant to improve the competitiveness of the country since railway is regarded as a cheaper mode of transport for cargo and can handle bulk cargo conveniently. The attainment of vision 2030 by the Government of Zimbabwe requires financing of the railway infrastructure both for refurbishments and for modernisation of the infrastructure.

From the SADC region, Zimbabwe’s rail-traffic density is second to South Africa. Similarly, the NRZ’s freight density of around 900,000 tonne-km/km of track is relatively high in comparison to most railways in the region that serve far less than that and passenger density is the highest in the region at 166,000 passenger-km/km. Table 2.4 shows that Zimbabwe’s NRZ has a relatively higher railway freight density in the region, besides South Africa (Pushak & Briceño-Garmendia, 2011).

**Table 2.4: Railway indicators for Zimbabwe vs. neighbouring countries (2000 to 2005)**

	NRZ (Zimbabwe)	CFM (Angola)	BR (Botswana)	CEAR (Malawi)	Nacala Railroad	Beira Railroad	Ressano Garcia	Transnamib	Spoornet (South Africa)	RSZ (Zambia)
State run (0) or Concessioned (1)	0	0	0	0	1	1	0	0	0	1
*Freight density (1,000 tonne-km/km)	902	469	827	90	270	663	634	475	2,427	406
*Passenger density (1,000 passenger-km/km)	166	--	--	38	103	44	44	33	60	92

**Source: Pushak and Briceño-Garmendia (2011)**

NB\*2.5 passenger-km are equal to 1 traffic unit, 1 tonne-km equal to 1 traffic unit.

-- = Unavailable data

As shown in Table 2.4, Zimbabwe's NRZ ranks second in terms of freight density, trailing Spoornet of South Africa. The NRZ has the highest available passenger density. If the infrastructure is sufficiently refurbished and new infrastructure installed, it has the potential to increase competitiveness for Zimbabwe. Like every other infrastructure in Zimbabwe finance is the major bottleneck to such an investment. Therefore, the need for a framework to make the financing decisions is important for the railway transport sector which is an economic transportation mode for commercial cargo in landlocked countries such as Zimbabwe. The following section reviews the air transport status in Zimbabwe.

### **2.4.3 Air Transport**

The aviation industry links Zimbabwe with the rest of the world as well as local areas. The major centre for aviation in Zimbabwe is handled through the Robert Mugabe International Airport (formerly known as Harare International Airport) which caters for domestic and international air traffic (Odero, 2018). The other important and active airports are the Joshua Nkomo International Airport in Bulawayo, Victoria Falls Airport as well as the Buffalo Range airport (AfDB, 2011). Additionally, there is an excess of 200 other airstrips, aerodromes and airports of diverse standards and state across the country (Odero, 2018). Zimbabwe's economy relies heavily on the tourism industry, with most tourists coming from outside Zimbabwe, making the air transport industry a major facilitator vis-a-vis tourists' arrival.

Activity in Zimbabwe's air space is managed by the Civil Aviation Authority of Zimbabwe (CAAZ) which is a regulatory board that has custody and responsibility over the management of national aviation infrastructure, as well as the provision of air traffic control services. Figure 2.3 shows the active airports and air strips in Zimbabwe used for either domestic or for international flights in the country.

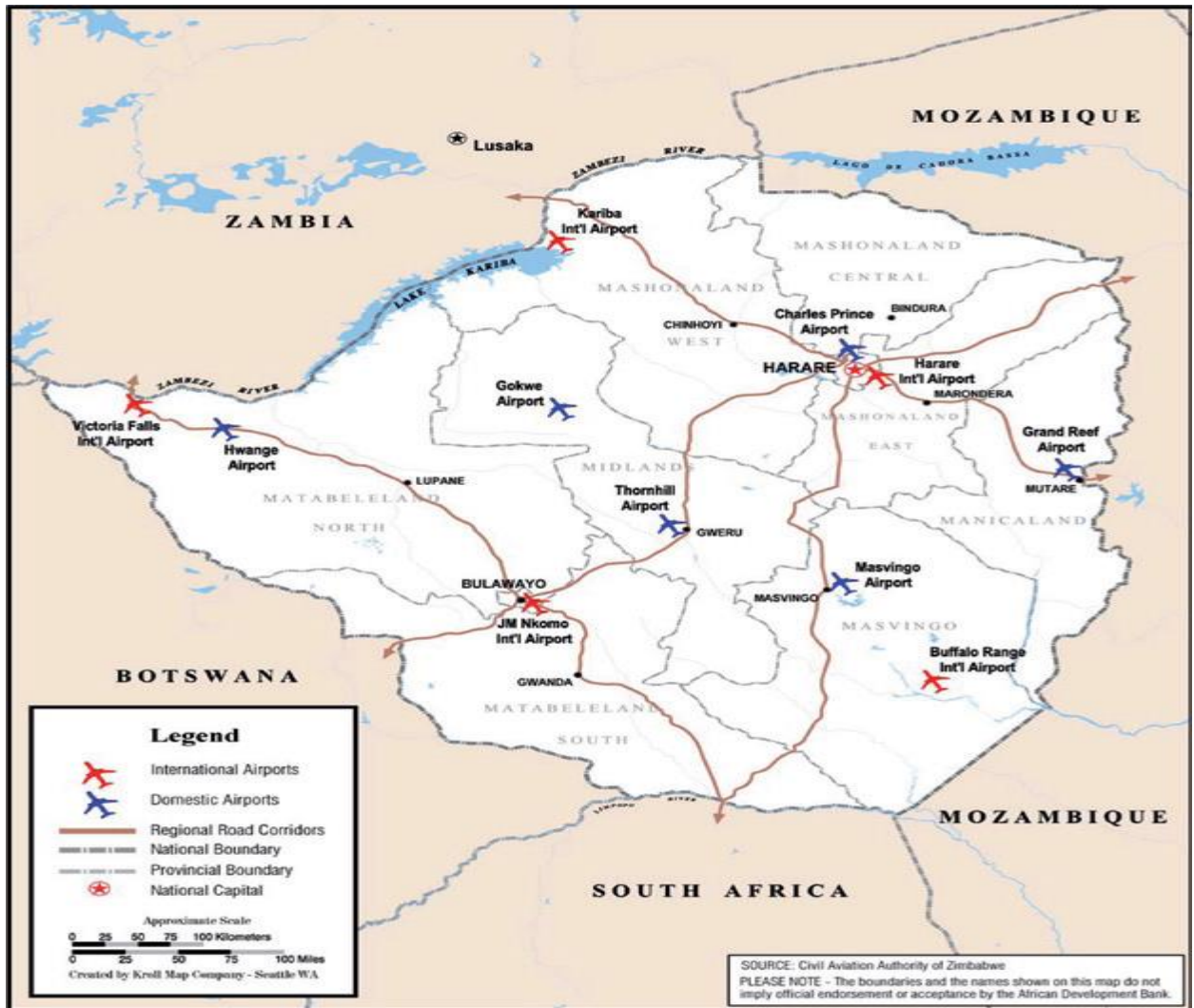


Figure 2.3: Main active airports in Zimbabwe (Source: [www.mapsofworld.com](http://www.mapsofworld.com))

Air Zimbabwe, the state-owned national airline, is the major provider of air cargo and passenger services. Air Zimbabwe has however discontinued some of its lucrative routes due to huge un-serviced debts which resulted in the seizure of planes by creditors in London in the recent past. Historically, Air Zimbabwe is counted amongst the most successful African airlines, but its fleet has depleted a total of ten planes. From this fleet, Mhlanga, Steyn, and Spencer (2017) noted that only four were functional by 2017. The depletion in the total fleet is against the background of an inherited fleet of eighteen aeroplanes at independence in 1980 (Mhlanga et al., 2017). The fleet further depleted such that by 2018, only two aeroplanes were functional (AfDB, 2019).

The demise of Air Zimbabwe was a result of several reasons, including poor quality service, negative media publicity, financial misappropriation, and interference by politicians (Mhlanga et al., 2017). These factors together affected patronage and resulted in financial woes which saw Air Zimbabwe's debt skyrocketing to nearly US\$140 million. To revitalise Air Zimbabwe requires a strategic partner to recapitalise, rehabilitate and properly manage the entity in a way that enhances the competitiveness of the national airline.

On a similar note, there are few international airlines flying to Zimbabwe due to the decline in demand resulting from government policies which did not inspire international tourist arrivals. The poor state of the main airport, the Robert Mugabe International Airport, requires refurbishment, although it is reported to have the longest runway of about 4 725 metres, which is longer than OR Tambo which is 4 418 metres (CAAZ, 2019). There is need for finance for the upgrade of the Robert Mugabe International Airport as well as other airports around the country and the various aerodromes dotted across the country. According to the African Development Bank (2019), capital development expenditure requirements for CAAZ managed airports amounts to about US\$240 million at 2017 prices. It is therefore necessary to have a framework for financing air transport infrastructure to enhance the ability of Zimbabwe to capitalise on the rich tourist attractions and improve economic performance of the tourism sector. It is, however, important to compare the state of air transport in Zimbabwe with comparatives in the SSA region, which is done in the following section.

#### **2.4.4 State of transport in Sub-Saharan Africa**

Development and socio-economic growth are anchored on transport infrastructure and services which are a prerequisite facilitator of trade and the movement of people (United Nations Economic Commission for Africa, 2009). For long, transport has been the most useful mechanism to access national and regional markets in the wake of globalisation, in which Africa is significantly lagging behind due to poor and inadequate transport. Africa's transport infrastructure is generally underdeveloped and its physical network poorly integrated (United Nations Economic Commission for Africa, 2009). Yet, trade between African nations heavily depends on the state of inland transport, that is, railway and road transport and to a lesser extent, coastal and inland water transport where the potential exists. Additionally, Africa is a

sporadically populated continent with settlements widely spread across numerous areas. Consequently, the investment required to connect countries and communities is expensive given the short-to-medium term economic returns (African Union, 2014).

The African average density for roads is about 6 km per 100 km<sup>2</sup> and for railways is 0.2 km per 100 km<sup>2</sup>. From the continental road network, more than 60% is unpaved, most of which is made from un-engineered gravel and earth quality. Less than 40% of the paved road network is in good condition (AU, 2014). In Africa, the number of people who can easily access all weather roads nears one billion. There is evidence from research that trade, and economic growth depends on transport. For instance, Limao and Venables (2000) found that the poor state of transport networks translates to 60 percent of the cost structure of transportation costs in landlocked countries whilst for coastal countries, the effect is about 40 percent. Sub-Saharan Africa has the least portion of paved roads when compared with any other region in the world. About 16 percent of the entire road network of the region is paved (Calderón, Cantú and Chuhan-Pole, 2018).

Africa's railway network is primarily made up of single-track lines extending from inland to coastal areas, but with limited inter-linkages. As articulated in the African Union Report (2014), these railway networks were engineered for steam-powered trains at the turn of the century and have hardly been upgraded to cater for longer diesel/electric locomotives. The African railway network is also built on a multiplicity of track gauges, the most common being two (standard: 1,435 mm and metric: 1,000 mm / 1,067 mm). Preferably, railways are expected to be the pillar of the African transport network, but this is not the case, as road transport which is more expensive has taken over this mainstay role.

Despite Africa having the fastest growing air transport sector globally, after the liberalisation of the market following the adoption and implementation of the Yamoussoukro Decision of November 1999, African airlines' market share of international flights between Africa and other regions of the world barely surpasses 2 percent (AU, 2014). The concept of access in terms of the concept of transport is evasive and intricate. A study by Buys et al. (2006) established that for Sub-Saharan Africa to grow its trade by US\$250 billion spread over 15

years, there is need to invest US\$20 billion in infrastructure and an additional US\$1 billion in annual maintenance costs. Such investments result in enhanced access to markets locally, regionally, and internationally. The major hurdle for such investments in most African countries is the access to the required finance since they rely on government budget appropriations. There is limited access to private capital for investing in expanding the transport and other infrastructure facilities. Therefore, based on lessons learnt from the African context the framework developed is better informed in making the financing decisions for infrastructure.

## **2.5 State of water and sanitation in Zimbabwe**

The United Nations' Committee on Economic, Social and Cultural Rights' comment number 15 provides guidance on the provision of and access to water services, as noted by Favre et al (2008). The guidance makes it a requirement for water to be potable and useable domestically. The guidance also stipulates the least amount of water which must be safe for drinking. Thus, water must be free from health hazards which are caused by chemicals and micro-organisms, as well as any radiology-related exposures. To achieve this access to water, infrastructure is important, as well as for attaining the 2030 Sustainable Development Goals (SDGs) (Grigg, 2019). Water infrastructure is multifaceted and includes water bodies such as dams and hydropower, irrigation, as well as the supply of drinking water and sanitation (Grigg, 2019). Potable water must possess certain key attributes, namely water must be odourless, colourless, and tasteless (Grigg, 2019).

On a related note, sanitation is regarded to be a human right which must be upheld. The achievement of the sanitation human right is through the prevention of contact to excreta by humans, animals, and insects (Grigg, 2019). Therefore, the achievement of personal hygiene requires having access to potable water and safe facilities for disposing of wastewater. It is a fundamental basic human right to access safe and potable water, as well as satisfactory sanitation amenities (Grigg, 2019). However, most developing countries including Zimbabwe have serious challenges in accessing water and sanitation facilities (Ahmad, Kinyanjui, Jonga, Mashingaidze, and Cole, 2016; Kativhu, 2016).

Challenges for accessing potable and safe water as well as satisfactory sanitation facilities are prevalent in Africa, such that a substantial part of its population are affected by this challenge (Manzungu, Mudenda-Damba, Madyiwa, Dzingirai, & Musoni, 2016). Statistics indicate that 40% of the world's people without access to potable water are from Africa and 90% of cholera cases recorded globally are from Africa, resulting from poor sanitation and unsafe water (Manzungu et al., 2016). Although it was one of the targets for the Millennium Development Goals (MDGs) to halve the proportion of people without access to potable water and sanitation facilities by 2015, the target was largely not met by most developing countries, predominantly those from East Asia, the Pacific, Latin America, the Caribbean, and Africa. The target has also been elusive for most African countries from Sub-Saharan Africa (Odaro, 2012).

Research shows that the failure in Africa to meet the MDGs' 2015 target was due to poor planning, rapid population growth, political volatility, as well as financing and funding challenges (Manzungu et al, 2016). There have also been constrictions in terms of public spending capacity as most Sub-Saharan African countries expend about 0.5 percent of their GDP on water and sanitation services. This has stifled investment in new and existent infrastructure (Odaro, 2012; Wolf, 2007).

In Zimbabwe, the challenge is more apparent in rural areas than in urban areas due to historical imbalances created during colonialism, where focus was on urban facilities development at the expense of rural infrastructure development (Kativhu, 2016). The state of the urban water and sanitation facilities was relatively well-developed at independence when compared to the rural infrastructure with access to potable water, estimated at 99 percent and 40 percent, respectively. Similarly, access to acceptable sanitation was estimated at 99 percent (urban) against 30 percent (rural) (Manzungu et al, 2016). After independence, there was concerted effort to invest in rural water infrastructure through an innovative Integrated Rural Water Supply and Sanitation Programme (IRWSSP) (AMCOW, 2011). The result was a remarkable improvement in water access from 40 percent (1980) to 70 percent (2000) and sanitation facilities from 30 percent (1980) to 60 percent (2000) (Manzungu et al., 2016). At some point in time during the late 1990s, Zimbabwe had one of the best ranked water and sanitation facilities in Sub-Saharan Africa (AMCOW, 2011).



The turn of the millennium in 2000 started a significant deterioration of the water and sanitation facilities in Zimbabwe due to political, social and economic challenges experienced (Manzungu et al, 2016). This was followed by an economic demise caused by the deterioration of public investments in infrastructure, as well as the plummeting of development assistance. These led to the creation of a gap to finance the repair and maintenance of the already ageing infrastructure, as well as constraints to expanding water and sanitation facilities to meet the corresponding growth in demand (AMCOW, 2011). This was exacerbated by the decline in the public sector's revenue base, which resulted in a technical skills flight (AMCOW, 2011).

The epitome of the decline in the water and sanitation infrastructure in Zimbabwe was depicted by a cholera outbreak in 2008-2009 where 98 592 cases were recorded, resulting in 4 282 people dying (Ahmad et al, 2016). The demise in water and sanitation affected both rural and urban areas, with Mapfumo and Madesha (2014) noting findings from the Rapid Response Assessment by the UNEP and UN Habitat in 2010 that there has been a significant growth in the number of people in urban Zimbabwe with challenges accessing potable water from nearly 250 000 in 1990 to more than 2.1 million by 2010 (Mapfumo & Madesha, 2014). The African Development Bank (2010) points to the serious challenge in urban water as shown in Table 2.5, indicating the towns and cities with major potable water challenges.

**Table 2.5: Water supply situation in selected towns and cities in Zimbabwe**

City/Town	Population	Water Supply		Water Demand	Shortfall
		Installed Capacity (m <sup>3</sup> /d)	Actual (m <sup>3</sup> /d)		
Harare	2,500,000	704,000	645,000	1,200,000	555,000
Chitungwiza	1,000,000				
Mutare	300,000	65,000	54,000	75,000	21,000
Chegutu	120,000	12,000	8,000	36,000	28,000
Masvingo	110,000	30,000	23,000	48,000	25,000
Bulawayo	738,600	211,000	132,000	156,000	24,000

**Source:** African Development Bank (2010)

As shown in Table 2.5, most cities/towns in Zimbabwe have water supply challenges and the national urban potable water demand is estimated at 2,000 megalitres, of which 600 megalitres are required in the capital city, Harare. The gravity of the water and sanitation challenges in Zimbabwe are worsened by the average age of the water and sewerage hardware of 50 years. For example, Harare’s major water treatment plant was constructed in 1954 and most of the water distribution pipework done around the same time (Manzungu et al, 2016). Consequently, between thirty and forty percent of the treated water in Harare is lost through leakages, exacerbating the city’s daily water deficit of between 200 and 250 megalitres. Similarly, the sewerage treatment plants are worse off, currently operating at between twenty and twenty-five percent of capacity (Manzungu et al, 2016).

To further worsen the water and sanitation challenges caused by the dilapidation of infrastructure, customers also resisted payment for services levied by local authorities such as

municipalities due to economic hardships. This dwindled the revenue collection by the authorities responsible for the water supply, such as the Zimbabwe National Water Authority (ZINWA) and municipalities, which affected their capacity to finance the water and sanitation infrastructure renewal and expansions. At the same time, these authorities could not get enough funding from the central government, which worsened the condition of infrastructure. Apparently, the resultant accessibility to potable water and dependable sanitation services in cities, towns and growthpoints is between forty and sixty percent. Whilst for rural areas, access to safe water is between forty and fifty percent and sanitation access levels are below twenty-five percent.

Due to sustained neglect, accessibility to safe water in rural areas decreased from 70 percent in 1999 to 61 percent in 2009, whilst accessibility to adequate sanitation decreased from 60 percent in 1999 to 30.5 percent in 2006 (Manzungu et al., 2016). Failure to maintain boreholes, the major rural water infrastructure, and the unaffordability of cement for pit latrine construction resulted in many rural families reverting to open defecation (AMCOW, 2011). AMCOW (2011) further notes that about 98 percent of people without access to potable drinking water by the year 2010 were in rural areas. At the same time, about 42 percent Zimbabwe's rural population was practicing open defecation (AMCOW, 2011).

The poor access to clean safe potable water has caused outbreaks of water-borne diseases in Zimbabwe's urban areas with Harare, the capital city hardest hit, as citizens resorted to using unsafe water from unprotected wells. This has been motivated by the erratic supply of water of questionable quality due to malfunctioning water and sewerage treatment plants; an erratic supply of electricity; the unavailability of water treatment chemicals, as well as leakages due to dilapidated infrastructure. The bottom-line cause of poor water supply and sanitation has been the poor funding and financing of water, hygiene, and sanitation infrastructure. The available resources pooled together from the government, ZINWA and local authorities have been insufficient to rehabilitate, let alone develop, the water and sanitation infrastructure throughout the country.

Therefore, there is need for private sector players to mitigate the water and sanitation infrastructure challenges. This is meant to cover the financing gap reported by AMCOW (2011) of US\$365 million for capital investment in water infrastructure alone and a gap of US\$336 million for sanitation. Thus, there is a yawning water and sanitation infrastructure financing gap of US\$701 million (AMCOW, 2011). The AfDB (2019) report notes that the private sector should contribute about US\$593 million to address the water supply challenges in Zimbabwe. However, like all other infrastructure sectors, the private sector seems not to be comfortable with investing in the water and sanitation facilities in the country. Therefore, it is important to develop a framework for infrastructure financing that enhances efficiency and attracts private sector investors into water and sanitation infrastructure investments in Zimbabwe. It is however important to review the state of water and sanitation in the greater African region known as Sub-Saharan Africa to draw lessons and take stock of where Zimbabwe currently stands in providing potable water and improved sanitation infrastructure.

### **2.5.1 State of Water and Sanitation in Sub-Saharan Africa**

In comparison to the African continent, the UNICEF/WHO JMP report (2010) estimates that there are 565 million and 330 million people from Sub-Saharan Africa without acceptable access to sanitation and potable water, respectively. There is a proven relationship between poverty and access to potable water, hygiene, and sanitation, which when addressed results in the improvement of livelihoods and enhanced productivity. Thus, the poorest are worst affected in terms of access to potable water. The World Bank's Development Indicators shows that nearly 925 million people did not have reliable access to potable water as of the year 2007. At the same time, the number of people without access to improved sanitation was almost tripled those without access to potable water.

There have therefore been arguments by the World Health Organization that the mortality of about 1.4 million children annually due to diarrhoea was attributable to the lack of access to reliable potable water. Diarrhoea is attributable to contaminated water and unacceptable sanitation (Prüss-Ustün, Bos, Gore, & Bartram, 2008). It was one of the MDGs to halve, by 2015, the number of people deprived of access to potable drinking water and basic sanitation. However, this MDG was missed. For Sub-Saharan Africa, the number of people living in

towns with access to potable piped water had significantly increased by the year 2015, but the effort was overtaken by the rate of urbanisation. The result was that Sub-Saharan Africa's access to piped water declined from 63 percent to 56 percent (GIZ, 2019).

The overall situation is that 42 percent of Sub-Saharan Africa's total population do not have a basic supply of potable water and 72 percent do not have access to acceptable basic sanitation (Eberhard, 2019 and the Joint Monitoring Program, WHO, UNICEF, 2017). Worsening the low access to potable water and sanitation in Sub-Saharan Africa and across the entire African continent is the rate of urbanisation, which is expected to grow, resulting in a population of about 1.3 billion by the year 2050 (Eberhard, 2019 and United Nations, 2014). The resultant growth in urban population has however not resulted in a corresponding growth in the national economies. As a result, there is a huge infrastructure financing gap which has been ever-increasing.

There is need for an enhancement in a multiplicity of investments towards the attainment of the Sustainable Development Goals (SDGs) on the reduction of poverty and the SDG on water and sanitation in Sub-Saharan Africa. The attainment of these SDGs directly leads to the achievement of the national vision 2030 of Zimbabwe becoming an upper-middle income economy. Such a vision requires investments in potable water and sanitation facilities. The investments require efficient financing decisions which are likely to be enhanced in Zimbabwe when the framework incorporates lessons from other countries in the SSA region. The following section reviews the state of information communication technology (ICT) in Zimbabwe and in the SSA region. The purpose is to showcase the potential that lies in Zimbabwe if there is enough access to ICTs of apt quality.

## **2.6 State of Zimbabwe's Information Communication Technology**

The African Development Bank (2019) notes that with the intention to promote "universal access to affordable postal and telecommunication services", the Government of Zimbabwe approved a policy to reform the ICT sector in 2016. Emphasis of the reform policy was on the need to improve accessibility and the quality of services. It is important to develop new

services through investing in infrastructure, removing monopolies in the ICT sector, privatising parastatals, as well as engaging in public- private partnerships (AfDB, 2019).

For the smooth flowing of operations in the ICT sector, regulatory oversight is provided through the Postal and Communications Regulatory Authority of Zimbabwe (POTRAZ), which was created through the Postal and Telecommunication Act of 2000. POTRAZ is mandated with the licensing of operators in the sector, ensuring that operators in the sector provide services of a suitable standard, as well as promoting the development of the ICT sector. Operators who are licensed by POTRAZ are required to make contributions for supporting the development of communication services in under-funded areas through a Universal Service Fund (USF) (AfDB, 2019).

The ICT sector of Zimbabwe has registered significant advancement in the last decade, although it continues to face some challenges that are slowing down the pace of its progress. Major highlights of the advancement as provided by Potraz (2018) include:

- a) Mobile penetration in Zimbabwe grew to 87.7 percent. The coverage is roughly on par with other countries in Africa. However, the mobile prices of \$0.24 per minute are very high to the extent of being nearly five-times higher than comparable countries. On the other hand, there is need to do more work to develop mobile coverage in rural areas.
- b) There is scope for expanding the potential latent in broadband in Zimbabwe. The penetration rate as reported by POTRAZ (2018) is 51.9 percent. Broadband prices of \$0.10 per Megabyte are almost ten times higher than charges in many countries in Africa. There is potential to boost the Zimbabwean economy if broadband services are developed since it is a vital barometer used by foreign investors seeking to bring Foreign Direct Investments to Zimbabwe (POTRAZ, 2018).
- c) The Government of Zimbabwe has undertaken good initiatives to use ICT to make government functions efficient and improve the delivery of government services. However, Government faces resource and capacity challenges in implementing e-government applications.
- d) Potraz (2017) reports a total of 8 378 mobile base stations as of 31 December 2017. Of these base stations, 4 804 were 2G, whilst 2 643 were 3G and 931 were LTE.

Problems are however still afflicting the fixed line telephone services. Zimbabwe's mobile telephone sector was at some point in time regarded to be amongst the best in Africa. This is no longer the case as it has been affected negatively by poor maintenance, as witnessed by having more than 100 000 customers requesting connection and who are almost always not being connected. The hardware has also deteriorated markedly over the years due to obsolescence, neglect, and theft.

Investment requirements into the telecommunications sector are related to the creation of business opportunities, access to knowledge and education. The International Telecommunications Union's report (2010) highlights the financing requirements for the ICT sector and there are huge gaps in terms of coverage, which require investment. Notably, the digital divide is narrowing slowly since the average mobile penetration for developing countries was around 57 percent by the year 2009. The gap is expected to have narrowed down further. Moreover, about two-thirds of cellphone subscribers/subscriptions are from developing countries. Of these subscriptions, the highest comes from Africa where more than 25 percent of the population has access to cellphones. However, there is contrasting evidence to the improvements seen in accessing essential phone services, as there is a gap which must be closed in terms of accessibility to novel ICTs. Moreover, here is a huge gap between the levels of access to phones, such that the level realised in 2008 had been realised in the 1990s by leading players in ICTs such as Sweden.

AfDB (2019) notes that Zimbabwe needs to invest about US\$414 million in ICT infrastructure for the period between 2018 and 2030. Of this amount, about US\$400 million is necessary for the expansion of the backbone fibre network. AfDB (2019) also highlights that from the investment required in Zimbabwe's ICT sector, the private sector is expected to contribute more than US\$200 million. There is evidence to suggest that the enhancement of penetration rates by 10 percent results in economic growth of between 0.6 percent and 1.2 percent. There are gaps in sources of finance since the government and parastatals in the sector cannot finance such investments. Hence the need for a framework to assist in making financing decisions for the ICT infrastructure as well as establishing the potential use of innovative finance to plug

the financing gaps that are existing. It is important to be guided by regional comparator countries in achieving the required levels of access to ICTs, hence the following review of ICT infrastructure from the SSA region.

### **2.6.1 Information Communication Technologies in SSA**

Zimbabwe has faced economic and political crises, but these have not resulted in Zimbabwe trailing other Sub-Saharan African countries, as shown through the main ICT indicator where Zimbabwe is on par with other countries (World Bank, 2011). The same parity has been maintained for fixed telephone penetration and internet access. Zimbabwe even surpassed the average penetration rate. In terms of the current density for broadband in Sub-Saharan Africa, it is bleak. In addition to the low broadband penetration in Sub-Saharan Africa, there is also a huge difference between the lower income countries and the upper middle-income countries (Calderón, Cantú and Chuhan-Pole, 2018). Upper middle-income countries have a subscription of about 5.25 subscriptions per 100 persons as of 2015, which is less than other comparable regions of the world. However, there has been a significant rise in internet density in SSA, with the most noticeable growth being realised in the lower income countries where access to the internet increased from 1.1 persons per every 100 people in 2005 to 11.4 persons per 100 people in 2015 (Calderón, et al., 2018). Calderón, et al. (2018) further highlight that internet access in the upper middle-income countries from the SSA grew from 7.5 to 50.1 persons per 100 people.

Oluwatobi, Olurinola and Taiwo (2016) submit that despite the usage of ICTs having been on the increase in SSA, it still lags other comparable regions. Therefore, there is need for bridging the technology gap existing in SSA. This will enhance the economic growth of the countries in SSA. The relationship between the usage of ICTs and economic growth is well documented in literature. Zimbabwe, being a member of the SSA, also lags behind in terms of access to ICT usage. Notable as well is the gap between urban and rural access to ICTs, with most of the population residing in rural areas meaning that many are excluded. It is critical to improve the quality of the ICTs being accessed. Such improvement in quality requires investments into the requisite infrastructure. Therefore, it is important to identify the best mechanism to finance the ICT infrastructure, guided by the framework developed in this study. The following



section considers the state of the supply of power/energy in Zimbabwe to clearly illustrate the gap that exists.

## **2.7 State of power supply in Zimbabwe**

The demand for electricity is fundamentally driven by the population, level of economic activity per capita, as well as the technology performance in the country. Consequently, as per the UNFPA (2011) report wherein the world's population is estimated to be about 9.3 billion with most of the population growth being in the developing world, it means more power shall be demanded. The supply of electricity power in Zimbabwe is dominated by the Zimbabwe Electricity Supply Authority (ZESA) holdings, which is a parastatal enterprise with several subsidiaries including the Zimbabwe Power Company (ZPC) and the Zimbabwe Electricity Transmission and Distribution Company (ZETDC) (IDBZ, 2019). The ZPC is charged with the responsibility of generating electricity at the various thermal and hydro power stations. Several independent power producers were licensed by the Zimbabwe Energy Regulatory Authority (ZERA) and are at various development stages. There are no independent power distributors in Zimbabwe.

The energy sector in Zimbabwe is superintended by the Ministry of Energy and Power Development, which has the responsibility of energy policy formulation, energy regulation and performance monitoring, conservation of energy, as well as research and promotion of the usage of novel renewable energy. Some of the roles of the ministry are executed through a statutory regulatory board called the Zimbabwe Energy Regulatory Authority (ZERA). ZERA primarily regulates the operations of individuals and private companies dealing in power, with such operations as generation, transmission, distribution or retailing of energy products such as petroleum and electricity (ZERA, 2020). ZERA issues the requisite licences.

An assessment of the energy sector in Zimbabwe was done by the World Bank (2011), where it was found that the ZPC and ZETDC had made significant progress in the refurbishment of power infrastructure to restore stability and security in the supply of electricity. One of the major refurbishments was the stabilisation of the ash-dam at the Hwange power station, which had weakened. This was meant to enhance health, safety, and security at the power station.

The major investments made by the ZETDC were the rehabilitation of the protection systems which reduced risk of equipment destruction and replacement of distribution infrastructure which had been destroyed by vandals, resulting in the restoration of the supply of power to many customers who had been disconnected from the supply of electricity.

On the other hand, the ZPC also engaged in projects to increase generation capacity at the Kariba and Hwange power stations (IDBZ, 2019). Despite these efforts to rehabilitate the power supply infrastructure, Zimbabwe continues to face power challenges, witnessed by extended periods of load-shedding going up to 18 hours per day. The power shortages have continuously disrupted economic activities in Zimbabwe. There is need for investment in electricity generation, transmission, and distribution infrastructure since there is a huge gap between the demand for and the supply of electricity.

The total installed electricity generation capacity in Zimbabwe is just below 2000MW, of which only around 783MW is presently available for production (IDBZ, 2019). Current electricity demand is around 1800MW, rising to around 2200MW in the winter season, with electricity imports that stood at about 300MW in 2018 (IDBZ, 2019). The result is a significant supply/demand gap of around 700MW, rising to 1100MW during the winter season. The current electricity generation capacity utilisation of the five major power generation plants is shown in Table 2.6 below:

**Table 2.6: Installed Electricity Generation Capacity in Zimbabwe**

<b>Power Station</b>	<b>Installed Capacity</b>	<b>Actual production</b>	<b>Production as a percentage of installed capacity</b>
Kariba South Hydro	750	440	58.7
Hwange Thermal	960	268	29.1
Harare Thermal	80	30	37.5
Munyati Thermal	80	30	37.5
Bulawayo Thermal	90	15	16.7
Total	1,920	783	40.8

**Source: ZETDC (2018)**

As shown in Table 2.6, the installed electricity generation capacity usually produces at about 40 percent of installed capacity. There is a gap for the refurbishment of the installed capacity since the available generation capacity is not firm, and outages continue to occur at all the power stations. There is a huge gap between electricity demand and what can be supplied by the ZPC.

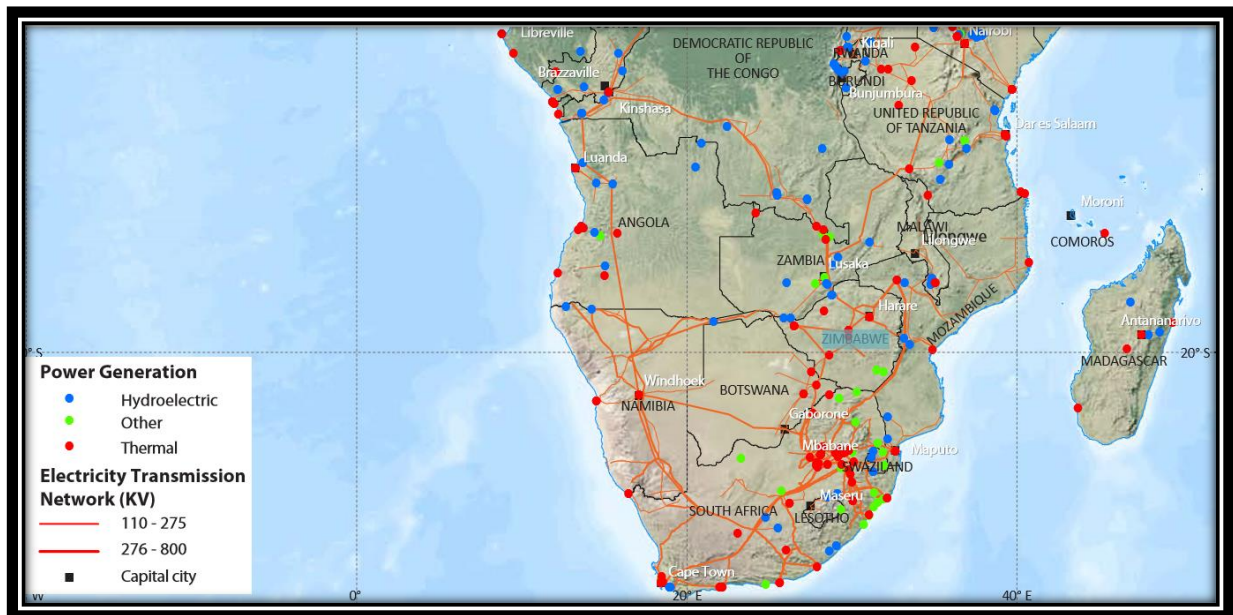
The gap is caused by the age of the power stations; thus, they cannot meet Zimbabwe's current and future electricity demand (IDBZ, 2019). For instance, the hydropower station at Kariba dam was commissioned in 1962, whilst the Hwange power station was progressively commissioned between 1983 and 1987 (AfDB, 2019). All five power stations usually operate at below capacity and require refurbishments. Such refurbishments require financing (IDBZ, 2019). The most immediate finance required is to finance the increase of electricity output, ensuring that the power stations produce at their installed capacity level. In the medium to long-term, there is need to finance new infrastructure to bridge the gap between installed capacity and total electricity demand (IDBZ, 2019). The demand includes the requirement for the currently unserved population as well as future population growth to achieve universal access to reliable and affordable energy. The need for a framework for making financing decisions is inevitable, hence the necessity for this study. However, lessons can be learnt from the SSA region as shown in literature reviewed in the following section.

### **2.7.1 State of Energy Supply in SSA**

Africa is believed to be very rich in energy resources, but poor in terms of the ability to extract and utilise these vast resources (UNEP, 2017). This is evidenced by the number of African countries facing energy crises. Consequently, power is exorbitant, inaccessible, and unreliable, resulting in many of the people being trapped in poverty. Thus, Africa's main barriers to social and economic advancement are caused by an insufficient power supply, energy shortages, high cost of energy, as well as the inability to access power (UNEP, 2017). The demand for electricity in Africa was forecast by the International Energy Agency (IEA) to continue growing at a steady four percent annually between the years 2012 and 2040. Africa's per capita energy consumption is the lowest globally, consuming about 3.3 percent

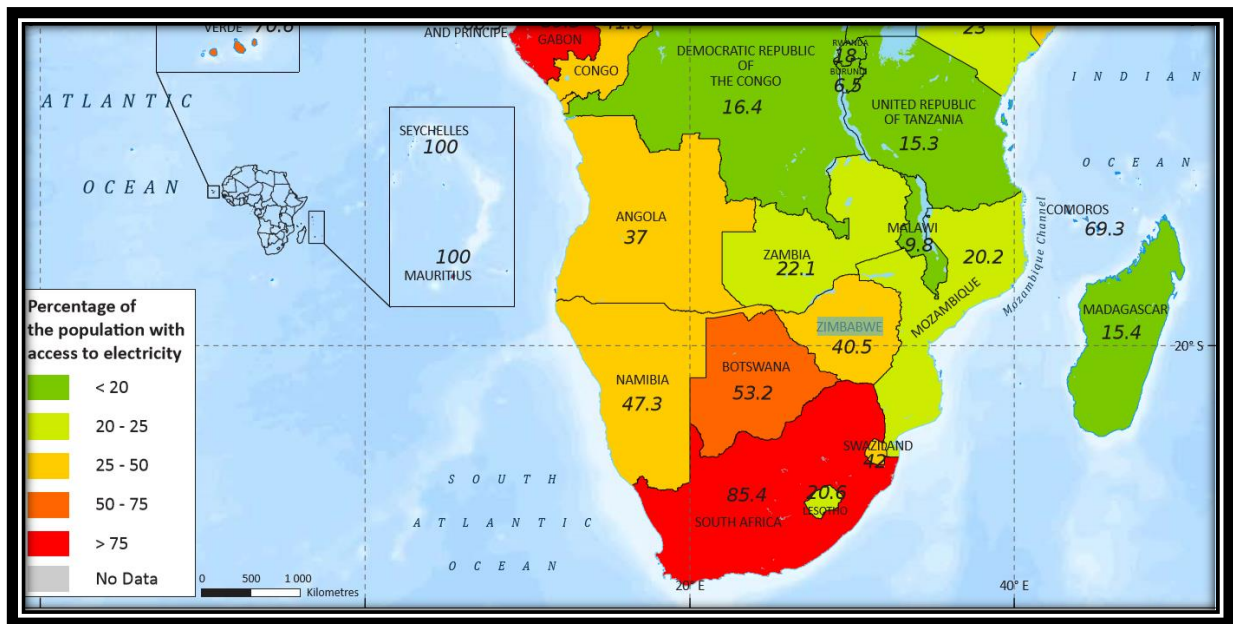
of the global primary energy, yet it constitutes about 16 percent of the global population (UNEP, 2017).

The energy poverty in Africa also translates to the various groupings, including Sub-Saharan Africa (SSA). The SSA is home to about 950 million people and is regarded as the world's most electricity-poor region, with at least 600 million people having no access to electricity (Avila, Carvalho, Shaw and Kammen, 2017). Avila, et al. (2017) further note that in addition to the population without access to electricity, several millions of people are connected to an unreliable electricity grid which cannot meet their daily energy service requirements. The demand for electricity in the SSA region was estimated by the IEA to have increased by almost 35 percent between the years 2000 and 2012, to 352 terawatt hours (TWh) (Avila, et al., 2017). Moreover, access to electricity by the entire population of the SSA region is not anticipated to be achieved before the year 2080. This implies the existence of a huge access to electricity gap in the SSA region. Figure 2.4 shows the main sources of power generation and the regional transmission network in the Southern African region.



**Figure 2.4: Southern Africa's power infrastructure (Source: UNEP, 2017)**

As shown in Figure 2.4, there is dispersed network of electricity distribution in the region, which shows the extent of the access to electricity by several countries in the region. For instance, the dense network in South Africa translates to 85.4 percent of its population accessing electricity, whilst the dispersed network in the DRC translates to 16.4 percent (UNEP, 2017). The electricity distribution network in the SADC region, as depicted in Figure 2.5, requires investments to close the infrastructure gap. The dispersed network can be explained in terms of the population with access to electricity in each country as shown in Figure 2.5.



**Figure 2.5: Access to electricity (percentage of population)(Source: UNEP, 2017)**

Figure 2.5 shows the population with access to electricity for countries in the Southern African region, with most countries having very low access. Most countries in the SADC region still require some effort to close the access to energy infrastructure gap. The gap in electricity access is expected to take some time to be covered due to the high wealth and income inequalities. This leads to different willingness and capacity to pay for electricity. The disparities are further exhibited by the huge variations in electricity prices, with the cheapest electricity in counties such as South Africa and Zambia, whilst electricity is more expensive in countries like Djibouti and Gabon (Avila, et al., 2017). The energy poverty in Africa and

SSA has various economic and social implications. Despite Africa contributing about 3.3 percent of global energy-related carbon dioxide emissions, it has suffered significantly disproportionate climate change effects. In addition, the expensive cost of energy has resulted in expensive costs of transportation, which have negatively affected the global competitiveness of goods produced in Africa (UNEP, 2017).

Despite several initiatives by various organisations, energy remains a challenge in Africa. The African Union's Agenda 2063 came up with the Africa Power Vision, which is anchored on the Programme for Infrastructure Development in Africa (PIDA), as well as the Africa Renewable Energy Initiative (AREI) which was endorsed by the AU heads of state (UNEP, 2017). The African Development Bank (AfDB) also developed an energy strategy entitled, the New Deal on Energy for Africa (NDEA), with a goal of universal access to energy by 2025 (UNEP, 2017). UNEP (2017) also notes that the achievement of universal energy access requires investments which have been estimated at between US\$43 billion and US\$55 billion until 2040, yet the current investments range between US\$8 billion and US\$9.2 billion. There is a huge financing gap to ensure universal access to energy. Therefore, the need for exploring the potential for using innovative finance to mitigate the financing gaps in power infrastructure.

## **2.8 Chapter Summary**

The chapter has outlined the status of public infrastructure in Zimbabwe. Focus is placed on the four classes of infrastructure classified as economic infrastructure. This classification of infrastructure includes transport, power, Information Communication Technology and water and sanitation. The initial part of the chapter contextualised infrastructure by clearly defining public infrastructure and outlining the various classifications of infrastructure from literature. Based on literature, the study focuses on economic infrastructure which includes, transport infrastructure, water and sanitation, information and communication, as well as energy/power supply.

Transport infrastructure considers road transport, railway networks and air transport. Although other studies have included seaport infrastructure, this is not necessary for

Zimbabwe since it is a landlocked country. Despite the existence of a well-connected road network, the state of the infrastructure in Zimbabwe is generally fair to poor, according to the available literature. Zimbabwe's road network also requires an upgrade to modernity. In terms of road network density, Zimbabwe has a density of 0.23km per km<sup>2</sup> which is relatively better than most developing countries and comparable to high income non-OECD countries. In terms of railway networks, there is need to expand Zimbabwe's network as well as modernising it from single-track railway lines as well as electrifying the network. Air transport generally contributes insignificantly to most African countries, where Africa barely contributes up to 2% of international flights.

Water and sanitation in Zimbabwe require major upgrades as there are serious constraints identified in literature. In urban areas, there are shortages in the supply of water since the supply facilities do not match the urbanisation rate. The result of the shortages is water rationing and sometimes households resorting to alternative sources of water supply, such as underground water harnessing. Information communication technology in Zimbabwe is at the developmental stage. Statistics from authoritative organisations such as Potraz registered significant changes to the subscriptions in mobile phone usage, as well as broadband, whilst there was a decline in fixed telephone subscriptions. Regardless of the growth in subscriptions in mobile subscriptions and broadband, electronic government is still behind significantly. Zimbabwe has however managed to maintain parity with Sub-Saharan Africa in terms of developments in ICTs.

The power supply situation in Zimbabwe is unable to meet demand. Zimbabwe has been experiencing power shortages which have resulted in load-shedding. Total installed capacity for electricity production in Zimbabwe is about 2000MW, of which current production is about 780MW. Demand for electricity in Zimbabwe ranges between 1800MW and 2200MW. This shows the huge supply gap in the supply of electricity. Therefore, it is imperative to invest in the expansion of the production of electricity to close supply gaps in Zimbabwe. Access to electricity in Zimbabwe is however better than the SSA region where the average access of nearly 42.5% of its population in urban areas, whilst close to 88% of the population in rural areas that cannot access electricity.

The chapter has showcased the gaps existing in the current supply against demand for infrastructure in Zimbabwe. There is need to invest in infrastructure in Zimbabwe, including transport, power, water and sanitation, as well as in information communication technology. The next chapter chronicles the trends in the financing of public infrastructure. Infrastructure in developing countries is financed using different mechanisms in comparison to emerging markets, as well as in the developed world. This is meant to establish lessons for Zimbabwe as the study is meant to develop a framework for the financing of public infrastructure.



## CHAPTER THREE

### TRENDS IN FINANCING PUBLIC INFRASTRUCTURE

#### 3.1 Introduction

The chapter showcases case studies of some prominent and successful public infrastructure financing mechanisms which have been used in different parts of the world. The assessment of the trends in financing of infrastructure is assessed according to the regions including developing economies, emerging markets, in Africa, in Sub-Saharan Africa, as well as in Zimbabwe. The purpose for presenting these trends is to draw lessons and examples which guide the study with ideas on the possible strategies that Zimbabwe can adopt to close the infrastructure financing gap which has been concisely exhibited in the previous chapter.

The chapter starts by highlighting the key features/characteristics of the financing of infrastructure, after which the computations of infrastructure financing requirements in the region are showcased. The regional trends in the financing of public infrastructure are then highlighted thereafter in the subsequent sections of the chapter.

#### 3.2 Characteristics of Infrastructure Finance

Financing infrastructure has several characteristics, some of which are highlighted by Elhers (2014) and outlined hereunder:

- a) **Long Maturity:** due to the length of time required for constructing infrastructure assets as well as the length of life of the infrastructure asset created, infrastructure finance tends to have a long maturity period.
- b) **Large Amount:** Infrastructure finance often requires huge capital for the creation of the infrastructure asset.
- c) **High Risk:** as a result of infrastructure financing's requirement for huge investments which will also take a longer time to mature, the associated risks tend to be correspondingly higher. The primary factors influencing the risk include uncertainty in the demand for the underlying infrastructure assets, environmental surprises such as hydrology risk in hydro-electric power projects, technological obsolescence (usually in

ICT infrastructure) and more importantly, political, and policy-related uncertainties. The common risks usually associated with investments in large-scale public infrastructure projects as highlighted by Van der Loo (2010) include:

- i) Such projects require large amounts of capital outlay, after which they require further investments to maintain them in their functional state. This usually results in the formation of separate agencies which may face the risk of being financially constrained.
  - ii) The time lags between phases of such projects may be too long, leading to decisions about the capacity of the projects being based on anticipated service demand levels. The actual demand levels for such projects usually remain very indeterminate; and
  - iii) Usually, such projects are laden with complications and inefficiencies as a result of them being provided by a multiplicity of government levels and sometimes agencies from various jurisdictions. The coordination of these many authorities may be difficult in terms of their ability to meet the expectations of the relevant stakeholders.
- d) **Positive invariable and low real returns:** investments in infrastructure projects usually yield low annual returns, which are often near zero in real terms. However, such returns are usually positive. This is a result of the significance of such investments in the downstream and up-stream economic sectors (EY, 2015).

### **3.3 Infrastructure Financing Needs**

Several scholars have conducted studies to quantify the infrastructure requirements gap in Africa, including Kingombe (2011); Mafusire *et al.* (2010); Briceño-Garmendia and Foster (2010); and Fay and Morrison (2005). To estimate the gap in financing of infrastructure in Africa, a study by Briceño-Garmendia and Foster (2010) found the gap to be between US\$25 billion and US\$95 billion annually. From the gap, the study found that nearly US\$30 billion of the required finance for public infrastructure could not be funded.

There have also been studies in developing countries conducted by scholars, including Fay and Morrison (2005) as well as Kingombe (2011), which pointed out that it was significant to

invest in public infrastructure since it helps in addressing basic needs of the communities whilst simultaneously promoting economic growth. There is however a need for striking a balance between the two highlighted significant objectives of public infrastructure investments. As a result, scholars advocate that such investments must be financed using innovative mechanisms, such as private sector and other non-governmental instruments, so that developing countries can achieve these objectives. The need for such innovative financing mechanisms emanates from the inability of the developing countries to finance their public infrastructure requirements in the entirety.

The following sections present the financing mechanisms used in developing countries, in emerging markets, as well as in developed nations for purposes of financing public infrastructure. The purpose of the following section is to showcase the successes realised in those nations and groups of nations for purposes of drawing lessons for the case study of Zimbabwe.

### **3.4 Financing public infrastructure in developed countries**

The gap in infrastructure also exists in the developed world where several developed countries and regions continue to face huge financing gaps. For instance, the infrastructure financing gap for the period between 2013 and 2030 was estimated to be in the region of €15 trillion (Subacchi, et al., 2014). This huge gap in infrastructure investments is meant to replace existing infrastructure stock as well as climate change-proofing the existing infrastructure. This gap has been left by the public finances available and hence must be met by either private sector players or innovative instruments.

There are various financing instruments suitable at different points of the cycle of projects. The general features of infrastructure projects include their ability to avail steady cashflows which sometimes are not affected by the business cycle (Jones and Llewellyn, 2013). Moreover, the risks associated with infrastructure investment projects usually decrease at the later stages of the projects, at which point debt finance becomes appropriate. However, at the commencement of the project, the amount of financing required is normally relatively low, with the WEF (2013) estimating that this amounts to between 2% and 4% of the project's total

financing requirements. Raising the required finance at this stage is usually very difficult due to the risks associated with the projects at the early stages (WEF, 2013). Due to the early project risks, feasibility study mistakes may lead to challenges and the under-performance of the infrastructure projects' subsequent stages, leading to further problems in raising finance for the project (KPMG, 2010).

As noted by Weber and Alfen (2010), the higher project commencement risks may usually result in the financial resources needed at this stage being raised through offering equity instruments to the project sponsors and promoters. Additional resources may be raised from investment funds such as institutional investors. It becomes possible to raise huge loans once construction of the project has commenced, as well as at subsequent stages of the projects. However, smaller loans may be raised during the earlier stages of the infrastructure project (WEF, 2013). The variation is the risks associated with each stage of infrastructure investment projects leading to variations in the forms and sources of finance used, as the risk appetites of different investors vary. The early stages of infrastructure projects usually attract private equity funds due to their propensity for lesser risk aversion, whilst as the projects advance, longer-term investors are inclined to join in later since their focus is on the projects' cashflows. Alternatively, infrastructure projects may be financed through resources availed by government economic development schemes and national or regional development banks. These usually provide finance in the form of re-payable grants, subsidies and/or low interest loans to support the infrastructure projects (Weber and Alfen, 2010).

For developed countries such as those in Europe, there has been a significant growth in the availability to infrastructure entities of equity finance. For instance, the infrastructure securities market grew by about 230 percent between 2003 and 2011, mostly due to the growth realised in energy infrastructure where there was a need to renovate assets (Rosenberg Real Estate Equity Funds (RREEF) Infrastructure, 2011). Most infrastructure assets are owned by companies that are listed on public stock exchanges. Capital raised from the stock market is the main source of private finance for investing in infrastructure for listed companies. Infrastructure stocks form a subset of global stock markets. The RREEF Infrastructure (2011) acknowledged that there were about 535 infrastructure stocks globally whose market

capitalization amounted to about US\$3.25 trillion. Infrastructure stocks represented about 6 percent of the world's total market capitalisation as of 2011, which was also confirmed by Standard and Poor (Inderst, 2013). US\$36 billion was raised globally as equity finance for infrastructure between the years 2006 and 2011, US\$10 billion of which was raised in Europe (Inderst, 2013).

To attract equity financing into infrastructure projects, the process has been driven through privatization, particularly in Europe. The RREEF Infrastructure (2011) notes a significant amount of infrastructure assets which have been privatised since 1988 amounting to nearly US\$2.35 trillion globally, 40 percent of which were in Europe. There has been an increase in such privatisation in Europe as countries such as Spain and Portugal privatised airport assets (RREEF Infrastructure, 2011b); whilst in the UK; focus was on the engagement of private financing for health facilities such as hospitals. As a result of the privatisation of government assets, there has consequently been an increase in Initial Public Offering for infrastructure securities in Europe.

Generally, loans and bonds including single or syndicated loans issued to finance infrastructure projects have maturities ranging between 7 years and 12 years (Weber and Alfen, 2010). Due to the mismatch between loan maturity and project duration, a single loan/bond tenure cannot cover the financing requirements of the project over its life cycle. Therefore, there may be need for re-financing of the same project. Furthermore, due to the huge amounts required for financing infrastructure projects, loans from one financial institution may be straining, hence syndicated loans arranged from a consortium of banks is the viable alternative (Weber and Alfen, 2010).

Globally, there has been a notable growth in project financing through loan syndication from about US\$194 billion in the early 1990s to about US\$2.67 trillion by the year 2007, before it shrunk during the global financial crisis since bank lending generally declined during that period (Twinamatsiko, 2009). There are advantages arising from the financing of infrastructure projects through syndicated loans, namely presentation of an opportunity to obtain more resources, as well as enhancement of risk diversification through the sharing of

information. This usually results in the lowering of financing costs for the borrowers, as well as lower user fees for the consumers of the infrastructure assets (Twinamatsiko, 2009).

Another important form of debt financing is through issuing bonds. Bonds are usually issued to finance huge projects, usually more than €100 million. There are numerous advantages to financing through bonds. Bonds' duration is generally longer than loans' duration, sometimes extending up to 50 years, which makes bonds a stable and reliable source of finance. Moreover, bonds are issued with fixed tenures which can be easily matched with anticipated cashflows from the project (ICMA, 2013). Financing of infrastructure projects through bonds is not a new phenomenon. This is evidenced by the issuance of a Eurobond in the 1960s to finance motorways construction in Italy. Nowadays, common infrastructure bonds are issued as corporate bonds and are issued for specific infrastructure projects.

There has been advancement in the form of infrastructure bonds, with the UK developing innovative bonds in the form of PPP/PFI bonds (Inderst, 2010). PPP bonds cost less, have a longer duration, and have the potential to be inflation-linked, as noted by Inderst (2010). In terms of returns, investments in infrastructure can produce better returns than other classes of assets (Jones and Llewellyn, 2013). A typical example of such better returns is the £304 million issued in 2013 for financing cable installation for a wind farm on the coast of Suffolk which offered 4.1 percent interest (Thompson, 2014).

However, the US has more advanced markets for corporate bonds than Europe (ICMA, 2013). In addition, there is more limited practice of investment in corporate bonds across the national borders in the European Union (EU) than in the US. Cross-border ownership of corporate bonds is also under-developed in the EU. Prospects for sharing risk between European countries is blurred by the disintegration of the EU financial markets when compared to markets in the US states (HLEG, 2013). In the period after the 2008 to 2009 global financial crisis, there has been a resurgence of issues of bonds. Due to the credit squeeze corporates have also turned to issuing bonds as a source of finance. Moreover, the higher yield from corporate bonds has attracted more investors than the sovereign bonds whose returns have plummeted to very low levels in some euro countries such as Portugal, Spain and Italy (Kaya

and Meyer, 2013). Corporate bonds issued in Europe, which may be classified as investment-grade, were worth about US\$20 billion as of March 2014 (Bolger, 2014). Corporate bonds, including infrastructure bonds in Europe, have created avenues for infrastructure companies to access a bigger pool of resources. However, resources are not accessed by infrastructure businesses due to certain limitations. Moreover, corporate bonds are not a substitute for banks loans, but rather complement loans as a form of debt finance.

This has been a discussion focusing on the financing of investments in infrastructure assets through equity or through debt in developed countries. These sources of finance are usually termed ‘conventional’ sources of finance. However, due to some of the limitations and constraints of these two sources of finance, newer mechanisms have been developed over time. Some of the developed mechanisms are tailored to financing infrastructure projects whilst some can be used to finance any other projects as well as infrastructure projects. These are collectively known as innovative finance. The financing of infrastructure using innovative financing mechanisms is discussed in the following sections.

#### **3.4.1 Innovative financing mechanisms: Public-Private Partnerships (PPPs) in the EU**

PPP refers to partnerships between the public sector or a public agency and the private sector for purposes of resolving possible challenges in the delivery of infrastructure projects (Bloomfield & Ahern, 2011). Engel et al. (2011) noted that the primary reason for PPPs is to team up the capabilities of both worlds for the purpose of implementing projects that each part could not effectively implement independently (Grossman, 2012). PPPs were promoted in the UK during the early 1990s for the purpose of enhancing the delivery of public goods and services. Similarly, other European countries started implementing PPPs after the UK, resulting in a significant growth in PPP projects in Europe since the early 2000s. Thereafter, more PPP projects were done outside the UK, mostly involving cooperation in the development and operation of energy and transport infrastructure. This was motivated by the need to privatise utilities, as well as the creation of huge multinational utility operators coupled with the revision of public spending meant to adhere with the criteria set by the Maastricht treaty (EC, 2003).

Italy is one of the EU countries that adopted PPPs, experienced growth in the PPP market when compared to public infrastructure markets between the years 2000 and 2013 (Carbonara & Pellegrino, 2014). PPPs have stood out as the most used infrastructure investment involving public and private sector players, enabling government services and/or private businesses being financed through such collaborative efforts. A vital feature of PPPs is the transfer of certain phases of the project to the private sector partner for limited time periods. Private sector involvement for PPPs spans beyond the construction stage into other subsequent stages of the project. Thus, PPPs create lasting relationships between the parties involved, resulting in the creation of efficiency gains from expertise and capital from private players as well as the sharing/transfer of risk with private sector players (Weber and Alfen, 2010). Therefore, PPPs usually result in the private sector player financing the infrastructure, leading to the alleviation of the financial burden from the government or public agency. Due to the financial limitations faced by most governments and public agencies, PPPs are a key financing scheme for cooperation between the private and public sectors.

### **3.5 Public infrastructure financing in emerging markets**

The level of expenditure on the development of infrastructure was recorded to be highest amongst emerging and developing economies of the world, such as India, China, Brazil, and Russia (Tortajada, 2016). The value of a country having good and appropriate public infrastructure and the significance of the positive effect on stirring economic growth and plummeting poverty is not questionable the world over (Tortajada, 2016). As a result, governments have prioritised investments in infrastructure and set commensurate policies to attract enough finance for the development of infrastructure (Chotia & Rao, 2018). The state of the inadequacy of infrastructure in India is well understood and documented. To realise the economic benefits of having the required infrastructure stocks, the Indian government focused on improving access to infrastructure and upgrading infrastructure to world class (Chotia & Rao, 2018). The result has been notable in some sectors, with India being regarded as having the world's second largest road network by 2016 (5.23 million kilometres) (Chotia, 2017). In the same year, India was ranked as having the second largest telecommunication network in the world with 1058.86 million subscribers in March 2016 (Chotia, 2017).



Historically, the Indian government had the sole responsibility for providing basic infrastructure to the populace. Financing of infrastructure in India is analysed between the pre-liberalisation and the post-liberalisation eras. During the pre-liberalisation period, the government was both facilitator and provider of infrastructure, whilst after liberalisation, there were multiple players in infrastructure development (Chotia, 2017). Post-liberalisation, India made significant progress towards attracting private sector investments in infrastructure such that between the years 2002 and 2012, nearly US\$250 billion had been invested in financing infrastructure (Chotia, 2017). In India, infrastructure investment had its finance coming almost entirely from the public sector, but 1991 marked a watershed as the Indian government started pursuing policies that attract private investment to the development of infrastructure (Chotia, 2017).

At the turn of the millennium, the private sector has come to be a significant player in infrastructure investment in India, constituting about 20 percent of infrastructure investment in the country by 2010 (Lall and Anand, 2010). This has resulted in the infrastructure finance system of India being made up of central government budget finance, debt finance and equity finance (Tortajada, 2016). The public sector remains the major player in the financing of infrastructure development in India. Debt finance mainly comes from the country's commercial banks and specialized Non-Bank Finance Companies (NBFCs), while other sources of finance include External Commercial Borrowings (ECBs), equity, Foreign Direct investment (FDI) and insurance companies (Kaur, et al., 2010).

The Asian Development Bank (2009) estimated the total infrastructure financing requirements for Asia to be around US\$8 trillion for the period between 2010 and 2020, of which 26 percent was required in India (Tortajada, 2016). Due to poor policies, private sector investment in infrastructure in India remains less than public sector financing (Tortajada, 2016). The breakdown of India's infrastructure finance system as described above yields the following picture in terms of contributions: about 45 per-cent of the total investment in infrastructure is financed from monies from the central government budget; 41 per-cent is financed from debt finance; and the remaining 14 per-cent is financed from equity financing (Kaur, et al., 2010). The sources of finance for infrastructure development in India are made up of public sector,

domestic savings, official development assistance, as well as debt provided by multilateral development financial institutions (Tortajada, 2016).

China is one member of the emerging market economies that hosts the largest population of the world, hence requiring more resources to finance infrastructure requirements. The Asian Development Bank (2009) estimated that Asia would require about US\$8 trillion to finance infrastructure during the decade spanning the years 2010 to 2020, an amount of which more than half (circa 53 percent) would be required in China (Tortajada, 2016). For annual estimates of financing requirements, China was estimated to require about US\$75 billion annual for the period between the years 2003 and 2013, with 90 percent being financed by the public sector (Bellier & Zhou, 2003).

Economic growth and the increase in demand for infrastructure was driven by urbanisation experienced by China at an unprecedented speed, from 17.9 percent in 1978 to 53.7 percent by 2013 (Tortajada, 2016 and Wang, et al., 2011). China's urbanisation was expected to reach 60 percent by the year 2020, requiring about UD\$7.75 trillion to finance the envisaged urbanisation plan over the seven-year period spanning between 2014 and 2020 (Tortajada, 2016). As a result, the Chinese government had to bear the burden of mobilising sustainable and sufficient resources to finance the increased demand for infrastructure (Wang, et al., 2011). Literature subsequently notes that there is a significant difference in the financing of infrastructure in urban China when compared to several other countries (Wu, 2010). China's urban infrastructure is primarily made up of transport (inclusive of roads and bridges); energy (such as electricity power); water management (including the supply of potable water); information and communications technology (such as mobile and telephones); facilities for managing waste (which includes the collection of garbage and its disposal); greening facilities (including road trees and public parks), as well as basic public amenities (Wang, et al., 2011).

Most industrialised countries rely on borrowings to finance their urban infrastructure due to the amount of capital required up-front (Chan, 1998; Bird, 2004). These countries access debt from their capital markets, as well as the rating of municipal bonds. As a result, bigger cities can access the bond markets better than small cities and towns. Apart from debt, the next most

significant source of finance for infrastructure is local authority taxes, contributing about 40 percent on average (Chan, 1998). Thereafter follows central government grants and subsidies, as well as user fees and charges. The financing mechanism used in developing countries somehow differs, with the main source of finance municipal infrastructure being property taxes, whilst debt financing is used to a lesser extent.

However, Chinese municipal governments cannot generate enough resources to finance their infrastructure from taxes and they are also restricted in terms of borrowing powers (Wong and Bird, 2004). Decentralisation of the fiscal system resulted in local municipal governments in China availing more incentives to encourage the local mobilisation of resources, including those to finance infrastructure. Decentralisation has led to uneven regional patterns of infrastructure financing since the central government delegates the provision of public services to local governments with little to no revenue support or any transfer system (Wu, 2010). The Chinese have generally departed from the conventional norms of financing infrastructure, with the municipalities having little or no capacity to contract debt, their property taxes contributing insignificantly and no budgetary support from central government (Lin, 2001).

Other emerging countries include Brazil and Chile, and their infrastructure financing landscape is briefly reviewed hereunder. In Brazil, the Banco Nacional de Desenvolvimento Econômico e Social (BNDES), a public sector development financial institution has been the major financier of the public sector infrastructure in Brazil until the mid-2010s when the subsidised financing it provided became stressed (Cavalcante, 2020). Brazil has also been a leading country to finance infrastructure using PPPs and they are one of the countries with success stories that are constantly referred to by many developing countries (Albalate, et al., 2015). Chile is also known for being able to attract private sector investments into public infrastructure due to its level of transparency. Therefore, Chile has financed most of its transport infrastructure using PPPs and has mastered risk management for PPP infrastructure projects (Albalate, et al., 2015). There however are still financing gaps for infrastructure in Brazil and Chile as the current state of the infrastructure is both insufficient and/or of substandard quality (Armijo & Rhodes, 2017). The purpose of reviewing how emerging

markets have been financing infrastructure helps in drawing lessons for Zimbabwe in order to reduce the financing gap by tapping successful financing methods that have been used in other regions. This section has reviewed literature on the financing of infrastructure in emerging markets, such as China, India, Brazil, and Chile. The following section reviews how countries Africa have been financing infrastructure.

### **3.6 Public infrastructure financing in Africa**

As discussed earlier, the level of need for the development of infrastructure globally has made it imperative that finance for investment in such capital-intensive projects be embarked upon seriously. Africa is reported to be experiencing the highest population growth, coupled with the fastest rate of urbanisation, which translates into huge demand for infrastructure services (OECD, 2019). It has been noted that investing in infrastructure plays a significant role in the development of the economies, as well as in the reduction of levels of poverty (ACBF, 2016). Africa therefore has a yawning gap in infrastructure that needs to be addressed. Consequently, it is important for countries to develop a variety of ways and instruments of financing infrastructure appropriate to their circumstances to tackle the daunting task of developing their infrastructure stocks.

Traditionally, the public sector (government) was responsible for financing infrastructure projects in most countries since the provision of infrastructure has been regarded as a public service, which is amongst the ‘three duties’ ascribed to the government for its citizens by Adam Smith (1776). Literature recognises that in most developing countries, especially those from Africa, infrastructure development is still financed by the public sector, as well as from foreign borrowings or private finance sourced from outside the countries (from international private investors) (Irving and Manroth, 2009). This has continued to hinder sustainable development in Africa. African governments have recognised the need to invest in infrastructure as part of Agenda 2063. Hence, for Africa to be recognised as an economic powerhouse globally, there is need for investment in transport, water, Information communication technology and reliable power supplies (ACBF, 2016).

However, Platz (2009) notes that theoretically, there are five options available to public providers to raise finance for infrastructure investments. Firstly, for those providers of infrastructure whose outflows are more than the costs of developing continuously, these require savings in advance of investments. Secondly, providers restrict capital investment to current receipts in a given period, in which case the providers do not borrow or save, but only make use of current receipts. The third option is referred to as financing mechanisms, whereby providers of infrastructure may take loans and pay back with future receipts. The fourth option entails infrastructure providers relying on grants or transfers between governments. Lastly, public providers of infrastructure may decide to privatize their operations in part. It is notable that infrastructure quality is more important than infrastructure stock (ACBF, 2016). Therefore, where these options cannot offer the best quality of infrastructure, more options must be pursued.

Most African governments have generally recognised that they lack the financial resources and technical expertise to close their infrastructure gaps. Therefore, they require both private sector capital and technical know-how in the development of infrastructure (Gravito, et al., 2017). Thus, the contribution of private sector players in infrastructure financing is inevitable. This diversification of infrastructure financing sources resulted in the opening up of opportunities for the active involvement of private sector financiers in many countries' infrastructure. African countries' infrastructure investments have become more attractive to international private sector finance in the form of foreign direct investments (Gravito, et al., 2017).

In the 19<sup>th</sup> century, a lot of infrastructure projects were financed by the private sector. Many of these privately financed projects required government support and subsidies. The move resulted in private financing, ownership and/or private provision of infrastructure leading to the economic crisis during the 1990s. The loose fiscal policies and monetary policies accompanied by low rates of income resulted in debt-based cash flows, which however improved the flow of resources to finance infrastructure in the markets. As a result of the important role played by the private sector in the provision of infrastructure, there was a better quality infrastructure than the level of poor quality infrastructure financed under public

management. It was acknowledged that the private sector operated on the basis of the consideration for cost efficiency, equity consideration, allocation efficiency and fiscal prudence (Mor and Sehrawat, 2006).

Literature records that the low-income countries (LICs) have not been able to attract much private finance to their infrastructure, with less than 2 percent of the total private finance for infrastructure flowing towards the LICs since the turn of the millenium (Bationo et al., 2018). Some of the reasons cited for such poor performance for LICs include these countries' weak business fundamentals. The poor business fundamental environment, together with high macro-economic risk and political volatility, have discouraged investors especially the risk-averse investors. After 2012, the flow of private infrastructure finance to LICs plummeted, with many LICs receiving nil flows of private infrastructure financing during this time due to the global economic crisis (Carter and Tyson, 2015; Bationo et al., 2018).

The dearth in private infrastructure financing was more noticeable in some sectors than others. For instance, water and sanitation infrastructure received a mere 7 percent of all the private financing availed to infrastructure during the decade up to 2017 (Bationo et al., 2018). This amount is too little after considering the importance of water and sanitation in LICs which generally are experiencing higher rates of urbanisation and have been failing to attract private infrastructure finance. some obstacles have also resulted in the private sector, such as their failure to collect payments from customers for services rendered in such urban environments, which have dissuaded investments in water and sanitation infrastructure (Bationo et al., 2018).

Another challenge affecting the availability of private financing for infrastructure pertains to the pro-cyclicality of private finance. During the period 2008 to 2014 ,there was an increase in private financing with annual averages of about US\$150 billion. This upswing was a result of the emerging markets being bullish and therefore investors were searching for better yields as the interest rates in developed economies were subdued. Therefore, emerging markets and infrastructure financing were more rewarding alternatives for private investors (Tyson and McKinley, 2014; Carter and Tyson, 2015). After a rebound of interest rates in the developed economies after 2014, emerging markets and infrastructure financing ceased to be attractive

to private investors, leading to a decline in private finance flowing to developing economies and to the infrastructure sector, with annual available finance averaging about US\$75 billion, an amount of almost half the average for the prior cycle (Tyson and McKinley, 2014; Carter and Tyson, 2015).

The knock down of infrastructure investments anticipated by Tyson and McKinley (2014) and Carter and Tyson (2015) was felt in Africa in 2016 when infrastructure financing was recorded at its lowest in the preceding five years at US\$66.9 billion. The Infrastructure Consortium for Africa (ICA), in their 2017 annual report published in 2018, gives the commitment to infrastructure finance for Africa which as shown in Table 3.1 has been constant for some years:

**Table 3.1: Infrastructure financing in Africa (2013 to 2017)**

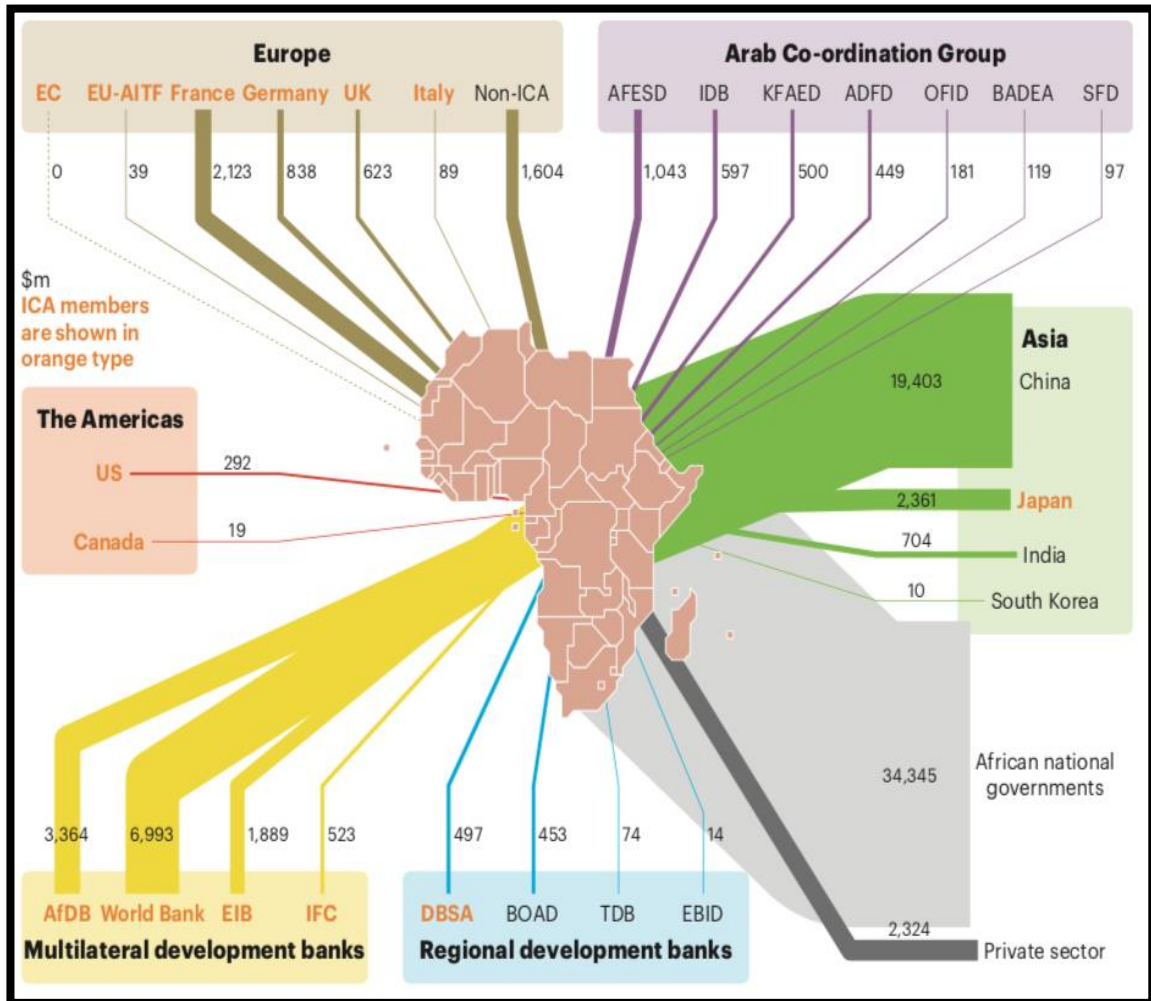
<b>Year</b>	<b>Infrastructure Finance amount (US\$ billion)</b>	<b>Change (%)</b>
2013	83.3	-
2014	75.4	-11
2015	78.9	+6
2016	66.9	-21
2017	81.6	+22

**Source:** ICA (2018)

The average financing commitment for public infrastructure was about US\$77 billion over the five-year period. The lowest commitment was in 2016, and there was an increase of nearly 22% in 2017 on the 2016 lowest figure.

Accordingly, the Infrastructure Consortium for Africa's 2017 Annual Report (2018) shows that the commitments for infrastructure financing across Africa for 2017 totalled US\$86.1 billion. The breakdown of the main sources of the finance was as follows: African National Governments US\$34.3 billion (42.1%) of total; ICA members US\$19.7 billion (24.1%); China US\$19.4 billion (23.8%); Arab Coordination Group US\$3 billion (3.7%); Others (Bi-

lateral/Multilateral) US\$2.9 billion (3.5%); and Private sector US\$2.3 billion (2.8%) (ICA, 2018). A detailed breakdown is diagrammatically outlined in Figure 3.1.

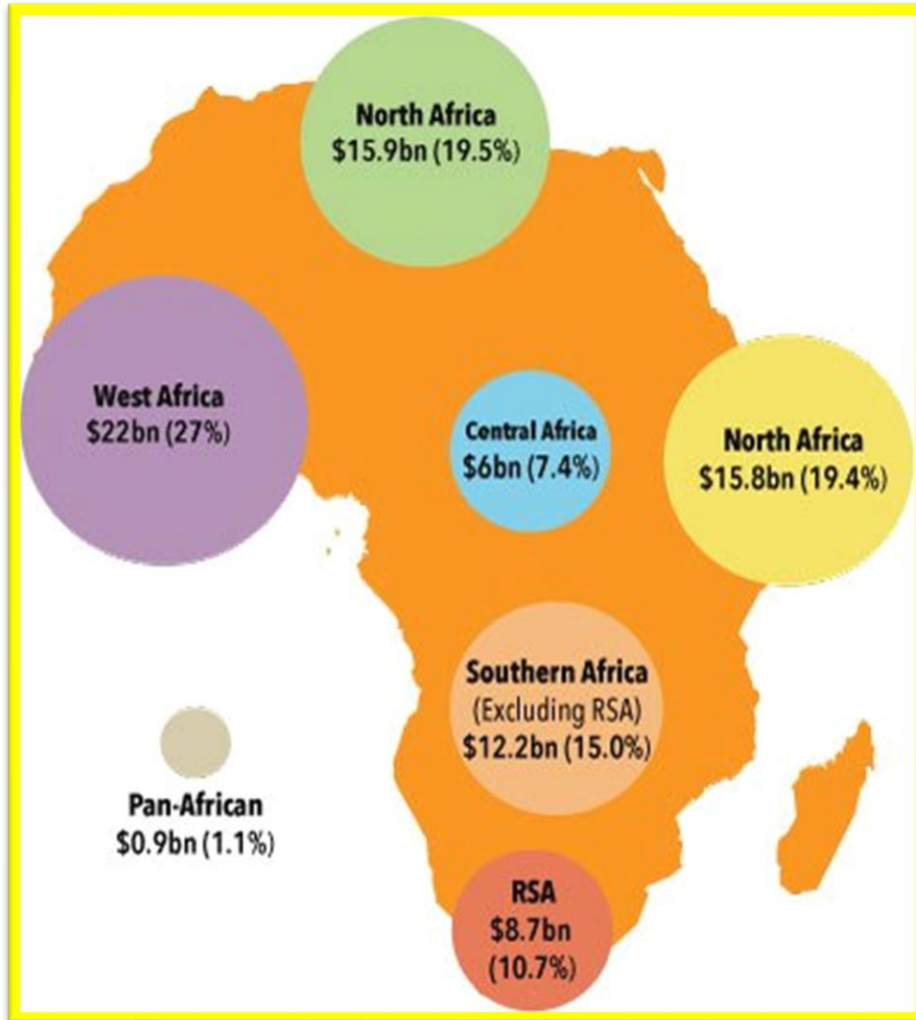


**Figure 3.1: Reported and identified financing flows into Africa's infrastructure in 2017 (Source: ICA, 2018)**

The major flows of infrastructure finance into Africa are from Asia, particularly China, which is the single largest source of infrastructure finance as shown in Figure 3.1, which also shows that there are several institutions committing resources to the development of infrastructure in Africa. The institutions include regional development banks, some of which are from outside Africa; multilateral development banks, as well as single developed economies such as the



United States of America (ICA, 2018). The destinations of the infrastructure finance committed to Africa during 2017 grouped by region are shown in Figure 3.2 below.



**Figure 3.2: Infrastructure Financing Trends (Source: ICA, 2018)**

As shown in Figure 3.2, West Africa received US\$22 billion; North Africa received US\$15.9 billion; East Africa received US\$15.8 billion; Southern Africa, excluding South Africa, received US\$12.2 billion; South Africa accessed US\$8.7 billion; Central Africa was host to US\$6 billion; and the Pan African Region received US\$0.9 billion (ICA, 2018). The result of this distribution of infrastructure finance is that some regions and/or countries are more

developed than others that are worse off. The following section presents some cases of success in financing public infrastructure in the Sub-Saharan African (SSA) region.

### 3.6.1 Infrastructure financing in Sub-Saharan Africa

Sub-Saharan Africa (SSA) is a group of 49 African countries located to the south of the Sahara Desert, with a total population of circa 800 million (Eberhard, et al., 2017). Investments in infrastructure are well known as catalysers for economic growth the world over, but most importantly in developing countries, including SSA (Aschuer, 1989 and Canning and Pedroni, 2008). Investments that improve infrastructure, including transport, power, information communication technology, water and sanitation, influence productivity positively and enhance regional integration and trade (OECD, 2019).

Despite infrastructure being an important ingredient in the production process-hence impacting economic prosperity and international competitiveness- SSA generally has the poorest developed infrastructure (African Union Department of infrastructure and energy, 2014). Table 3.2 below highlights the major infrastructure deficits for lower income countries in SSA when compared to other lower income countries (LICs):

**Table 3.2: Infrastructure deficit in Sub- Saharan Africa**

<b>Infrastructure element</b>	<b>SSA LICs</b>	<b>Other LICs</b>	<b>SSA Deficit</b>
Paved road density (km per 100km <sup>2</sup> arable land)	31	134	-76.9%
Total road density (km per 100km <sup>2</sup> arable land)	137	211	-35.1%
Telephone density (lines per 1000 people)	10	78	-87.2%
Mobile density (lines per 1000 people)	55	76	-27.6%
Electricity generation capacity (megawatts per one million people)	37	326	-88.7%
Electricity coverage (% of population)	16	41	-61.0%
Improved water coverage (% of population)	60	72	-16.7%
Improved sanitation coverage (% of population)	34	51	-33.3%

**Source:** Adapted from Gutman, Sy and Chattopadhyay (2015)

Table 3.2 gives an overview of the deficit in key economic infrastructure in SSA's lower income countries, which are most of the countries making up the SSA region. The figures extracted from Foster and Briceño-Garmenda (2010) have not significantly changed due to a dearth in finance for the development of infrastructure.

Africa must invest an additional US\$93 billion each year in infrastructure to close existing infrastructure gaps (United Nations Department of Public Information, 2017). The SSA region is the most power-poor region of the world, requiring financing of about US\$41 billion annually for the purposes of maintaining, operating, rehabilitating, and expanding power generation capacity (ACBF, 2016). About 62.5 percent of SSA's population does not have access to electricity, which translates to about six in every ten people from SSA who do not have access to electricity (World Bank, 2017).

The next most deficient infrastructure in the SSA region is transport, needing investments in the region of US\$20 billion annually for investing in road networks, railway, port, and airport maintenance and upgrading (ACBF, 2016). More than US\$11 billion is also needed for SSA's water and sanitation infrastructure for both maintaining existing infrastructure and for expansion to meet the sustainable development goals targets (ACBF, 2016). Information Communication Technologies in the SSA region require about US\$10 billion annually for maintaining and upgrading accessibility (ACBF, 2016). Given these expansive infrastructure financing requirements, the following sections review the models used to finance infrastructure in the SSA region.

Briceño- Garmendia, Smits and Foster (2009) note that most of the countries in SSA and Africa generally spend between 6 percent and 12 percent of their gross domestic product on investments into infrastructure, an amount that is not significant in absolute terms due to the small size of the economies. SSA has been facing challenges in attracting private investors into infrastructure due to several factors that span across Africa (Briceño-Garmendia, et al., 2009). There are policy and regulatory uncertainties, bureaucracy, perceived corruption, and political uncertainties that deter private sector participation in infrastructure financing in the

SSA region (OECD, 2019). Therefore, SSA has continually received very small portions of private infrastructure investments.

The poor performance of the SSA countries is further complicated by the non-existence of sovereign credit ratings; incapacitation of domestic financial markets; as well as higher risk caused by political and regulatory uncertainties (Sheppard, et al., 2006). To close the infrastructure financing gap, innovative financing mechanisms have been used, such as public private partnerships (PPPs), local currency infrastructure bonds as well as commodity-linked bonds, which are issued in the form of exchange-traded funds (Brixiova, et al., 2011).

Africa has generally been attracting the lowest number and value of PPP financing for infrastructure when compared to the rest of the developing world. The number of PPP deals in the whole of Africa during 2016 were 17 in total, valued at about US\$4.18 billion, of which 11 deals financed power/energy infrastructure, two were in transport and one financed ICT infrastructure (AfDB, 2018). However, PPPs have been popular in the transport sector in most developing countries after they have proven to be successful innovative infrastructure financing mechanisms in the developed world (Osei-Kyei & Chan, 2016). The SSA countries remain part of the developing world where there are few transport PPP projects, whilst there are numerous failed PPP projects. The predominant success stories of PPPs in the SSA include a Nigerian toll road concession known as the Lekki Toll Road Concession; another N4 toll road project connecting South Africa and Mozambique; as well as the Mozambican Port of Maputo project (Osei-Kyei & Chan, 2016).

The participation of the private sector in financing infrastructure is seen as a strategy to enhance efficiency in the operation and maintenance of infrastructure assets. However, there have been notable challenges in the SSA region in attracting substantive amounts of private capital due to the lack of depth and complexity of the financial markets, except for South Africa. In 2016, the SSA region attracted a total of 11 deals with private players in the form of PPPs or private capital from commercial loans worthy about US\$3.3 billion, nine financing power/energy whilst the remaining two financed transport infrastructures (AfDB, 2018).

In Ethiopia, the biggest source of finance for the decade up to 2013 for infrastructure was financed using private resources, with China being a leading financier. The China Exim Bank pledged loans amounting to about US\$6.3 billion between the years 2007 and 2013 to finance power and railway infrastructure in Ethiopia (Jalles d'Orey & Prizzon, 2017). In Ethiopia, China has also been a leading financier of road infrastructure through quasi-commercial loans advanced through the China Exim Bank. The level of financing for infrastructure in Kenya by China has been increasing, as witnessed by an increase from US\$74 million in 2011 to about US\$157 million in 2015 in energy infrastructure (Jalles d'Orey & Prizzon, 2017). In Kenya and Ethiopia, there was minimum to no infrastructure financed through official development finance due to the decline in donor financing of infrastructure.

The SSA region has seen a rise in private financing of infrastructure due to resource challenges for the governments and state-related entities. The leading recipients of private sector finance in the SSA region between the years 2009 to 2012 were South Africa, Nigeria, Ghana, Kenya, and Ethiopia (Gutman, et al., 2015). China has also been increasing its finance in infrastructure in the SSA region and has extended focus from financing resource endowed economies into areas where they have expertise such as hydro-power generation (Gutman, et al., 2015). Official development finance has also been declining in the SSA region, with the OECD-DAC committing just below US\$2 billion, followed by the World Bank providing loans of just under US\$1 billion and the African Development Bank financing less than US\$500 million worth of infrastructure in the SSA region (Gutman, et al., 2015).

Despite the growth in private financing for infrastructure in the SSA region, the governments' (public sector) budget appropriations remain the main financiers of infrastructure. However, data on the amount spent by the public sector in SSA remain scarce, but the International Monetary Fund estimates that this amounted to about 65 percent of their expenditure, which amounts to about US\$60 billion (Gutman, et al., 2015). The amount spent by individual countries may differ, with South Africa leading spending at about US\$29 billion followed by Kenya spending about US\$3 billion (Gutman, et al., 2015). Case studies of some countries in the Southern Africa region are presented below to contextualise the infrastructure financing gap in Zimbabwe.

Zambia is Zimbabwe's closest comparator country. Box 3.1 gives an overview of the financing architecture of public infrastructure in Zambia.

### **Box 3.1: Overview of Infrastructure status and Financing in Zambia**

Zambia attained her independence from Britain in 1964. Since attaining independence Zambia's infrastructure has been known to be deficient both at national level and local government levels (Mwanaumo, Chisumbe, Mbewe, Mambwe, & Haabazoka, 2020). The deficiencies have been exhibited through undependable electric power and fuel supplies, deficient healthcare services, poor road networks and ICT services amongst many others (Mwanaumo, et al., 2020). Zambia also requires alternative financing alternatives for covering the infrastructure gap, since resources from the government and development partners cannot adequately finance infrastructure requirements (Mwanaumo, et al., 2020). Budget constraints and inefficient management of public infrastructure assets have led to the government of Zambia considering courting private sector sectors into public infrastructure (Mwanaumo, et al., 2020).

However, there are challenges that make public infrastructure financing by local private sector players in Zambia which include (Rajé, 2017):

- a) Poor bankability of infrastructure projects.
- b) Constraints on the availability of private capital locally.
- c) Barriers such as regulatory bottlenecks, transparency challenges, and limited skilled human resources.
- d) Limited infrastructure financing instruments and vehicles.
- e) Multiplicity of risks such as currency risk, perceived and real political risk among many others.
- f) Poor development in markets for infrastructure assets.

To make public infrastructure financing in Zambia more attractive to private sector investors it is important to ensure there a supporting framework for investments such as PPPs, there is need for capacity building the project development skills, improve governance and regulation of the infrastructure sector (Rajé, 2017). Additionally, it also important to invest into improvement of infrastructure bankability, risk management and ensuring investment into infrastructure is attractive to fund managers such as insurers, by undertaking reforms in the insurance sector (Rajé, 2017). Moreover, Zambia has been declared at higher risk to debt distress after the public debt grew from US\$3.5 billion in 2011 to about US\$14.4 billion in 2018 (CUTS, 2018). This has resulted in Zambia facing challenges in attracting finance to invest into infrastructure of the right quality and quantity. Zambia is considering financing of public infrastructure through PPPs to supplement government resources and mitigate the public infrastructure financing gap (Mwanaumo, et al., 2020). China's presence in Zambian infrastructure financing has become more visible since the year 2000, although China has been investing in infrastructure before this time (Ofstad, 2020). However, the terms of grants and loans obtained from China by the Zambian government are elusive and there is no transparency (Ofstad, 2020).

As summarised in box 3.1 Zambia has financing challenges like Zimbabwe. It is therefore important to consider other countries in the region. Box 3.2 presents the status of public infrastructure financing in Mozambique another comparator country which is at an almost similar level of economic development.

### **Box 3.2: State of infrastructure and its Financing in Mozambique**

Mozambique attained political independence from Portugal in 1975. This was however followed by a civil war which ended in 1992 (Fischer & Nhabinde, 2012). As a result, the infrastructure in Mozambique was either destroyed during the civil war or suffered extended periods of neglect during the years of the civil war. Therefore, the country did not inherit a healthy stock of infrastructure from the colonial government (Fischer & Nhabinde, 2012). Mozambique is a huge country, but her population is very thin and is always affected by unfavourable weather conditions especially the rainy season which is consistently affected by floods (Armas, 2014).

Mozambique's total road network was recorded in 2008 to be about 37,000 km, of which 6,000 km is paved and 22,500km are classified as primary or secondary roads (Domínguez-Torres & Briceño-Garmendia, 2011). The density of classified road network in Mozambique is 29km/1,000km<sup>2</sup> which is reportedly the least density in the Southern Africa subregion. Mozambique has 3,130 km of railway network made up of three disconnected networks, that is, Nacala corridor, Beira corridor and Maputo corridor (Domínguez-Torres & Briceño-Garmendia, 2011). Water provision in Mozambique is better than most countries with comparable climate. The country has been making significant progress towards reducing its population relying on surface water and those practicing open defecation. Power supply in Mozambique is more reliable than several other African countries. However, Mozambique has the least electrification rate averaging about 15 percent (Armas, 2014).

The government of Mozambique's expenditure into public infrastructure development is comparable to comparator African countries, but government expenditure per capita into public infrastructure averaging 8 percent of GDP is very low and insufficient to the country's infrastructure requirements (Armas, 2014). China has also been active in financing public infrastructure in Mozambique, especially in transport infrastructure just as in many other African countries (Robinson & Hale, 2017). Chinese companies were involved in the development of about a third of transport infrastructure in Mozambique and the Mozambican transport network is important for other Chinese projects in countries such as Zimbabwe and Zambia that are landlocked (Robinson & Hale, 2017). Mozambique has also used PPP in financing infrastructure with the first successful project being the highway connecting Maputo and Pretoria via Witbank in South Africa (Fischer & Nhabinde, 2012).

The state of infrastructure financing in Mozambique has shown challenges in terms of incapacitation of the public sector and the absence of a weak regulatory framework to support PPP financing although the country registered some significant experiences. The most developed country in terms of infrastructure development is South Africa and therefore, box 3.3 outlines the landscape in infrastructure financing in South Africa.

### **Box 3.3: Infrastructure financing status in South Africa**

South Africa is the most significant contributor of the infrastructure stock in the Sub-Saharan Africa (SSA) region. For instance, in 2012 the SSA region produced about 389,000 gigawatt hours of electricity of which 61 percent was produced by South Africa (ACBF, 2016). Financing of public infrastructure is by a variety of players. The central, provincial, and local governments are active infrastructure financiers through state owned companies accessing finance from budget appropriations, issuing bonds, and arranging PPPs. Infrastructure is deliberately one of the top priorities on the South African Government's budgetary expenditures (Calitz & Fourie, 2010). South Africa is also regarded one of the leading African countries in terms of internal financing of public infrastructure (ICA, 2018). However, public sector spending into public infrastructure development is not sufficient to meet the country's requirements for refurbishing and improving infrastructure (Fourie, 2015). Public sector financing also faces challenges in efficient management and maintenance of infrastructure.

Due to public sector capacity to meet public infrastructure financing requirements, the private sector is an important and integral player in public infrastructure financing in South Africa, through subscription to bonds issued and participating in PPP arrangements. South Africa is credited for having the most developed capital markets and having a well-developed PPP financing framework. Despite South Africa's ability to attract private sector capital, there are challenges relating to the governance of PPPs (ACBF, 2016). Treasury Regulation 16, giving effect to the PPPs framework is said to be complicated and deemed seeking to regulate instead of promoting PPPs in South Africa (ACBF, 2016). There are governance and transparency challenges in the use of PPPs in South Africa (Fourie, 2015).

South Africa has been the biggest recipient of PPP infrastructure financing in the Southern African sub-region. Some examples of infrastructure financed through PPPs in South Africa are highlighted hereunder. 33 PPPs undertaken in energy infrastructure in Southern Africa of which 30 were in South Africa (Mfunwa, Taylor, & Kreiter, 2016). The 2003 Mozambique-South Africa gas pipeline attracted about US\$1.2 billion investment commitments, making it the biggest private sector financed project (Mfunwa, et al., 2016). The N4 toll road connecting South Africa's city of Pretoria to the Mozambican port city of Maputo is another success story of PPPs, valued at US\$660 million (Osei-Kyei & Chan, 2016).



After highlighting some cases of public infrastructure financing in the Southern African region it is important to review public infrastructure financing landscape in Zimbabwe.

### 3.7 Public infrastructure financing trends in Zimbabwe

The African Development Bank (2011) forecast infrastructure financing requirements of US\$14.2 billion for the decade 2010 to 2020, an amount extrapolated to US\$40 billion for the 20-year period between 2012 and 2032. The financing requirements are huge when compared to the size and state of the Zimbabwean economy where, according to the Zimbabwe Scoping Report (2015), the infrastructure set-up is unique when compared to other African countries. The uniqueness is that Zimbabwe possesses features of a ‘middle income country’ as well as ‘a fragile state’. Zimbabwe possesses the basic infrastructure which generally requires some refurbishment due to the dilapidation experienced during the period of hyperinflation and economic decline that ended in 2009 (ZEPARU, 2016).

The prior estimate of financing requirements by the AfDB (2011) for the decade 2010 to 2020 was revised by the African Development Bank (2015) from US\$14.2 billion to US\$20 billion after a survey. Findings from the AfDB survey (2015) established a surge in financing requirements for purposes of repairing roads littered with potholes, dams that have been silted, damaged bridges, schools, hospitals, and dilapidated power infrastructure. Financing of these infrastructure requirements mainly anchors on budgetary appropriations which have for the past six years made the following appropriations for capital expenditure:

**Table 3.3: Capital Expenditure Budget appropriations**

<b>Fiscal year</b>	<b>Capital expenditure appropriations (US\$ million)</b>
2013	391
2014	492
2015	536.8
2016	831.5
2017	520
2018	1,200

**Source:** MoFED Budget Statements (2013-2018)

The amounts allocated for capital expenditure by the Government of Zimbabwe are shown in Table 3.3. The amounts in real terms were not significant as they averaged US\$660 million annually over the six years presented in Table 3.3, against a requirement of investing about US\$2 billion each year set out in the AfDB Report (2011). The same amount outlined by the AfDB (2015), which notes that uplifting Zimbabwe's infrastructure to be among the best in Africa, needs an additional investment of at least 2.2 percent of its Gross Domestic Product (GDP), an amount which equates to almost US\$2 billion each year.

The Government of Zimbabwe currently spends about five percent of their revenue towards capital expenditure, amounts shown in Table 3.1. Yet the AfDB (2015) notes that Zimbabwe requires investments of about US\$1.2 billion in the power/energy sector alone. The major challenge cited by the AfDB (2015) as affecting Zimbabwe's ability to attract Foreign Direct Investments (FDIs), including into infrastructure, is the poor governance and policy inconsistencies which require reform. To bridge the financing gap from the government's budget appropriations, there is need to consider Public Private Partnerships (PPPs) as an alternative. This route was previously attempted through a government policy launched in 2013, known as the Zimbabwe Agenda for Sustainable Socio-Economic Transformation (Zim-Asset). Zimbabwe could also take advantage of Diaspora remittances as innovative finance for infrastructure, with an estimated value of US\$1.5 billion each year. The AfDB (2015) also suggested that Zimbabwe could leverage its rich mineral resources to set up a sovereignty fund to finance infrastructure projects.

The transport infrastructure sector in Zimbabwe is made up of four sub-sectors, namely road, rail, airports, and inland water transport (AfDB, 2019). The Government of Zimbabwe has been committing resources towards the rehabilitation and expansion of transport infrastructure. In the road transport infrastructure, the Government of Zimbabwe entered into a PPP with Group Five International, a South African Johannesburg Stock Exchange-listed entity. The PPP was a joint venture between the Zimbabwe National Road Administration (ZINARA) and Group Five International meant to rehabilitate more than 800 kilometres of road network, at a cost of US\$206 million. Financing was through a loan obtained from the Development Bank of Southern Africa (DBSA, 2012).

Zimbabwe has three international airports which are all being refurbished or being expanded: the Robert Mugabe International airport in Harare, the Joshua Nkomo International airport in Bulawayo and the Victoria Falls International airport. The latter was refurbished and expanded until 2015 at a cost of US\$150 million, financed by the Exim Bank of China (AfDB, 2019). The Exim Bank of China has been active in providing finance for infrastructure projects in Zimbabwe in sectors other than transport. The Exim Bank of China gave a loan of US\$319 million in 2014 for the expansion of the Kariba power station, which added about 150 megawatts to the hydro power plant (Dreher, et al., 2017). Further loans amounting to more than US\$1 billion for several infrastructure projects were also reported in Zimbabwe's media. Therefore, the shortfalls in infrastructure financing from budgetary appropriations have been to some extent supplemented through bilateral loans.

### **3.8 Chapter Summary**

The chapter has once again showcased the infrastructure financing gaps from the perspectives of government and other public financiers. The literature reviewed has shown that financing infrastructure remains problematic for countries both in the developed world as well as in developing countries. The purpose of the literature review was to showcase success stories encountered in financing public infrastructure from different perspectives. Firstly, the perspectives from developed countries are significant in informing developing countries, based on those countries that have realised significant success. Secondly, the perspective of emerging markets such as China and Brazil, amongst many other countries, are illustrated. Thirdly, literature was reviewed showcasing infrastructure financing from the Sub-Saharan African region and lastly, from the Zimbabwean perspective.

Developed countries have realised some success in financing public infrastructure using innovative finance, particularly public-private partnerships. Moreover, the private sector has significantly invested in infrastructure in developed countries. The primary reason for the success stories in financing infrastructure from the private sector as well as PPP has been the depth of their financial markets. The huge amount of resources held by private equity funds such as insurance funds have resulted in the need to invest in long-term assets and infrastructure investments have become the best investment alternative that can match the

desired investment tenure. However, the ability to attract both private capital and public resources has not been able to completely exhaust the financing appetite for infrastructure. For example, the USA's infrastructure has been consistently graded D<sup>+</sup>, clearly showing that the infrastructure is deficient, thus there is not enough financing to maintain and improve infrastructure assets.

Emerging markets have become an alternative investment market for private equity funds seeking higher returns, especially after the global financial crisis. Therefore, most countries from the emerging markets have been able to attract both PPPs and private investments into infrastructure. This ability to attract private capital has been buttressed by the latent returns from these markets, where investments generally yield more than from developed countries. Moreover, these countries have relatively stable political and economic environments where economies register more growth than developed countries. The ability to augment government resources with private resources has also not been able to satisfy the financing requirements of the emerging markets' infrastructure requirements. This has significantly improved the state of the infrastructure and led to enhanced productivity and economic growth.

Africa and Sub-Saharan Africa have the greatest deficiency in infrastructure due to the dearth in resources from the governments and the unavailability of private sector resources to finance infrastructure. The main reasons for the poor financing of infrastructure have been identified to include poor governance and political instabilities. These have chased away potential private capital as these instabilities cannot inspire investor confidence. The result has been the greatest infrastructure poverty when compared to other developing countries and regions. For instance, SSA has the greatest power poverty when compared to other developing regions of the world. Therefore, infrastructure financing in Africa and in SSA remains a major challenge which has been affecting productivity and the ability to achieve the sustainable development goals (SDGs) of the United Nations.

Zimbabwe is part of the developing countries as well as of the SSA region. The Government of Zimbabwe has not been able to finance investment for infrastructure to enhance both its productivity and global competitiveness. The major reason for this inability has been

governance related. However, similar reasons applicable to the SSA region are also applicable to Zimbabwe. The result of the unavailability of finance for infrastructure investments has been the poor productivity attributable to power shortages and poor technologies. Moreover, Zimbabwean products are more expensive on the global markets when compared to other regions, such as the emerging markets and the developed countries.

It is therefore critical that financing decisions be informed by appropriate methodical approaches. These approaches may be understood if there is a framework in place to guide infrastructure financing decisions. Most developing countries including Zimbabwe lack the technical expertise necessary to inform their financing decisions for infrastructure projects. The importance of a country's ability to attract the required resources to finance infrastructure requirements has numerous direct and indirect benefits for any country. The following chapter reviews literature on the frameworks available to inform this critical process of the financing of the development of public infrastructure. Specifically, the chapter reviews literature on the various instruments that may be deployed to finance infrastructure requirements for countries.

## CHAPTER FOUR

### THEORETICAL PERSPECTIVES ON PUBLIC INFRASTRUCTURE FINANCING

#### 4.1 Introduction

Globally, there have been discussions about how governments of both developing and developed countries can deliver the best public infrastructure to their citizens. Moreover, there has been increased pressure on the resources available for investment in infrastructure due to higher growth in their populations, rising rates of urbanisation, as well as a surge in expectations as the world has become one due to globalisation (Poole, et al., 2014). Resources such as finance have not been enough to meet the rising demand in both social and economic public infrastructure. Economic infrastructure includes transport, energy (power), Information Communication Technologies (ICTs) and water and sanitation. Gaps have been identified in all these infrastructure sectors and citizens expect governments to provide these, despite the dearth in finances to invest in these infrastructures. Zimbabwe is also faced with similar challenges of resources for financing her public infrastructure requirements.

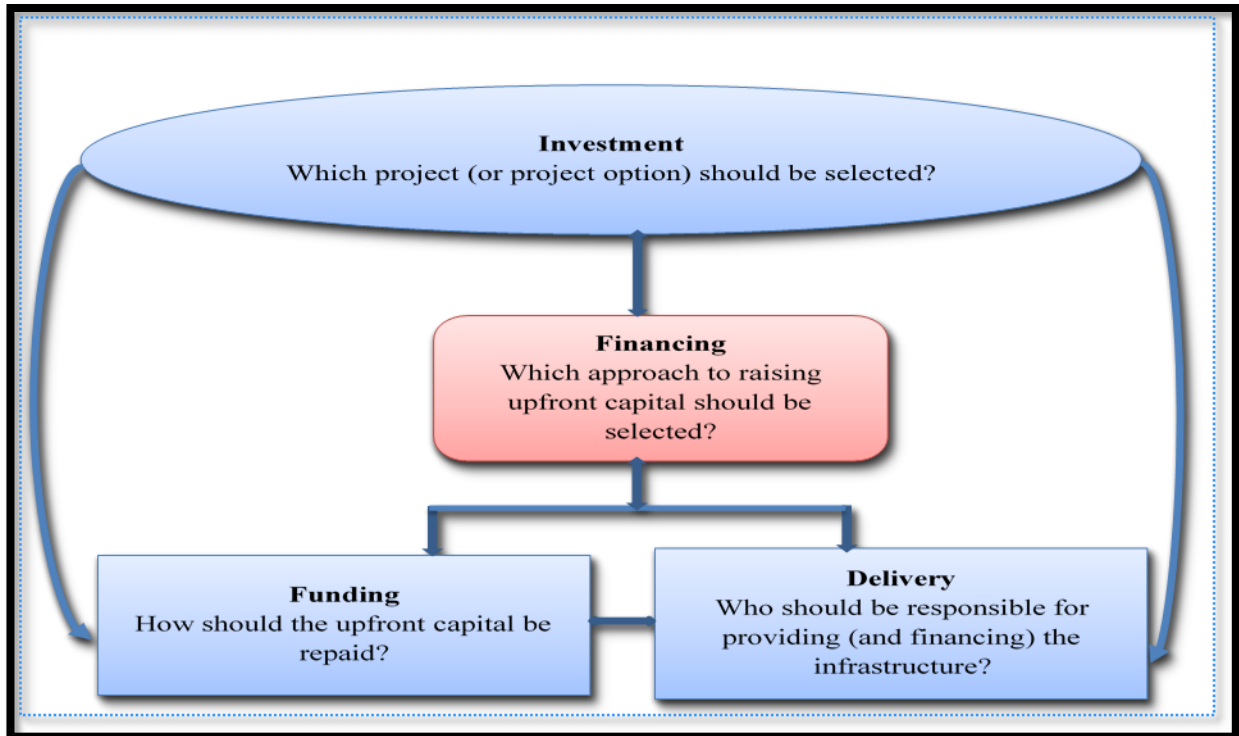
Public infrastructure can broadly be financed through budget appropriations, any other resources controlled by the government and public institutions, or through debt. Besides public resources, infrastructure can be financed by the private sector, either through debt finance or some other special arrangements with the government. There have also been innovative methods of financing public infrastructure, with the leading mechanism being a blend of public and private resources known as public-private partnerships. Further to this there are several other innovative mechanisms which have been developed and used to finance developmental and humanitarian interventions, but which are used to a lesser extent to finance public infrastructure. The focus of the study is to establish how economic infrastructure is financed both from the theoretical perspective as well as from practical perspectives. This is meant to ensure that the establishment of a framework for public infrastructure financing for Zimbabwe may be developed in the study.

Given the overview to the financing of public infrastructure outlined above, this chapter reviews theoretical literature on the various ways in which public infrastructure may be financed. The purpose of reviewing the variety of mechanisms to financing economic infrastructure is to showcase the contributions of these financing instruments in closing the infrastructure financing requirements gap. The literature reviewed explores the various theories relating to the financing of public infrastructure, as well as the various instruments that are available in literature to finance public infrastructure from the public sector (government) perspective.

In terms of outline, section 4.2 introduces the concept of public infrastructure financing from a theoretical standpoint. This is meant to distinguish interrelated concepts in relation to infrastructure, that is, financing, funding, delivery, and investment. This is followed an overview about the variety of sources of finance for public infrastructure from a theoretical perspective. Thereafter theories related to the financing of infrastructure by the public sector are reviewed, followed by theories that guide the private sector when financing public infrastructure and the various financing instruments that may be used and finally the use of innovative finance in financing public infrastructure is reviewed from the perspectives of undergirding theories. The various innovative financing instruments are the last to be reviewed. The theoretical perspectives to the financing of public infrastructure are important for the study as they form the foundation of the study and are meant to guide the thesis in terms of the study conducted and the presentation, interpretation, analysis and discussion of results for the study.

## **4.2 The concept of Financing in Public Infrastructure**

Understanding how economic agents invest in infrastructure through financing is key in this study. The study focuses on developing a framework for appraising financing approaches for public infrastructure projects. The concept of infrastructure financing is closely linked to the concepts of investment, funding, and delivery of the infrastructure, as depicted by Figure 4.1 below.



**Figure 4.1: Financing’s relation with other infrastructure decisions** (Source: Henn, 2015)

As shown in Figure 4.1, there is a connection between investment, financing, funding and the delivery of infrastructure (Henn, 2015). Given the relationship depicted in Figure 4.1, it is fundamental to briefly distinguish between these concepts. Although the study focuses on financing, the other decisions may be made either concurrently or separately of each other, but they contribute jointly towards the provision of public infrastructure. For instance, the need for such distinction between investment and financing is motivated by classical literature such as the Fisher Separation Theorem which states that productive investment opportunities with the maximum net present value should be recognised without being influenced by the evaluation of the financing mechanism to be deployed to realise it (Fisher, 1930). Therefore, the decision to invest should be made with minimum influence from the financing decision.

Investment is accordingly defined by Chan et al. (2009) as the allocation of present resources such as capital and labour for purposes of realising products or income, thereby foregoing current consumption. On the other hand, the financing decision is independent of the net economic benefits realisable from the investment and usually must be done after the



investment decision has been made. Therefore, when evaluating a project, financing costs should not be included as they represent a transfer payment without any effect on the project's net economic value. This does not relegate the importance of the financing decision and the financing approach must be appraised separately since it affects the society in terms of the financial obligations and the distribution of resources (IER, 2005). Financing in relation to infrastructure deals with the activities pertaining to obtaining and allocating the financial resources needed to implement the investments in infrastructure projects (Chan, et al., 2009). This study is premised on the financing, which is a critical decision that must be made to ensure that investments in infrastructure are realised.

As shown in Figure 4.1, the concepts of delivery and funding in relation to infrastructure are also closely related. Infrastructure funding refers to the streams of income that will be used to repay the amount of capital outlaid for the project or laid up for future investments into the infrastructure project. For example, toll fees collected from road users may be the funding for recouping the amount invested into building the toll road, which can be a mixture of private sector borrowings and equity. Chan et al. (2009) further state, in relation to the funding decision, that the critical issue is deciding whether the government should obtain the amounts to repay the continuous costs of operating infrastructure, principal investments as well as interest from taxes or user fees. On the other hand, the delivery of infrastructure pertains to 'who' has the responsibility to make the infrastructure available. The cycle of the infrastructure delivery process includes the development of specifications, procurement, obtaining finance, construction of the infrastructure, its operation, as well as the provision of oversight over service provision. Given the multitude and variety of processes involved, it is usually possible to have numerous entities involved in the delivery of the infrastructure. It therefore becomes imperative to distinguish between funding and financing once again conceptually.

In the context of investments in infrastructure, the terms 'financing' and 'funding' are essentially different (Maxwell-Jackson, 2013). As discussed above, funding pertains to the process through which the defrayment of infrastructure costs is recovered over time whilst financing relates to the process through which the upfront costs of constructing the

infrastructure are met (Maxwell-Jackson, 2013). These definitions of the concepts of financing and funding have attained repute and are commonly used widely in literature, as depicted in reports by practitioners and publications by scholars. For instance, the Australian Financial Services Council and Ernst and Young (2011) define these concepts as follows:

*“...the funding of infrastructure is defined as the allocation of ultimate cash flows that support the construction and operation of infrastructure. The financing of infrastructure is defined as selecting the immediate source of cash that will physically develop the assets with the repayment of this investment over the life of the asset. Funding is the revenue stream that repays the financing”* (Australian Financial Services Council and Ernst and Young, 2011: 6).

This definition echoes the definitions outlined earlier about these concepts. The essence of the definitions is to clearly distinguish the two concepts which are commonly used to mean the same thing.

The attempt to distinguish these concepts is not easy since there is a blurred definition in extant policies and practitioners' discourse. Therefore, clearly distinguishing whether infrastructure is privately or publicly financed and/or funded is important. Accordingly, Vander Ploeg (2011) claims that infrastructure can only be funded from either taxation or from user fees/charges and these are the only possible sources of funding infrastructure investments. This view is also resonated by PricewaterhouseCoopers (2013) in a report where they suggest that infrastructure funding is either obtained from fees charged to the users or when the government spends what they have collected from taxpayers. Therefore, from these two possible sources of funding, spending by the government (taxation) is implied as public funding, whilst payments by users of infrastructure or any revenues generated by the infrastructure are regarded as private funding of infrastructure. This distinction may appear clear from a theoretical perspective, but not so clear in practical realities. For example, in the Private Finance Initiative (PFI), the private refers to the way the infrastructure project is financed (Leyshon and Thrift, 2007). However, accounting standards offer room for accountants to interpret, which has resulted in some PFI projects being classified and reported as being privately funded infrastructure (CECA, 2013).

There are some authors who have attempted to overtly simplify the distinction between private financing and public financing. For instance, Van der Ploeg (2011) submits that infrastructure can be financed by using revenues generated by the infrastructure to meet the costs, otherwise known as the ‘pay-as-you-go’ basis, or by borrowing to meet the costs of constructing the infrastructure with repayments to be met with future revenue from the infrastructure investment. This overtly simplified binary definition of infrastructure financing may not adequately capture other multifarious mechanisms of financing infrastructure (Chen & Bartle, 2017). There have been new mechanisms and instruments developed as the financial markets have developed for financing infrastructure. It is therefore important to explore the variety of instruments used to finance public infrastructure and the sections that follow review the theories pertaining to the novel financing instrument’s function, collectively known as innovative financing.

The last section of the literature review outlines the major innovative financing instruments that can be used to finance public infrastructure, as outlined in literature from a theoretical perspective. As stated in the introduction to this chapter, infrastructure can be financed from the public sector, privately or a hybrid of the two, which has been termed ‘innovative financing’. The following section reviews some theories that are applied when selecting the best source of finance.

### **4.3 Public infrastructure financing theoretical perspectives**

Infrastructure is one of the key pillars of modern society and economies. Countries require vigorous, effective, and well-maintained infrastructure systems for the purposes of sustaining and supporting their economic activities and global competitiveness, leading to the enhancement of the quality of life for their citizens (Chen & Bartle, 2017). Given the centrality of the need for the development of infrastructure in the pursuit of the global sustainable development goals, it has become important that countries, especially developing countries, continually invest in the improvement of the infrastructure (Jalles d’Orey & Prizzon, 2017).

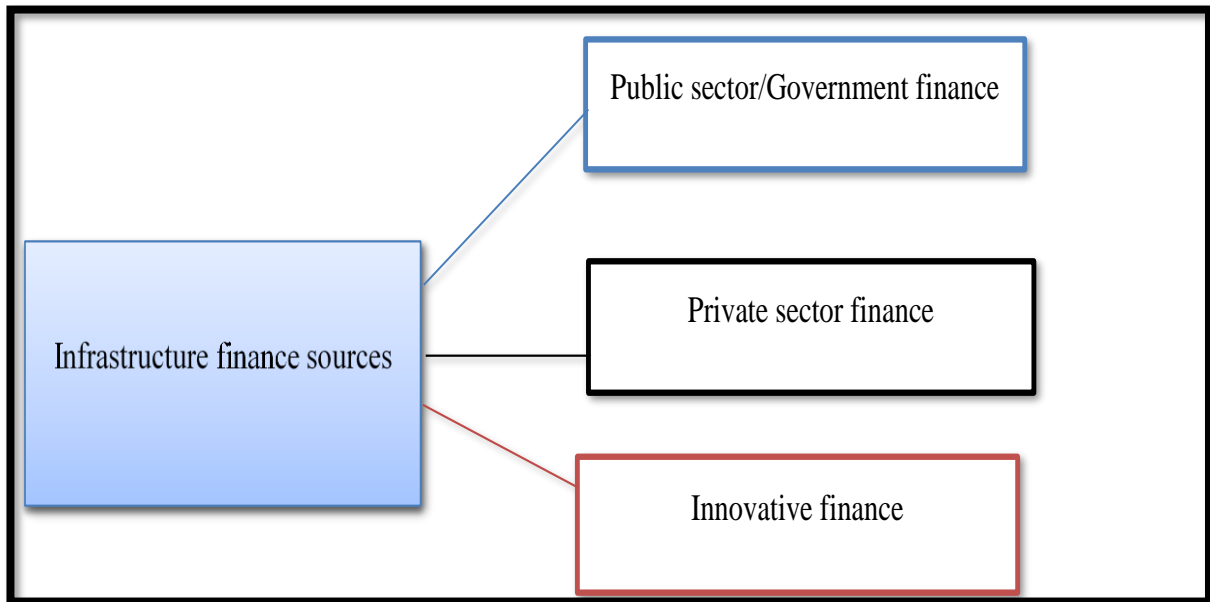
The major stumbling block to countries investing in the best social and economic infrastructure has been and continues to be finance. There are two primary players in the

provision of infrastructure, namely the public sector and the private sector, both of which may play different roles such as financing, regulating, delivery and investment. Traditionally, the public sector represented by the government and their various agencies participated in the provision of infrastructure due to market failures and the fact that infrastructure has been classified as public goods, as discussed earlier in this chapter (Chen & Bartle, 2017). Despite the public sector facing constraints in providing the finances required for the optimal stock of infrastructure assets, the private sector cannot exclusively provide infrastructure due to the resultant natural monopolistic nature of most infrastructure assets. It is therefore imperative to ensure a balance in the roles played by the public sector and the private sector.

Traditionally, the financing models used to finance public infrastructure in developing countries relied on development finance institutions, public institutions, multilateral institutions, and export credit agencies, whilst only relying on the private sector in the delivery of the infrastructure by taking advantage of their project execution expertise, cost optimisation and operational efficacies (Ray, 2015). Governments have however been faced with financial constraints in terms of a lack of fiscal space to raise finance for investment into infrastructure development (Woetzel, et al., 2016). Due to this dearth of financial resources, the private sector entered the infrastructure provision sector, resulting in the destruction of public monopolies and the associated revenue being determined by market forces, which in turn led to a change in the financing models for infrastructure assets (Ray, 2015).

With the coming on board of the private sector, the vehicles which may be used by public institutions to raise finance are broadly categorised into either cashflow financing or capital market financing (Chan, et al., 2009). Cashflow financing is dependent on the quality of the cashflows to be generated by the investment (asset) financed to recoup and repay both the principal and interest advanced. On the other hand, capital market financing is premised on the quality of the statement of financial position (balance sheet), which influences the ability of the entity to raise debt finance. Therefore, private sector investors into infrastructure are looking for investment opportunities that offer stable returns and that are also inflation-proof in the long-run to match their liabilities (Woetzel, et al., 2016).

The financing of infrastructure on one hand has its challenges in terms of the limitations in resource purse constraints, as well as challenges in terms of capabilities in the execution and management of the infrastructure projects (Woetzel, et al., 2016). On the other hand, the private sector does not have the capacity to invest alone into the size of infrastructure projects and neither are they willing to bear the full risk of investing in long-term infrastructure projects (Wagenvoort, et al., 2010). This has resulted in the blending of the public sector and private sector investments into financing public infrastructure in what is termed ‘innovative finance’ (O’Brien & Pike, 2015). Innovative finance is also known as an alternative mechanism for financing infrastructure and is defined by Chen and Bartle (2017) as an umbrella term encompassing novel mechanisms and financial arrangements used in providing finance for infrastructure development. Figure 4.2 presents an overview of the primary sources of finance for the provision of public infrastructure.



**Figure 4.2: Sources of public infrastructure finance** (Source: Chen and Bartle, 2017; O’Brien and Pike, 2015 and Gutman, et al., 2015)

Figure 4.2 summarises the major sources of finance as depicted in theory. As noted earlier, it is the public sector (government) that bears the primary role of providing infrastructure, a role which most governments cannot fulfil alone hence calling for private sector involvement (Chan, et al., 2009). Private sector involvement is of varying degrees, with options for full

privatisation which most governments are unwilling to allow due to the challenges associated with such privatisation of infrastructure provision (Gutman, et al., 2015). This has resulted in the creation of innovative instruments whereby the government and private sector share responsibilities and risks, which is known as innovative financing (Bayliss & Van-Waeyenberge, 2018). The three sources of infrastructure financing are discussed in terms of their theoretical underpinnings in the following sections, starting with the public financing, followed by private financing and finally innovative financing.

#### **4.4 Financing of infrastructure by the Public Sector**

The role played by the public sector in financing public infrastructure can be explained from public finance, public policy, and public welfare economics perspectives. An overview of the roles played by the public sector from a theoretical perspective is outlined in this section of the chapter. Firstly, the theory of public finance and public policy and then the public welfare economics perspective are reviewed. Furthermore, the main purpose of this theoretical review is to situate the roles of the public sector in the development of a framework for public infrastructure financing for Zimbabwe, which is the primary purpose of the study.

##### **4.4.1 Theory of Public Finance and Public Policy**

Since the current chapter focuses on reviewing literature on the financing of public infrastructure, it is imperative to lay the theoretical foundation to the study. One of these fundamentals is outlining in general the theory of public finance together with public policy. This is important as it helps in understanding the effects of financial decisions by governments and entire economies, as well as entire market systems (Stiglitz, 2010). Moreover, public finance and public policy theory also deal with the social evaluation of government funding systems such as tax policies, which helps in appraising financing mechanisms in addition to the usual monetary aspects. Key aspects evaluated for taxes include their fairness (equity principle), transparency, their adherence to the efficiency principle and certainty, amongst many others (McNutt, 2002; Abelson, 2008; McTaggart et al., 2010).

Scholars in public finance and public policy devote most of their discussions to the principles of the overall financial positions of the government, which despite its importance does not add

much value in relation to the current study dealing with the appraisal of how infrastructure may be financed and the appropriate instruments. For instance, scholars such as Hyman (1999), Gruber (2007), Rosen and Gayer (2007) as well as Abelson (2008) discuss the variety of practices and principles applicable to public expenditure and taxation in order to achieve several interests for the government, such as public interests and social welfare objectives. Further to this, these scholars describe such concepts as market failure, rationale for economic actions by governments, regulation of markets, economic growth as well as the effects of various taxes and tax policies by governments. In addition to these, there is also discussion of the effects of budget deficits on economic activities and the concept of excessive public borrowings, together with theories explaining the burden of such public borrowings (debt) which include the Neo-classical model and the Ricardian model.

As outlined by Rosen and Gayer (2007), much of the theories of public finance and public policy is focused on the financial liabilities for governments, without attaching these liabilities to any assets such as public infrastructure. Therefore, due to this lack of balance, the assessment of the financial position for the governments is likely to be misleading. Thus, public finance and public policy theories deal with limited aspects about public sector financing without providing adequate details regarding the processes of selecting the instruments to use to finance public infrastructure. This omission may result in highly misleading assessments of a government's financial position. However, despite this lack of balance, the discussion employs a review that focuses on the key aspects relevant to the study, although some of the theories are not from the public finance and public policy discourse. Firstly, justification for the involvement in the financing of public infrastructure is provided by clarifying whether infrastructure is a public good or not, then the changes that have happened over time in the extent to which the public sector has been actively financing public infrastructure together with the private sector.

#### **4.4.2 Infrastructure as public goods**

The definitions and classifications of infrastructure have been developed and contextualised in Chapter 2. It is however important to emphasise that the financing of infrastructure requires one to firstly to appreciate the role/(s) played by the government in market economies. Since

the focus of study is on the financing of economic infrastructure, the role of the government from an economic perspective was first articulated by Adam Smith in a book published in 1776 titled *An Inquiry into the Nature and Causes of the Wealth of Nations* (Smith, 1776). As outlined by Smith (1776), the study of public economics involves elements of studying both the positive and normative roles played by the government in ensuring economic efficacy, as well as contributing towards aspects such as public expenditure, finance and economic policies. Therefore, public economics is positive and normative since it does not only consider how actions by the government affect economic activities, but it also considers mechanisms for achieving welfare amongst its citizenries. Public economics also deals with political science and ethical philosophy (Abelson, 2008). It follows that welfare economics avails sophisticated normative theory on when governments ought to interfere with the markets' economic system, as well as the envisaged effects of such interferences (Dictionary of Economics, 2013).

Public economics theories generally proffer that intervention by the government is necessary where market failures are inevitable. Below are common market failures when providing public infrastructure:

- a) **Externalities:** this refers to market situations when it fails to sufficiently reflect the benefits (positive externalities) and/or costs (negative externalities) of the good or service. Perkins (2005) notes that without government intervention, competitive markets are likely to over produce negative externality-goods whilst under-producing goods with positive externalities.
- b) **Inelastic demand:** essential public infrastructure services are relatively inelastic in nature. Thus, Vander Ploeg (2006) avers that due to the absence of practical substitutes, the demand for public infrastructure services is regarded as comparatively insensitive to price or cost changes.
- c) **Economies of scale:** the provision of public infrastructure involves investments in huge capital-intensive and long-payback period projects, which results in few such systems and in natural monopolies. This is articulated by Vander Ploeg (2006), who therefore concludes that there are no economies of scale.



- d) Nature of public goods:** naturally, public infrastructure like other public goods is regarded as non-rivalrous, that is, an increase in users does not encumber on the benefits derived by existing users of the infrastructure. Moreover, public infrastructure is also regarded non-excludable, that is, it is hard, expensive or unrealistic to exclude those who refuse or cannot afford to pay to use it (Gannon and Smith, 2009; Perkins, 2005; Ubbels et al., 2001).

According to Kay (1993), the free-market system does not always achieve efficiency in allocating goods and services due to the existence of market failures. Infrastructure is a public good which is of strategic importance and as a result requires the participation of the public sector (government or government agencies) to avoid the provision of such services by a single dominant private supplier (monopolisation), poor coordination and insufficient capital investment timeously (Kay, 1993). There are several reasons warranting the government to be actively involved in providing public infrastructure, as outlined by the Allen Consulting Group (2005) to include the following:

- a) For minimising or overcoming possible bottlenecks in supply, exposing public interests.
- b) For oversight of the delivery of essential public infrastructure; as well as
- c) For addressing market failures with the potential to lead to sub-optimal private investment in infrastructure.

Public infrastructure is generally classified as a public good, but there are very few examples of such infrastructure which are in essence purely public goods, such as national defence; whilst on the other hand there is no public infrastructures that is purely a private good in nature. Therefore, infrastructure is rather more quasi-public or merit goods by nature. Nelson (2005) and Van der Ploeg (2006) highlight that merit goods including education, museums, and theatres, are beneficial to society and individuals. On the other hand, quasi-public goods which include public transport, water treatment and highways, possess key features of public goods such as non-excludability and non-rivalry, but they concurrently provide considerable benefits to individuals (Nelson, 2005 and Van der Ploeg, 2006).

The government is usually active in providing these quasi-public and merit goods because consumption would be negatively impacted if consumers/individuals were supposed to pay the full cost of using these goods. Therefore, some of the goods are classified as social infrastructure and includes services such as education, public housing, courts, correctional services, and healthcare (Infrastructure Australia, 2008). On the other hand, there is what is called ‘economic infrastructure’, so named because they are an essential element consumed by businesses and individuals (households) in the economic productive processes, which include water and sanitation facilities, power supplies, telecommunication facilities, roads, railways, and communication facilities (Merna and Njiru, 2002). The following sections reviews the instruments used by the public sector to finance infrastructure.

#### **4.5 Public sector infrastructure financing instruments**

Globalisation, coupled with rapid urbanisation and industrialisation in some regions of the world, has seen infrastructure financing requirements doubling from about US\$1.7 trillion in 2006 to more than US\$3 trillion by 2015 (Dreher, et al., 2017). This growth in financing requirements has not been matched with a proportionate growth in governments’ capacity to finance infrastructure requirements for sustainable development. Since time immemorial, governments have carried the burden and role of providing public infrastructure including the financing thereof. One major source of revenue for financing governments’ expenditure, including the financing of investments in infrastructure, has been taxes (Wagenvoort, et al., 2010). In addition to taxation, governments have also traditionally, and continue to, raised finance through borrowing, commonly known as public debt (Wagenvoort, et al., 2010). Finance raised through taxes are invested into infrastructure projects as budget appropriations, whilst the debts can be obtained through the issuance of instruments such as general obligation bonds or specific bonds and/or revenue bonds (Chen & Bartle, 2017). The basic modalities of these financing instruments are reviewed in the following sections.

##### **4.5.1 Budget Appropriations**

Literature records that despite the public sector and governments being unable to meet their countries’ infrastructure requirements, budget appropriations continue to be the leading source of public finance for investments into public infrastructure for most countries across the globe

(Calitz and Fourie, 2007; Chan, et al., 2009; UNECE, 2017). Financing infrastructure through budget appropriations ensures that there are no future liabilities and obligations attached to the revenues generated by the asset so financed. The major handicap of financing public infrastructure assets through budget appropriations is noted as the opportunity cost of having invested the same resources in alternative assets, including making transfer payments to the taxpayers who could have invested in the market and realised better returns. Due to the unavailability of resources, there are usually delays in expenditure on major projects especially those whose development is done in phases.

Apart from taxation, budget appropriations are also financed from public borrowings (public debt), usually raised through the issuance of several types of government bonds. The total costs associated with borrowing include the rate of return on the bonds and any other related costs, such as administrative costs, for issuing the debt instruments as well as the contingent liabilities related to the project which must be borne by the government as they are the sole financier for the infrastructure projects. In addition to these, Kingombe (2011) notes that finances obtained through official development assistance (donors) and/or advances from international development financial institutions are sometimes extended to the infrastructure projects in the form of budget appropriations by the host/recipient governments.

The main advantage noted for financing infrastructure through budget appropriations without regard to the way the finances are raised is the subjection of the appropriations to public scrutiny through their representatives in parliament and transaction costs are relatively lower than other alternative financing instruments (Chan, et al., 2009). On the other hand, the primary weakness of financing infrastructure assets through budget appropriations noted by Claitz and Fourie (2007) is that governments usually prefer to use appropriations without taking due consideration of other alternative appropriate financing mechanisms. Moreover, budget appropriations tend to reduce incentives and scope for the allocation of project risks to those more capable of managing these risks (Chan, et al., 2009). Budget appropriations are key in this study as they represent a financing instrument commonly used to finance public infrastructure in developing countries. Therefore, their review guides the entire study as it is a fundamental financing instrument whose contribution cannot be ignored.

#### **4.5.2 Infrastructure Project Bonds**

This refers to the issue of public debt instruments, including but not limited to bonds for the purpose of financing specifically identifiable infrastructure projects (Chan, et al., 2009). Collateral security for such debt is usually provided in the form of the asset financed and/or the revenue associated with the asset financed. The issuance of specific bonds remains an integral instrument for financing infrastructure in numerous countries, but the inherent contingent liabilities for the governments led to developing countries phasing out this financing mechanism. Specific bonds are particularly common in the municipal bond markets (Jackson, 2007 and Peterson, 2000). There has also been the prevalence of tax-exempt bonds issued by municipalities which attempt to reduce financing costs (interest), but they still fail to offset completely the opportunity cost of tax revenue forgone and high transaction costs (El Daher, 2000).

Infrastructure project bonds have been used in financing public infrastructure in Zimbabwe and therefore, their review is important for the author and the reader to situate the extent to which they have been used and the potential scope for raising more infrastructure finance to reduce the financing gap. Moreover, the framework developed in this study is important for ensuring that infrastructure project bonds are used in projects that match the associated risk profile.

#### **4.5.3 Financing State Owned Companies**

Experience drawn from developed countries is that state-owned companies should have their infrastructure investments largely financed through raising debt, although it is possible to use a mixture of financing instruments (Chan, et al., 2009). Where there are regulations for declaration of dividends to the government, together with any regulation of user fees levied, these have the potential to influence the capacity of the state-owned companies in financing their infrastructure requirements from their retained earnings. Borrowing powers for state-owned companies are usually limited in terms of the legislation establishing these companies, leaving the companies resorting to financing their infrastructure requirements through capital injections from the stockholders (government). Whenever state-owned companies raise their finance from capital markets, the market becomes a watchdog monitoring their financial

performance and scrutinising the viability of their infrastructure investments (Chan, et al., 2009). The case in Zimbabwe is that state owned companies and parastatal enterprises rely on financing from the fiscus for their infrastructure investments. Therefore, the review is important because some of the entities providing public infrastructure in Zimbabwe are either state enterprises or parastatal enterprises.

The above review of instruments for financing public infrastructure by the public sector is not comprehensive as there are a variety of other instruments which are developed and used within certain jurisdictions. Instruments reviewed are common across a variety of jurisdictions and therefore are also applicable in Zimbabwe, the country under study. The instruments reviewed represent the most frequently used financing instruments. The following section reviews theoretical literature pertaining to the participation of private sector players in the financing of public infrastructure.

#### **4.6 Private sector participation in infrastructure financing**

The motivation for the participation of private sector players has been the need to close the infrastructure financing gap, which has continually been growing due to the under-investment by the public sector into public infrastructure due to resource constraints (Gutman, et al., 2015). Infrastructure financing from the private sector takes the form of either equity or debt (Chong & Poole, 2013). There are several players involved in the financing of infrastructure including institutional investors such as insurance companies and pension funds, financial institutions and private companies seeking investment opportunities (Woetzel, et al., 2016).

There are useful theories in the selection of the best approach to finance assets. Entities in the private sector, when making financing decisions especially concerning long-term assets such as infrastructure, always seek to utilise optimally long-termed finance so that they match the duration of the investment. Decisions to invest in public infrastructure by these players is guided by several theories which are reviewed hereunder. The theories include the Capital Structure Theory by Firer, Ross, Westerfield, and Jordan (2008), Pecking Order Theory by Myers and Majluf (1984) and the Agency Theory by Jensen and Meckling (1976), amongst many other relevant theories.

#### **4.6.1 The Capital Structure theory**

The proportions of the combination of equity and long-term debt used to finance an entity's operations is known as the capital structure of the enterprise (Firer, et al., 2008). How entities prefer to finance their operations in terms of combining debt and equity affects the capital structure of the entity. The effect of the capital structure on the value of the entity was established by Modigliani and Miller in 1958, whereby they propounded that in perfect capital markets where there are no taxes and costs associated with bankruptcy, the capital structure has no impact on the value of the entity. According to this theory, the value of the enterprise rather depends on the capacity of the enterprise's assets to generate value regardless of whether they were financed from equity (internal resources) or from debt (external capital) (Modigliani & Miller, 1958).

However, Modigliani and Miller, in 1963, revised their 1958 theory and considered the effects of taxes and propounded that entities should utilise debt as a source of finance to the maximum extent possible as they stand to benefit through tax shields due to the deductibility of interest for tax purposes (Modigliani & Miller, 1963). Therefore, entities that use debt to finance assets and operations are likely to pay lower taxes than those that employ equity as a source of finance. This is likely to result in the entity's assets being able to generate more value if financed from debt. The theory guides private sector players on the selection of financing instruments that maximises the value of their enterprises after investing in infrastructure assets.

#### **4.6.2 Pecking Order Theory and Agency Theory**

The Pecking Order Theory advocates the financing of assets and operations through equity over debt and/or short-term borrowings instead of long-term debt or internal resources over external resources. This preference is predicated on the information asymmetries that exist between the firms and potential investors (Myers & Majluf, 1984). According to the Pecking Order Theory, information asymmetry can be resolved by financing business entities' investments through retained earnings and avoiding issuing new securities whilst, if the entity has large information asymmetry, it should issue debt rather than selling their stocks undervalued (Myers & Majluf, 1984).

The Agency Theory on the other hand describes the existence of conflicts of interest coupled with information asymmetry between key stakeholders of the firms, such as management and stockholders as well as external providers of finance (lenders) (Jensen & Meckling, 1976). Conflicts of interest are usually propagated by management who always intend to achieve their own interests (targets) at the expense of firm value creation for shareholders and lenders. This leads to equity holders incurring agency costs in a bid to monitor and control management's behaviours and actions (Jensen & Meckling, 1976). Similarly, when debt is used to finance the firm's investments, managers may attempt a transfer of value from lenders to equity holders through information asymmetry, leading debtors to incur agency costs to narrow the information asymmetry and therefore realise the true value of their advanced credit (Jensen & Meckling, 1976). Therefore, both debt and equity have agency costs related to their use to finance investments.

#### **4.6.3 Risk and Return theory**

There has been a notable increase in formation and advancement of expert infrastructure during the 1990s, which called for the classification of infrastructure investments as a new class of assets (Inderst, 2010). As a result of this advancement, the evaluation of risk-return in investments into infrastructure requires further scrutiny, just like all other portfolio assets. Investments into infrastructure assets possess certain qualities such as their low sensitivity to movements in the markets and the economy; returns from infrastructure investments are not highly correlated with returns from other classes of assets; and the investments have cashflows with long-term predictability and stability (Platz, 2009). Moreover, Platz (2009) iterates that these features require prospective investors not to expect unrealistic returns.

Since infrastructure investments are part of the portfolio for the investors, the Capital Asset Pricing Model (CAPM) helps investors to theoretically determine the rate of return required on infrastructure investments, given their inherent non-diversifiable risk as propounded by Sharpe (1964); Lintner (1965) and Black (1972). The CAPM model is mathematically represented by the following linear equation (model):

$$E(R_i) = R_f + \beta_i(E(R_m) - R_f)$$

Where:  $E(R_i)$  gives the expected excess return of the market.

$E(R_m)$  represents the expected return from the market.

$R_f$  is the expected return from risk-free assets; and

$\beta_i$  represents the responsiveness of the asset to systematic risk

The CAPM model would help the investor in public infrastructure in terms of the rate of return they would set as an expected hurdle return for purposes of determining the suitability of the investment decision, as well as the source of finance used. These are some of the fundamental guiding theories that guide private sector players when making financing decisions in their participation in public infrastructure developments. The review of these theories is also important for the study as it forms a basis in the interpretation of the level of private sector financing of public infrastructure in Zimbabwe. The following section reviews the major instruments used by the private sector in financing public infrastructure.

#### **4.7 Private Sector infrastructure financing instruments**

Private sector participation in infrastructure finance is mainly through corporate finance, but there has been a notable increase in project finance (OECD, 2015). In developed countries, the private sector has participated in the financing of public infrastructure through subscribing to sub-sovereign bonds since the mid-2000s (Platz, 2009). For developing countries, private sector involvement has generally involved foreign capital combined with debt in the form of syndicated bank loans, issuing bonds, bridge and backup facilities, multilateral and export credit agency loans and guarantees (Dailami & Leipziger, 1998). Some of these instruments are explained in the following sub-sections.

##### **4.7.1 Equity-Listed infrastructure companies and infrastructure funds**

There are companies that have been established for purposes of investing and managing infrastructure assets, which are listed on stock markets (OECD, 2015). The listed infrastructure entities may include but are not limited to the following: utility providers, transportation companies, telecommunication companies and airports companies, amongst many others (Chan, et al., 2009). Given the broad spectrum of the players in the sector, there is no standard definition of infrastructure companies. Besides the listed companies, there are funds traded on public stock markets which raise finance through initial public offerings and



other special arrangements for the purposes of investing in infrastructure assets (Chen & Bartle, 2017). Such funds allow retail investors and institutional investors to directly invest in infrastructure assets by acquiring units in such funds (OECD, 2015).

#### **4.7.2 Government, municipal and other sub-sovereign infrastructure bonds**

This category of infrastructure financing instruments includes bonds issued by public entities into the capital market for the purpose of financing the construction and/or operation of public infrastructure assets (OECD, 2015). The issue of these bonds is usually sponsored by central governments, local governments (municipalities), public sector agencies and multilateral development financial institutions. These bonds can be issued in the form of revenue bonds that are directly related to specific infrastructure projects, or quasi sovereign bonds whose proceeds or part thereof is used to finance infrastructure projects, or sub-sovereign bonds issued by government-controlled entities, including development banks (OECD, 2015). In addition, multilateral development banks can provide credit for infrastructure projects through issuing subordinated and/or mezzanine debt instruments, or just acting as lead originators or investors in senior bond issues. Such bond issues are classified as investment grade by most institutional and liability-driven portfolio holders due to their long-dated maturities and high credit quality. To encourage investors taking up these bonds, they are usually tax exempted for both the principal and coupon receipts.

#### **4.7.3 Infrastructure Syndicated loans and bank loans**

Another way in which the private sector invests in public infrastructure projects is through syndicated loans originated by either development or commercial banks and investors participating through syndicated loan markets, or directly investing through co-investment arrangements (OECD, 2015). The major advantage of such syndicated loans is the sharing of the financing risks by several investors (Ehlers, 2014). The syndicated loan is advanced as either a corporate finance structure or through a project finance special purpose vehicle entity (OECD, 2015). On the other hand, banks participate in public infrastructure financing through the banking model of underwriting infrastructure project finance loans, then hold the loans until maturity when they service them (Ehlers, 2014). The lead underwriting bank/(s) may sell portions on the syndicated loan market. Project finance loans can be issued either during the

construction phase or the operational phase of the infrastructure assets since they are regarded as more flexible than bonds. Interest on such loans can be fixed or variable, with benchmarks such as the EURIBOR and/or LIBOR and with tenures of up to 30 years, depending on the asset financed (OECD, 2015).

#### **4.7.4 Infrastructure Corporate bonds**

This refers to the issue of standardised securities either publicly or through private placements by publicly traded infrastructure companies or utilities, with the bonds issued onshore or offshore (OECD, 2015). There are chances of the corporate bonds performing better when issued in an offshore market with more depth and liquidity, however this is affected by the sovereign rating of the country (Chan, et al., 2009). The tenure for these bonds is usually longer than that of loans, therefore allowing the borrowing entities to lock-in long-term financing, which is suitable for infrastructure assets. Corporate bonds are legally bound by indentures and are usually registered with securities markets regulatory authorities when traded publicly (OECD, 2015). Corporate bonds usually bear fixed coupon rates and sometimes entail inflation-indexed payments, whilst their risk is associated with the issuing corporate entity rather than the viability of the underlying infrastructure assets financed. Corporate bonds are therefore considered less risky than project bonds and they are either investment grade or below investment grade (Ehlers, et al., 2014).

#### **4.7.5 Infrastructure Project bonds**

This refers to the issue of standard securities, publicly or through private placement, for purposes of financing specified stand-alone infrastructure assets or projects (Chan, et al., 2009). This type of bond is gaining in popularity as a project financing instrument suitable for brownfield projects and is also being used to finance long-term infrastructure projects (OECD, 2015). Project bonds are usually issued through special purpose vehicle companies formed for the purposes of project finance procurement as a separate legal entity and are traded to banks or other bond investors (Bellier & Zhou, 2003). Legally, project bonds are bound by bond indentures which are more standardised contracts that specify the associated covenants (OECD, 2015). Just like corporate bonds, projects bonds can be issued onshore or offshore and where onshore markets face liquidity and depth challenges, the bonds can be issued

offshore where the major markets are the US market, which is bigger, and the Eurobond market (Ehlers, et al., 2014). Participation in these offshore markets may require more stringent disclosure requirements, which may also be similar for publicly traded project bonds where audited financial statements disclosure is a basic requirement to maintain the public listing (OECD, 2015).

#### **4.7.6 Green Infrastructure bonds**

There are a variety of definitions for green bonds, with most authors agreeing that green bonds are sovereign, corporate bonds, project bonds or sub-sovereign bonds issued for the purpose of financing green infrastructure assets such as renewable energy (Xiangsheng & Shuxiu, 2019). Green bonds are also known as green infrastructure bonds if the proceeds from the bond issue are invested into the financing of infrastructure assets. Green bonds are usually issued by development banks, governments, municipalities, corporations, banks (as covered bonds) or by special purpose vehicle companies as project finance and asset-backed instruments (Ngwenya & Simatele, 2020). Green bonds are still being developed and are yet to be standardised, with such standards as the Climate Bonds Standard and the Green Bond Principles showcasing the key features as well as the protocols for issuing green bonds and their related market (Madurika & Sisira, 2019). Green bonds are sometimes classified as innovative infrastructure financing instruments but for this study, they are classified as both private infrastructure financing and innovative finance.

The sections above have highlighted some of the key instruments through which the private sector can directly participate in financing public infrastructure. Additionally, there are other instruments which are used, namely convertible bonds and preferred equity, mezzanine and subordinated debt instruments, as well as infrastructure debt funds amongst others (Chen & Bartle, 2017). The importance of the private sector in financing public infrastructure cannot be over emphasised. It is noted in literature that the level of private sector financing of public expenditure in developing countries is negligible. However, for Zimbabwe the review is important given that the Government of Zimbabwe has expressed its desire to have a private sector led economic growth and therefore, the need to ensure the private sector is highly active in financing public infrastructure. Their contributions are therefore critical for the

development of the framework. The following section highlights some of the instruments through which the private sector may invest in public infrastructure , known as innovative financing instruments for public infrastructure assets.

#### **4.8 Innovative financing instruments**

The concept of innovative financing is evasive and no universally agreed definition exists. One of the prominent definitions is given by the OECD:

*“Innovative financing comprises mechanisms of raising funds or stimulating actions in support of international development that go beyond traditional spending approaches by either the official or private sectors, such as: 1) new approaches for pooling private and public revenue streams to scale up or develop activities for the benefit of partner countries; 2) new revenue streams (e.g., a new tax, charge, fee, bond raising, sale proceed or voluntary contribution scheme) earmarked to developmental activities on a multi-year basis; and 3) new incentives (financial guarantees, corporate social responsibility or other rewards or recognition) to address market failures or scale up ongoing developmental activities” (Sandor, et al., 2009:3).*

Therefore, the concept of innovative finance entails a mixture of specifically designed instruments and practices for augmenting conventional approaches and sources of financing to achieve international development goals (Heinrich-Fernandes, 2019; Elmer, et al., 2018 and Mostafavi, et al., 2014). It is further noted that the conventional approaches to financing public infrastructure, such as government grants and budget appropriations funded from the fiscus, are not enough to meet the needs for financing public infrastructure (Mostafavi, et al., 2014). As Tomalty (2007) highlights, the magnitude of the challenges faced in Africa and other developing countries far outweighs the public and philanthropic resources allocated to these challenges.

At prevailing investment levels from both the public and the private sectors into sectors supporting the United Nations’ Sustainable Development Goals (SDGs) in developing countries, there is an annual financing shortfall of about US\$2.5 trillion (UNCTAD, 2014). This therefore requires taking advantage of the latent potential for using innovative financing

approaches to catalyse more private capital towards investing in public services such as public infrastructure (Rillo & Ali, 2018). Designing innovative financing instruments is rarely a linear process and progress very rarely occurs in tandem. The notable innovative financing approaches of public infrastructure financing entails public-private partnerships (PPPs), credit enhancement tools and novel special bond instruments (Mostafavi, et al., 2014). There are several other innovative financing tools useful for expanding the fiscal space for governments and other public agencies for investing into infrastructure development. The following sections review the theoretical underpinnings of the innovative financing approaches.

#### **4.8.1 Public-Private Partnerships (PPPs)**

The phrase Public Private Partnership (PPP) is defined in several ways by different authors including Ireland's Department of Public-Private Partnerships (2001); Akintoye, Liyange and Renukappa (2011); Witters, Marom and Steinert (2012); and the World Economic Forum (2005). From the various perspectives, it can be deduced that PPP refers to an innovative association between a private sector player and a public sector player for purposes of blending resources to enable the attainment of mutually beneficial goal/(s) (Witters, et al., 2012). PPPs are therefore a risk-sharing and innovative financing mechanism that entails the partnering together of the public sector and private sector for purposes of providing public assets or services, or for engagement into projects conventionally provided by the public sector (Carbonara & Pellegrino, 2014).

The PPP is a legally constituted and recognised relationship between the parties and their tenure is either indefinite or specifically defined during their establishment (OECD, 2000). PPPs have gained global prominence and have sometimes been termed a panacea for closing infrastructure financing gaps across the globe due to their latent potential to avail resources under the control of the private sector in the provision of public infrastructure and ultimately economic development (Oshin-Martin, 2014 and Byiers, et al., 2016). There are however indications that PPPs have failed to realise the anticipated results in closing the infrastructure investment gaps identified (Jomo, et al., 2016). This therefore requires the implementation of PPPs to be methodical and guided by principles that enables the PPPs to successfully achieve

the goals for which they were established, some of which are presented in the following section.

#### 4.8.1.1 Reasons for participating in PPPs

PPPs result in the collaboration and sharing of expertise, assets and decision-making capabilities that facilitate the efficient and effective provision of public services or utilities (Landow and Ebdon, 2012). There are distinct factors motivating both private sector players and the government or public sector agency in financing infrastructure using PPPs. Some of the factors identified by several scholars are summarised in Table 4.1 below:

**Table 4.1: Reasons for public and private sectors undertaking PPPs**

<b>Public sector motivators for involvement in PPP</b>	<b>Private sector motivators for undertaking PPPs</b>
<ul style="list-style-type: none"> <li>• Helps the government in managing their budget deficits, by lowering overall and initial capital costs for investments in infrastructure.</li> <li>• PPPs help the public agency/sector in bridging technical and managerial skills gaps using private sector excess skills, leading to enhancements in efficiency and creativity in the provision of public services/goods.</li> <li>• PPPs are a tool for the management of risk for taxpayers through the sharing of risk with the private players, thus optimising users' fees and charges.</li> <li>• PPPs create room for competitive bidding by private sector players leading to a reduction in costs as well as the enhancement of quality service provision.</li> <li>• PPPs help in improving the operational efficiency of public services by taking advantage of technologies and innovations introduced by the private sector.</li> </ul>	<ul style="list-style-type: none"> <li>• PPPs open markets that were once monopolised by the public sector resulting in new opportunities for investment by the private sector.</li> <li>• Risk for private actors in PPPs is mitigated through long-term guarantees by the public sector, leading to the players undertaking projects otherwise considered too risky, but likely to give better returns.</li> <li>• PPPs avail project financing opportunities for the private sector through the subsidies and/or guarantees made by the government, which is handy especially during the initial stages of projects.</li> <li>• PPPs offer private sector players opportunities for stable, long-term investment opportunities which help in the maximisation of revenue through adopting appropriate marketing strategies.</li> </ul>

**Source:** (VanHam and Koppenjan, 2002; Ahadzi and Bowles, 2004; World Bank, 2012; Landow and Ebdon, 2012 and World Economic Forum, 2013)

In addition to the various generic factors motivating the participation of the private sector and public agencies in PPPs, it is noted that participation in PPPs in Europe has not been impressive. The European Commission (EC, 2006) noted that PPPs were important for improving infrastructure investments in the EU as it was a crucial risk-sharing financing mechanism between the private and public sectors. PPPs were noted to have the capacity to transform the EU's transport and energy infrastructure. PPPs are also credited for offering returns to investors, resulting in a beneficial trade-off and resolution of challenges in infrastructure requirements and the availability of finance to cover this gap (Bayliss & Van-Waeyenberge, 2018).

There was a significant rise in the number of PPP projects from two during the early 1990s to about 120 projects running by the year 2009. Kappeler and Nemoz (2010) noted that nearly 1 340 projects financed through PPPs had been launched by around 2009, with an estimated value of more than €250 billion. However, the UK has always led by both number of PPP projects and the value thereof, with about 67 percent of the total number of projects and close to 53 percent of the total value of PPP projects by 2009 (Kappeler and Nemoz, 2010). Despite the UK leading in financing public infrastructure through PPPs, there have been a significant rise in other countries' financing infrastructure through PPPs, such as Greece, France, Portugal and to a lesser extent, Spain, and Ireland. Overall, PPP financing accounted for less than one percent of the EU's GDP, whilst public financing constituted at least three percent of Europe's GDP (EIB, 2010). The critical success factors for using PPPs are reviewed in the following section.

#### **4.8.1.2 Critical success factors for PPPs**

The effectiveness of PPPs in achieving their desired mutually beneficial goals depends on several principles which guide the players from the negotiation stage through to the implementation of the PPP contract. One of the leading proponents of the guiding principles for the establishment of PPPs is the OECD (2012), which highlight the principles for the governance of PPPs as including the following:

- a) It is vital to establish a vibrant, predictable, and authentic PPP institutional framework supported by competent and well-resourced authorities.

- b) The PPP's selection processes must be grounded in the concept of Value for Money (VFM), and
- c) The budgetary processes involved in the PPP should be transparent for purposes of minimising fiscal risks and ensuring that the procurement process has integrity.

Further to the principles highlighted above as outlined by the OECD, the UNDP also establishes several principles meant to address the issues and challenges affecting the implementation of PPPs (UNDP, 2019):

- i) *Goal compatibility*- there is need to ensure an understanding between the government or public sector agent and the private sector partner, as well as the community leadership. This can be achieved by ensuring that both parties focus on the long-term and broader complementary objectives of the partnership and not the immediate operational challenges (UNDP, 2019).
- ii) *Acceptance*- the government or public sector agency and the private sector players must ensure that there is social and political acceptance of the partnership arrangement, otherwise it will fail if there is no buy-in and acceptance from stakeholders (UNDP, 2019).
- iii) *Credibility and transparency*- to achieve effectiveness in the PPP, it is challenging given the number of stakeholders involved due to the lack of trust between the partners and difficulty in predicting the outcome of the partnership. Partnership champions must maintain credibility and the related processes and operations must be transparent for all stakeholders involved in the PPP (UNDP, 2019).
- iv) *Accountability*- partners in the PPP must be responsible for the performance and results achieved in the project under execution in relation to the agreed standards. To achieve accountability in PPPs, it is imperative to clearly define the roles and responsibilities for each partner, which is followed up with monitoring (UNDP, 2019).
- v) *Economic and financial feasibility*- the PPP's success is ensured when it is feasible economically and financially for the private sector player and the public sector party involved. Economic sustainability is achieved by the economic activity generated by the PPP. On the other hand, financial sustainability is a factor of demand by customers



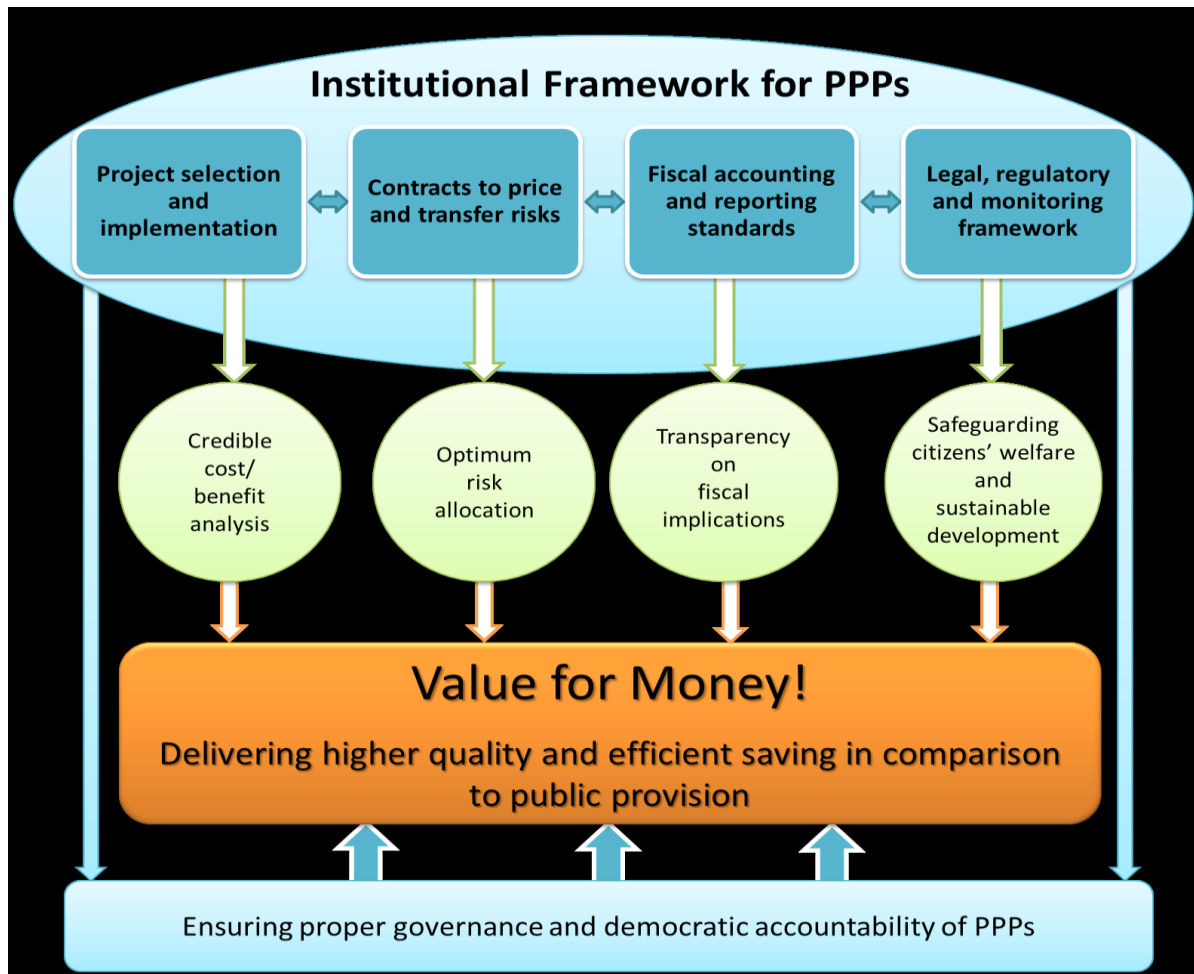
or the willingness of the government to subsidise to ensure sustainable demand (UNDP, 2019).

- vi) *Enabling environment*- successful implementation of PPPs hinges on the setting up of a supportive legal framework, regulatory framework and a supportive political environment. This enabling environment is critical for the private sector entities investing in public infrastructure projects as it creates a safe environment for their investments (UNDP, 2019).

The principles discussed above all are hinged on the establishment of a supportive institutional framework which supports the implementation of PPPs for achieving better service delivery and efficiency, as well as having a positive impact on development (Jomo, et al., 2016). There are key aspects which must be done by the public sector or any agent of the public sector, forming the enabling institutional framework and these include (Jomo, et al., 2016):

- i) Accurately determine infrastructure projects for which PPPs are ideal and viable,
- ii) Properly craft the PPP contracts so that there is effective pricing risk transfer/sharing with the private sector partners,
- iii) Ensure that an all-inclusive and transparent fiscal accounting and reporting framework for the PPPs is in place, and
- iv) Provision of the relevant legal, regulatory, and monitoring frameworks and standards for purposes of assuring and ensuring adherence to the proper and agreed upon pricing and quality for the services.

These requirements need to be set in motion before the establishment of any PPP. The framework is depicted in Figure 4.3:



**Figure 4.3: An enabling institutional framework for PPPs (Source: Jomo, et al., 2016)**

Figure 4.3 shows that successful implementation does not only depend on the principles highlighted earlier, but requires the establishment of a framework that guides, especially the public sector partner on the groundwork that must be put into the PPP before commencement. From the accounting perspective, there is need for public sector accountants to be actively involved in the crafting of the PPPs by ensuring an appropriate accounting and reporting framework that enhances transparency in the PPP projects. This is meant to minimise the challenges affecting PPPs in their implementation as highlighted in the following section.

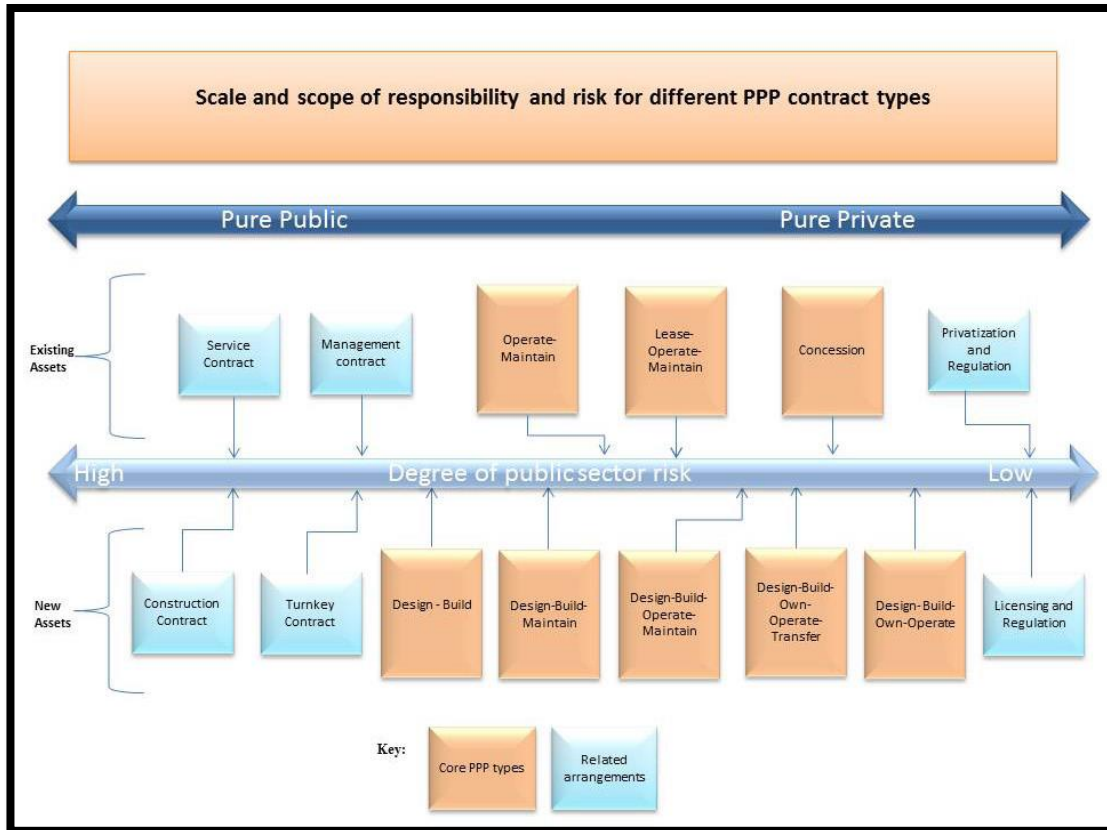
#### **4.8.1.3 Challenges in implementing PPPs**

Despite the many factors supporting the financing of public infrastructure through PPPs, there are challenges associated with the implementation of PPP financing arrangements. One of the

fundamental challenges is their high level of reliance on the political and financial commitments of the public agency or the government. PPPs also have some drawbacks. There are also challenges associated with poor transparency in the procedures for procurement in most PPP projects, which negatively affects effectiveness of PPP financing. Furthermore, there may be unanticipated delays during the construction stage, resulting in cost over-runs and returns on equity investors into PPP projects may not be transparently disclosed. Moreover, scholars do not support the financing and delivery of public infrastructure using PPPs. Bayliss and Van-Waeyenberge (2018) noted several scholars, including Boardman, Siemiatycki and Vining (2016); Romero (2015); and Trebilcock and Rosenstock (2015), who point out that PPPs are a more expensive financing mechanism. Moreover, the underlying contracts may be inflexible and last longer, as well as challenges associated with getting private investors interested in financing some PPP projects. PPP projects have also been assessed and found to be performing less efficiently in terms of the transfer of risk and the social impact of the projects (Bayliss & Van-Waeyenberge, 2018). An overview of the various types of PPP financing arrangements are reviewed hereunder.

#### **4.8.1.4 Types of PPPs financing arrangements**

There are several types of PPPs contracts which can be presented in a participation continuum in the infrastructure between purely private sector on one hand and purely public sector on the other hand (Jomo, et al., 2016). In other words, a PPP is a blend of public and private sector resources (Jomo, et al., 2016). PPPs are based around design and build contracts and may take other forms depending on the extent of risk and benefit sharing in the infrastructure asset (Wojewnik-Filipkowska & Węgrzyn, 2019). Literature records that PPPs can take any of the following forms: build-operate-transfer (BOT), build-own-operate (BOO), build-own-operate-transfer (BOOT), design-build (DB), build-lease-operate-transfer (BLOT) and design-build-finance, amongst several variations (Jomo, et al., 2016). The variety of PPP arrangements and contracts are summarised in Figure 4.4.



**Figure 4.4: Types of PPP contracts and Risk sharing (Source: Jomo, et al., 2016)**

The selection of the form in which the PPPs are implemented from the variations shown in figure 4.4 depends on the ability to transfer or share risks between the public agency and the private sector player (Demirag, et al., 2012). This is done to ensure that the PPP is beneficial to the users of the public infrastructure, since the public sector wishes for their private partner to invest financially into the asset and their performance is monitored by the financier of the project, who is usually an independent third party. These are the mechanisms that ensure that PPPs improve efficiency in the delivery of public infrastructure assets and services. The following section reviews the theoretical underpinnings of crowd funding as an innovative public infrastructure financing instrument.

#### **4.8.2 Crowdfunding**

There is an array of definitions for crowdfunding, with the World Bank defining crowdfunding as a way of raising finance from multiple individual members of the public in the form of donations or investments, which is normally enabled by using internet-based platforms (World

Bank, 2013). In addition, the European Commission defines crowdfunding as: "... an emerging source of financing involving open calls to the public, generally via the internet, to finance projects through donations, monetary contributions in exchange for a reward, product pre-ordering, lending, or investment" (European Commission, 2015). The amounts raised through crowdfunding start from as little as US\$1 000. For the purposes of this study, the definition by the European Commission is adopted since the study is focused on crowdfunding as an innovative mechanism to finance public infrastructure investments.

Besides crowdfunding being used to finance entrepreneurial start-ups, it is also used to finance the development of public goods that include infrastructure and when it is used to finance such, it is known as 'civic' crowdfunding (Ansink, et al., 2017). There are a variety of models through which crowdfunding is executed, as outlined hereunder:

- i) **Donation-based:** Crowd-funders in this model are motivated intrinsically and they expect no tangible benefits except the feeling of making a difference by donating to worthy causes they believe in and hence are satisfied by just making their contributions (Pierrakis & Collins, 2013). Contributors to donation-based crowdfunding do not expect any compensation in return for their contributions and it is commonly used by religious organisations.
- ii) **Reward-based:** This type of crowdfunding entails contributors being rewarded mostly through non-financial awards for their pledges (Ahlers, et al., 2015). The main motivation for participation by crowd-funders is to receipt special non-monetary rewards such as the receipt of a first edition upon release of a product or gift token which may be received (Ahlers, et al., 2015).
- iii) **Lending-based:** For participating in such crowdfunding models, funders are looking for investment opportunities wherein they are entitled to periodic returns and ultimately a repayment of the principal amount invested (Ahlers, et al., 2015).
- iv) **Equity-based:** Crowd-funders are awarded equity shares together with the associated rights and returns in relation to their investments in the funded venture or project (Pierrakis & Collins, 2013). This is another crowdfunding investment platform wherein funders expect to have ownership of the financed assets, ventures or projects.

- v) **Royalty (revenue sharing) crowdfunding:** This is a risk-sharing investment that entails crowd-funders being rewarded through the receipt of royalty fees or agreed proportions of future sales or profits from the project financed (Massolution, 2015).
- vi) **Hybrid crowdfunding:** The hybrid crowdfunding model entails a mixture of any two or more different models from those described above (De Buysere, et al., 2012). The combination is meant to capitalise on the advantages of the selected models and ensure success of the crowdfunding campaign (De Buysere, et al., 2012).

Crowdfunding campaigns can also decide on the model for allocating funds, which can either be on an ‘All-or-Nothing’ (AON) basis or a ‘Keep-It-All (KIA) basis (Cumming, et al., 2020). The AON model entails the funds raised in a crowdfunding campaign only being expended upon meeting or surpassing the predetermined amounts, whilst KIA involves the payment of any part amounts raised regardless of the amount meeting the set targets. The next section considers the key features of diaspora bonds and remittances as a source of finance for public infrastructure.

#### **4.8.3 Diaspora Bonds and Diaspora Remittances**

Most developing countries are saddled with unsustainable budget deficits that they cannot finance from tax revenues as their economies cannot sustain higher taxes, neither can they borrow from their financial and capital markets which usually malfunction (Akkoyunlu & Stern, 2012). These options are however available for developed countries that have stronger economies, better functional financial markets, and higher levels of tax compliance. Therefore, to cover the budget deficits, developing countries have four financing options available to them, namely borrowing from domestic markets, printing money, liquidating their foreign reserves and/or borrowing from international markets (Akkoyunlu & Stern, 2012).

Most, if not all, of the above stated financing options are either out of reach or have undesirable economic effects. For instance, borrowing from domestic financial markets is nearly impossible due to a lack of liquidity and depth, whilst printing money may result in inflationary effects on the economy. The only viable option is usually borrowing from international markets, which also becomes out of reach since developing countries do not

normally have good credit ratings or are already declared bad debtors (Akkoyunlu & Stern, 2012). On the other hand, donors and grantors provide financing for such purposes but these are usually attached to strict conditions that most developing countries cannot satisfy. Therefore, developing countries must consider other alternative forms of external financing that are sustainable for their governments, even during times of crises (Michaelowa, 2003).

Diaspora bonds represent a mechanism through which developing countries can tap into the diaspora communities' savings and borrow whilst the diasporas have an opportunity to invest in their country of origin (COO) and earn extra revenue therefrom (Ketkar & Ratha, 2010). Such bonds are usually issued in a foreign/hard currency and they help with diaspora engagement, with the diaspora community feeling an integral part of their COO by making economic contributions. Historically, diaspora bonds have been issued since the early 1930s by Japan and China, with the most popular being in the 1950s by Israel and later by India (Boamah, et al., 2017).

Ketkar and Ratha (2010) highlight that diaspora bonds are a debt instrument that may be issued by the government or by other sub-sovereign entities or sometimes by a private corporation with targeted subscribers being the diaspora community. These financing instruments have proven useful for countries facing difficulties such as economic sanctions or any restrictions. Diaspora bonds represent a significant potential for financing development, with Ratha and Plaza (2011) suggesting that diaspora bonds have the potential to capitalise on the emotional connections of the diaspora and their willingness to give back and offer to both the poor and the wealthier migrants a means to invest in their COO. In addition to diaspora bonds, governments of developing countries may also take advantage of diaspora remittances.

Global remittances have always been increasing, with the total amount of remittances exceeding US\$406 billion in 2012 (Mishra, 2016). Similarly, inward remittances to the sub-Saharan African (SSA) region increased from US\$23.5 billion in 2006 to about US\$34.8 billion in 2015 (Mugano, 2018). The growth in diaspora remittances represents a significant potential for investments, which governments of the SSA and other developing countries could take advantage of and create investment instruments that capture these remittances,

most of which are for social purposes. An example of such instruments could be the creation of life assurance and medical insurance funds denominated in hard currency whose proceeds can be invested in infrastructure bonds, in return providing the diaspora communities with the social services they require, such as funeral assistance or medical treatment for their relatives in their COO. More innovative instruments may be created to capture diaspora remittances into financing viable infrastructure investments. The following sections review the theoretical underpinning of the use and deployment of innovative taxes into the financing of public infrastructure.

#### **4.8.4 Innovative taxes**

It is noted that developing countries have challenges in financing public expenditure through taxes due to the limitations of their populace who may not afford more or higher taxes, leading to cases of tax evasion (Akkoyunlu & Stern, 2012). Given this handicap, the governments of developing countries still need to develop innovative taxes and tax heads to meet key public goods financing requirements such as infrastructure. The importance of taxes as a source of revenue for governments in both developing and developed countries is not arguable. Taxes provide a stable source of revenue for both local and central governments and is usually expended into governments' developmental priorities, such as the need for enhancing public infrastructure as well as other essential services by governments (Pfister, 2009).

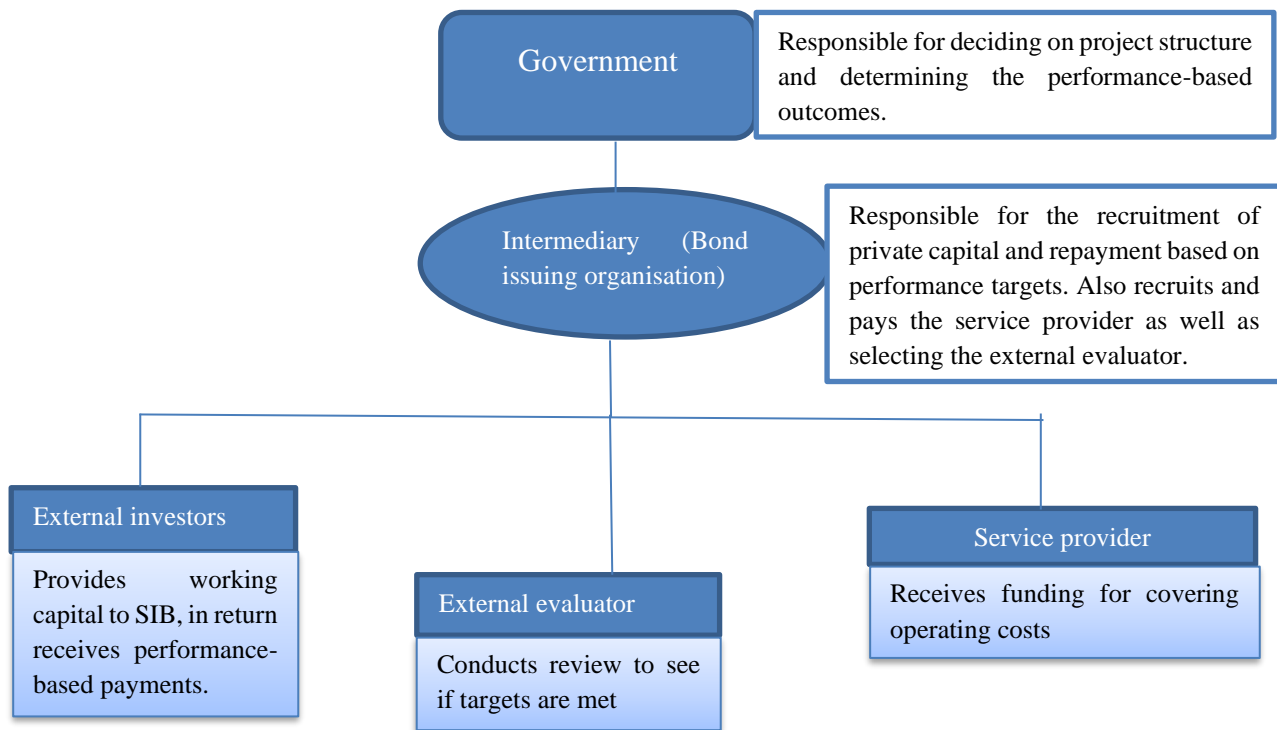
Taxation is an instrument that can be used by governments to direct and influence foreign investments and international trade through appropriate policies. One of the notable innovations in taxes and tax policies which is very popular in the United Kingdom and the United States of America is known as tax increment financing (McIntosh, et al., 2015). This refers to a method of financing public investments such as infrastructure in designated re-development areas, thereby capturing the incremental tax revenues arising from the stimulation of the re-development (Novak, 1999). Therefore, financing is availed for investment into re-development, which usually includes public infrastructure without crowding-out other capital expenditure needs from the government budgets (Novak, 1999).



There are a variety of ways through which both central and local governments can be innovative with their tax policies to attract and raise additional financing for public infrastructure requirements. Tax policies have always been used as instruments at the disposal of governments to influence economic and investment activity since time immemorial and they still can come up with policies for financing infrastructure requirements. The following section reviews literature on the use of social impact bonds into public infrastructure developments from the theoretical perspective.

#### **4.8.5 Social Impact Bonds (SIBs)**

Social Impact Bonds (SIBs) are an innovative mechanism for financing social service programs whereby several investors invest in specified projects and the principal investment and an agreed return becomes only repayable/payable upon the achievement of agreed upon impacts (Warner, 2013). Social impact bonds are commonly used in the UK and are also known using a variety of other names, with the phrase ‘Pay for Success’ being used in the United States of America, whilst in Australia they are known as ‘Social Benefit Bonds’ (Arena, et al., 2016 and Clifford, 2016). Despite the variations in names, these innovative financing tools have similarities: there is a contract (not bonds per se) between a project commissioner who is usually the government or public sector agency and a commissioning agency, acting as an intermediary with responsibility for deal preparation, administration and that sub-contracts the social service providers (SSPs) (Warner, 2013). There is also at least one investor who provides the upfront finance for the project by subscribing to the bonds issued by the intermediary (commissioning agency) (Warner, 2013). Figure 4.5 presents the nexus of relationships and responsibilities of the various parties involved in SIBs financing arrangements.



**Figure 4.5: SIBs nexus of stakeholders (Source: Warner, 2013)**

Figure 4.5 summarises the players that participate in the raising of finance through social impact bonds. As shown in Figure 4.5, the intermediary is at the core of the issuance and delivery of infrastructure using SIBs as they have a relationship with all the other players in the SIBs value chain. SIBs therefore involve a set multifarious and intricate partners, contracts/agreements and guarantees so that performance, evaluations, and payments follow the agreed pattern (Warner, 2013). Thus, the government, the intermediary, investors, and service providers need to agree on timeframes and performance metrics to minimise potential conflicts if certain aspects are left grey.

Historically, SIBs were first issued in the UK in 2010 and they have been issued in several other countries, thereafter, including the USA, India, Germany, Sweden, Israel, Switzerland, Belgium, Finland, and Peru, amongst many others (Dear, et al., 2016). SIBs are an innovative arrangement that integrates concepts of philanthropy, venture capital, performance-based financing, and social programme financing into a single project (Warner, 2013). By their nature, SIBs if properly structured have the capacity to attract private investors with profit

maximization objectives who may not be attracted to PPPs (Warner, 2013). SIBs have mainly been used in developed countries and to a limited extent in developing countries. Therefore, the potential impact of SIBs in narrowing the public infrastructure financing gap in Zimbabwe is limited. However, this study is important as it enlightens players in the public infrastructure financing landscape to consider other instruments such as SIBs to tap into finances available from ‘green investors’, who may be unwilling to subscribe to any infrastructure bond issues. The following section reviews theoretical literature pertaining to State Infrastructure Banks.

#### **4.8.6 State Infrastructure Banks**

State Infrastructure Banks originated in the USA as a form of revolving funds capitalised by the federal government, with each state providing an equivalent amount to the fund and these are used primarily to finance transportation infrastructure (Chen, 2016). Beneficiaries to the fund receive loans or grants that are repayable with interest charged at or below market rates. Repayments must be made in order to allow more beneficiaries from the fund (USDOT-Federal Highway Administration, 2017). Despite this form of state infrastructure banks having been in use for a relatively long time, but it is not widely used outside of the USA. According to Chen (2016), the participation of the federal government in setting up the funds helps unlock more local government investment into capital expenditure by about three dollars for every one dollar released and the higher interest charges of the state infrastructure banks strengthen the role of the programme and stimulates capital investments in transportation infrastructure.

The concept of State Infrastructure Banks was developed into multilateral and national development financial institutions with a mandate of financing public infrastructure investments (Uzsoki, 2018). Such institutions include the Development Bank of Southern Africa, African Development Bank, Asian Development Bank, European Investment Bank, International Bank of Reconstruction and Development (World Bank), Inter-American Development Bank (Uzsoki, 2018) and national banks such as the Canada Infrastructure Bank (Whiteside, 2017) and the Infrastructure Development Bank of Zimbabwe, amongst others. This model of infrastructure banks operates as advisors in infrastructure financing

transactions, asset management experts, experts in real estate, as well as experts in the design, engineering and development of infrastructure (Whiteside, 2017).

It is apparent that infrastructure banks have been developed in different forms and they have registered success to various extents. Reviewed in the prior sections are some of the main innovative instruments that may be used to finance public infrastructure. The ensuing section summarises the various forms through which public infrastructure may be financed, from public financing to private financing as well as the blending of public and private resources into what is known as innovative financing.

#### **4.9 Chapter Summary**

As reviewed in this chapter, public infrastructure can be financed by the central government, local government/municipalities, and public sector organisations from a variety of sources such as taxation and loans. These are collectively known as public financing. Due to financial constraints faced by governments and their agencies, the private sector also finances public infrastructure to a varied extent. Total financing and controlling of public infrastructure are known as privatisation or commercialisation, whilst a blend of private and public resources is known as innovative financing of public infrastructure.

Financing of infrastructure is anchored in public finance and public welfare economics which recognises that infrastructure is a public good because of its key features. Public infrastructure financing is primarily financed as budget appropriations which are funded from taxes and/or public borrowing on either the local markets or from international markets. Government borrowing is achieved using the issue of a variety of instruments such as infrastructure project bonds. In addition, the public sector finances infrastructure from their equity resources retained through either state enterprises or parastatal enterprises.

Due to the financial constraints faced by governments and public sector enterprises, the private sector, seeking investment opportunities, also finances public infrastructure. Given that the private sector is motivated to finance public infrastructure for realising returns on their investments, their participation is guided by a few theories which include the Capital Structure

theory, Pecking Order theory, Agency theory and the Risk-return theory. The private sector can finance public infrastructure using instruments such as investing in the equity of infrastructure companies, subscribing to bonds of various types issued by governments, municipalities, and other sub-sovereign entities; as well as financial institutions pooling their resources and providing syndicated loans to specific infrastructure projects.

Sometimes, the public sector and the private sector may pool together their financial, technical and other resources for the purposes of developing public infrastructure assets. Such arrangements, collectively known as innovative financing, are meant to share risks and expertise and therefore, the theories discussed under private financing are also applicable in relation to innovative financing. There are several innovative financing instruments, the most prominent of which is public-private partnerships. Other innovative instruments include diaspora bonds and remittances, social impact bonds, and state infrastructure banks.

The following chapter reviews empirical studies regarding the financing of public infrastructure as discussed in this chapter. The empirical literature is reviewed from an overall perspective, starting with public financing followed by private financing and lastly innovative financing. The empirical literature review in the following chapter is guided by the objectives of the study presented in Chapter 1.

## CHAPTER FIVE

### EMPIRICAL EVIDENCE ON PUBLIC INFRASTRUCTURE FINANCING

#### 5.1 Introduction

The previous chapter reviewed literature on the theoretical aspects of how public infrastructure is financed. It is acknowledged that governments and other public sector entities have the primary responsibility of financing public infrastructure. However, there are circumstances that affect the ability of the public in financing the infrastructure requirements of their jurisdictions alone, especially the lack of access to financial resources. This is when the private sector takes advantage of the public sector handicaps and invests in public infrastructure to varied extents. There is ultimate privatisation wherein the private sector invests their resources and operates the infrastructure assets and there are a variety of innovations whereby the public and private sector partner in the development and delivery of public infrastructure assets and services. Such arrangements are collectively known as innovative financing mechanisms.

This chapter therefore reviews literature on the empirical studies done in relation to the various mechanisms of financing public infrastructure. The purpose of the literature review is to establish the extent to which these financing mechanisms have been successful or failed to achieve the envisaged success. Moreover, the review of other studies will help in situating methodologies that have been used in those studies in order to ensure that the current study takes advantage of well-grounded methodologies or helps in synthesising the various methods used in order to come up with the best methods to achieve the objectives of the study.

Therefore, this review of literature is guided by the objectives of the study which are re-emphasised hereunder. The study aims to develop and recommend a conceptual framework that is useful when selecting options to finance public infrastructure requirements in Zimbabwe. This process is achievable by firstly identifying infrastructure financing mechanisms, assessing their efficiencies, and then developing an informed framework that

considers the crucial aspects necessary to making a financing decision. The specific objectives of the study are:

- a) To determine the main sources of public infrastructure financing in Zimbabwe.
- b) To establish innovative finance's capacity to close the public infrastructure financing gap in Zimbabwe.
- c) To assess the role played by public-sector accounting in attracting appropriate and efficient mechanisms to finance public infrastructure in Zimbabwe; and
- d) To recommend a framework for selecting suitable and efficient mechanisms to finance public infrastructure in Zimbabwe.

The review of literature is therefore guided chronologically by the above-stated objectives. The primary focus of the review is the review of published scholarly articles, but in cases where there is a dearth in literature, grey literature by such institutions as the International Bank for Reconstruction and Development (World Bank), International Monetary Fund, African Development Bank, Asian Development Bank, and the United Nations' agencies amongst others is also reviewed. For purposes of the review, studies are not categorised by region, but the evaluations of the various concepts are reviewed collectively. The following section therefore reviews literature on the various sources of public infrastructure financing.

## **5.2 Sources of public infrastructure finance**

Infrastructure has traditionally been viewed as public goods and the primary responsibility for financing the development and delivery of infrastructure was for the public sector: central government, local government, state enterprises, parastatal enterprises and other agencies of the government (Chotia & Rao, 2018). After realising that taxation and public debt cannot sufficiently finance public infrastructure requirements, nations and states turned to national and international private capital providers for financing public infrastructure investments (Chotia, 2017). Thus, due to stress on the traditional sources of finance, governments have also turned to some innovative mechanisms of financing public infrastructure requirements. Table 5.1 below summarises the most common sources of finance for public infrastructure investments that governments may deploy as either primary or complementary sources.

**Table 5.1: Continuum of sources of public infrastructure financing**

<b>Temporality</b>	<b>Source of finance (type)</b>	<b>Examples</b>
Established 'tried and tested'	Taxes and fees	Special assessments; User fees and tolls; Other taxes.
	Grants	Extensive range of grant programmes at multiple levels (e.g., federal national, provincial, state, supranational)
	Debt finance	General obligation bonds; Revenue bonds; Conduit bonds; National Loans Funds.
	Tax incentives	New market/historic/housing tax credits; Tax credit bonds; Property tax relief; Enterprise Zones.
	Developer fees	Impact fees; Infrastructure levies.
	Institutional investor platforms	Pension and Insurance infrastructure platforms; State infrastructure banks; Regional infrastructure companies; Real estate investment trusts; Sovereign Wealth Funds.
	Value capture mechanisms	Tax increment financing; Special assessment districts; Sales tax financing; Infrastructure financing districts; Community facilities districts; Accelerated development zones.
	Public private partnerships	Private finance initiative: Build-own-operate-(transfer); Build-lease-transfer; Design-build-operate-transfer.
	Asset leverage and leasing mechanisms	Asset leasing; Institutional lease model; Local asset-backed vehicles.
	Newer 'innovative'	Revolving infrastructure funds.

**Source:** (O'Brien & Pike, 2015)



Table 5.1 presents a variety of sources of finance for investment into public infrastructure. At one end is financing of public infrastructure assets through taxes and fees which represent the conventional source of finance for the public sector (O'Brien & Pike, 2015). At the other end are the innovative sources of finance which represent innovations created in pursuit of newer mechanisms of raising finance for investment in public infrastructure (O'Brien & Pike, 2015). However, the conventional sources have been established, whilst the innovative financing mechanisms are relatively newer and still in the process of evolution.

In addition to the summary given in Table 5.1, several scholars have identified the various instruments that may be used to finance public infrastructure. Some of the authors include: Dailami and Leipziger (1998); Kennedy and Orr (2008); Chan, et al. (2009); Bothra (2009); Calitz and Fourie (2010); Estache (2010); Mafusire, et al. (2010); Inderst (2010); Sawant (2010) and Kingombe (2011), amongst many others. The major public financing instruments include budget appropriations by the government; funded through taxes collected; government borrowings in the form of bonds issued for specified purposes; and financing by government trading enterprises and national development banks (Chotia, 2017). It is however noted that there are several other instruments used to finance public infrastructure and these are reviewed under the appropriate headings in the following write-up, with the government taking a leading role in the financing of public infrastructure investments.

Ideologically, there are varied viewpoints regarding the suitable extent to which the government must be involved in the provision of public infrastructure, and participation in the economy in general (Abelson, 2008). Political views range from the Libertarians who believe in the barest minimal involvement of the government and socialists who believe in government involvement to the greatest extent, whilst in between these extremes are social democrats and conservatives (Abelson, 2008). Due to the linkage existing between economics and politics, there are a variety of economic views on the apt extent of government involvement, and these have been shifting as time moved (Chan, et al., 2009). In the developed economies, mainstream economists' views have almost turned full circle from the minimal involvement view held primarily around the nineteenth century (Abelson, 2008). Thereafter, economists supported an increased level of involvement by the government for about a

century, beginning around the year 1870, which was followed by a reversal of the extent of government involvement for a period of around the last quarter of the twentieth century (Chan, et al., 2009).

The global financial crisis around the years 2008/09 impacted the extent of government involvement, resulting in governments playing a more active role as they pursued programmes to stimulate economic activity in a manner almost reminiscent of Keynesian economic principles (Stiglitz, 2010). Table 5.2 provides a succinct indication of some of the important historical changes recorded in fiscal policy in developed countries:

**Table 5.2: High-level shifts in mainstream fiscal policy**

<b>Period</b>	<b>Fiscal policy</b>
Pre-World War I	Clear or implied fixed budget guidelines.
Inter-war years	Expansive fiscal policies meant to inspire economic activity
Post-World War II	Flexible Keynesian fiscal policy
1970s to late 1990s	Fiscal policies emphasised accountability, adopted financing methods that were more conservative, with governments relying on current revenues for financing their activities, at the same time restricted their public borrowings.
Since late 1990s	A more relaxed fiscal approach although not consistent for all countries. More participation by the private sector in financing public infrastructure projects.

**Sources:** (Robinson, 2002; van der Ploeg, 2006; Chan, et al., 2009; Wettenhall, 2011; Checherita-Westphal and Rother, 2012 and Productivity Commission, 2014)

As shown in Table 5.2, during the periods before World War I, most countries adopted restrictions in their fiscal policies with the objective of achieving balanced budgets in principle (Chan, et al., 2009). In the subsequent period between the wars, governments adopted fiscal policies meant to inspire economic activities meant for the countries to recover from the effects of the 1930s' Great Depression. Then came the period after the Second World War, during which governments' fiscal policies were expected to respond to the prevailing

economic conditions (Schick, 1998). During this period for instance, major infrastructure investments embarked upon between the 1950s and the early 1980s were financed through public debt (Schick, 1998). The OECD notes that there was however a period during the 1970s when fiscal tightening was restored in response to concerns about the ‘crowding-out’ effects of governments’ spending options, as the governments were excessively involved in the market economy such that they affected the rest of the market (OECD, 1995).

Concerns of excessive borrowing by governments in Europe led to member states agreeing to set strict ceilings for debt that governments could accrue to a maximum of 60 percent of their national gross domestic product in what is now as the Treaty of Maastricht (Checherita-Westphal & Rother, 2012). As a result of such limits, the amounts of finance available for investment in public infrastructure were depleted, which further negatively affected economic activity and efficiency for the European countries (Clark, et al., 2002). As a result of the effects of these limits on the entire value chain, there was need for relaxing fiscal policies for the affected countries to boost their economic performance, given the prevailing bias against public capital investment (Robinson, 2002).

Kellermann (2007) notes that the United Kingdom had to enhance their budget framework in 1998 to clearly distinguish between current and capital expenditure. This created a fiscal ‘golden rule’ which stipulated that the government should focus on maintaining a balanced budget over the economic cycle rather than focusing on the maintenance of cash balances, or without public sector borrowings (Robinson, 2002). However, there is no consistent application of this ‘golden rule’. The fiscal policy adopted by Australia required either balancing the budget or achieving a cash surplus in their budgets (Productivity Commission, 2014). There were fiscal reforms to the European Union’s Stability and Growth Pact in 2005 whereby member states affected by economic downturns had a relaxation of their austerity measures (De Grauwe, 2003). For the United States of America, the government intervened through introducing more fiscal stimulus programmes to bail out financial systems that were on the verge of imminent collapse, as well as other industries that were struggling which included automotive manufacturing companies (Lucas, 2014).

As shown in Table 5.2, there has been shifts between regimes of tight discipline in fiscal policies to fiscal policies that were more responsive to prevailing economic situations. As a result, there were a variety of models for delivering public infrastructure (Slack & Tassonyi, 2017). Also apparent from the literature reviewed is that it is challenging trying to establish the optimal roles the government can play in providing public infrastructure since it is more of a quasi-public good which provides benefits to the private sector whilst at the same time creating either negative or positive externalities (Abelson, 2008). Due to the challenge in distinguishing the extent and role of government involvement in the provision of public infrastructure, a gamut of models for the delivery and financing of public infrastructure have developed over time (Slack & Tassonyi, 2017).

Moreover, the challenges faced by governments to provide for all infrastructure requirements are apparent and evident through the extent of congestion on the highways and the insufficiency of electricity power for both domestic and industrial requirements (Slack & Tassonyi, 2017). The variety of models used range from outright public provision, which was common in Britain, Canada and Australia when railways were introduced at the beginning of the 19<sup>th</sup> century, to private delivery models of railways during the late 19<sup>th</sup> century into the start of the 20<sup>th</sup> century in the United States of America, up to the more recent Public-Private Partnership (PPP) models (Nelson, 2005).

The private sector's enhanced participation in financing public infrastructure projects was limited by the dearth of investible projects (Ehlers, 2014). Most of the time, the projects are improperly designed, and their contractual terms have risk allocation implications and a sharing of returns that incentivises the partners inappropriately. To mitigate these flaws would require greater participation by the private sector in the design of the projects as it has the aptitude to financially structure these projects and enhance the economic rationale thereof (Ehlers, 2014). This is expected to improve the chances of success and efficiency of the projects. As a result, a constant flow of investible projects would be able to attract large investors to make commitments towards financing infrastructure projects (Ehlers, 2014). Infrastructure projects, especially those in developing countries, have not been able to attract the expansive financial resources in the capital markets into financing infrastructure projects,

despite the variety of capital market instruments which remain significantly under-utilised, yet they have huge capacity to enhance the finances available for investment in public infrastructure (Ehlers, 2014). The many capital market instruments would therefore attract an assortment of investors with diverse risk appetites to invest and be able to diversify their portfolios well (Ehlers, 2014).

### **5.3 Innovative finance's capacity to close infrastructure financing gaps**

A very popular oxymoron is the paradox of lack/scarcity amidst plenty. Globally, there is growth in huge surplus savings yet there are simultaneously investment gaps, especially in public infrastructure (Noman, 2017). Governments and public sector entities have resorted to austerity since they have been typically affected by scarcity, whilst on the other hand the private sector is most times bothered with plenty of savings that cannot have appropriate investment opportunities (Noman, 2017). For instance, sovereign wealth funds' assets under management grew from US\$4.3 trillion in 2011 to about US\$7.3 trillion by mid-2016, yet the infrastructure financing gaps continued to grow (Noman, 2017). As a result, most governments have been faced with financial objectives of contending with these deficits/gaps through fiscal consolidation and reducing their budget deficits (O'Brien & Pike, 2015).

Given that conventional infrastructure financing through government grants is funded from taxes, the possibility for achieving the public financial management objectives is the use of innovative financing mechanisms (Mostafavi, et al., 2014 and O'Brien and Pike, 2015). Badu, Owusu-Manu, Edwards, and Holt (2011) conducted a study on the extent to which innovative financing mechanisms and methods were used in Ghana to close the gap left by conventional financing mechanisms. The study found a lack of knowledge about innovative financing mechanisms that may be used to narrow the infrastructure gap (Badu, et al., 2011). In the study, the development of various innovative financing solutions is tracked on how and where they have been used to finance public infrastructure in the context of developing countries. The methodology used was inductive and made use of extant literature together with data provided by Ghanaian government ministries, government departments and agencies with infrastructure procurement responsibilities (Badu, et al., 2011).

In a follow-up study, Badu, Edwards, Owusu-Manu, and Brown (2012) explored the strategic issues underpinning the use of innovative financing of public infrastructure in Ghana. The focus of the study was the likely inherent impediments as well as Ghanaian market bottlenecks affecting the implementation of innovative financing solutions (Badu, et al., 2012). The study found that Ghana had investment capacity challenges, lacked experience of implementing innovative financing solutions and had challenges in the mobilisation of revenue for projects financed through innovative finance (Badu, et al., 2012). There are various innovative infrastructure financing mechanisms, namely public-private partnerships, crowdfunding, social impact bonds, infrastructure project bonds, tax increment financing, state infrastructure banks and innovative taxes, amongst others (Mostafavi, et al., 2014 and Badu, et al., 2011). Some financing instruments are classified as both private financing and innovative financing mechanisms. These innovative financing mechanisms have been used to varied extents in different countries, but evidence is available from developed countries, with limited scholarly work in developing countries, reviewed hereunder, starting with PPPs which are more commonly used and widely researched.

### **5.3.1 Public-Private Partnerships (PPPs)**

PPPs were introduced in the UK in the early 1990s as private finance initiatives meant to harness private sector resources for financing public expenditure, particularly public infrastructure investments (Wang, 2014). This was done in a bid to contain fiscal challenges whilst infrastructure requirements and complexities were increasing (Kang, et al., 2019). PPPs have since their introduction been used widely in public infrastructure development and delivery arrangements in many countries across the globe, including both developing and developed countries (Chan, et al., 2009 and Wang, 2014). However, there has been a mixture of both success and failure stories (Ameyaw and Chan, 2015 and Babatunde and Perera, 2017). The use of PPPs in financing public infrastructure does not always guarantee that investments are optimal (Calitz and Fourie, 2010 and Sawant, 2010).

There is continual debate about the participation of the private sector in the provision of public infrastructure. The debate is motivated by the existence of a mixture of both failure and success stories of either public provision or private provision of public infrastructure. Vining

and Boardman (2008) reviewed the experiences with large-scale investments by the state or state-controlled entities and found that such projects usually exceed the set budgets, but the involvement of the private sector tends to reduce the costs associated due to the existence of competitive pressures. Regan (2009) buttresses the PPP model and avers that PPPs' benefits outweighs their demerits, as they provide greater latitude in innovation and the transfer (sharing) of risk.

PPPs have however experienced their own challenges and failures, with Gannon and Smith (2009) highlighting the London Underground PPP in which the private sector players had the responsibility of maintaining and rehabilitating the infrastructure and failed to deliver. The project had been financed through the private consortiums' (Metronet and Tube Lines) equity contributions and grants from the government (Gannon & Smith, 2009). Due to the long-term nature of the project (30 years), the private sector consortiums participated in the project between 2004 and 2010 and all collapsed, and the control and maintenance responsibilities reverted to the government (Williams, 2010). The London Underground PPP is also known for creating unnecessarily complicated contracts, having high information asymmetry which resulted in dubious risk sharing, performance incentives and moral hazard (Gannon and Smith, 2009; Williams, 2010). Some of the likely challenges associated with delivering public infrastructure through PPPs include unclear governance, accountability challenges and unclear financial arrangements (Williams, 2010). Therefore, partnerships with private entities add a completely new set of complications to the process of selecting the best approach to finance public infrastructure projects.

The primary reasons for using PPPs in the financing and development of public infrastructure entails the ability to leverage private financial resources, expertise in management and taking advantage of creative commercial skills (Ameyaw & Chan, 2015). The coming together of partners that usually have different and sometimes divergent objectives, which may include the profit motive for the private sector whilst the public sector may have political objectives, results in the creation of complex risk profiles for the partnerships. Given this background, Ameyaw and Chan (2015) conducted a study integrating a robust literature review with case studies of water infrastructure projects in Ghana involving PPPs in order to identify the key

risks affecting the success of PPPs. The study established a total of 40 risk factors grouped into eight sources (Ameyaw & Chan, 2015). The key risks according to the study include poor regulatory and monitoring frameworks; poor guidelines to allocate risk; financing risks; unacceptance by society and the public; as well as a lack of skills and experience for implementing the PPPs by either or both parties (Ameyaw & Chan, 2015). Therefore, risk management is key for achieving success in financing public infrastructure using PPPs.

The successful implementation of PPPs hinges on several factors. Babatunde and Perera (2017) conducted a study to evaluate PPPs' critical success factors in transport infrastructure in the case of Nigeria. The study was conducted by combining a literature review with case studies of transport infrastructure projects in Nigeria, with data being collected through interviews and documentary analysis on the case studies (Babatunde & Perera, 2017). The study was a sequential mixed method whereby 26 critical success factors were identified from literature and were incorporated into a study protocol based on a technique known as failure mode and effect analysis (FMEA) (Babatunde & Perera, 2017). Based on the results, three cross-cutting critical success factors for PPPs in all transport sector projects were identified, that is, participation by the central government through providing guarantees, obtaining political support for the PPPs and the economic feasibility of the project (Babatunde & Perera, 2017). It is important to have these factors in place in order to ensure the success of PPPs.

It is noted that developing countries have huge infrastructure financing gaps, whilst at the same time there are relatively more failed PPPs. Accordingly, Kang, et al. (2019) conducted a study to assess the factors affecting the successful implementation of PPPs in developing countries. 19 PPP case studies from several developing countries such as South Africa, Gabon, Indonesia, Colombia, and Bolivia were selected for the study for purposes of establishing the factors that facilitate or impede the successful implementation of PPPs (Kang, et al., 2019). According to the study, the factors are classified as financial, economic, political, legislative and management prerequisites (Kang, et al., 2019). These factors must be appropriately structured to guarantee the success of PPPs in infrastructure projects in developing countries.



A study by McQuaid (2019) considers the micro and macro factors affecting the use of PPPs as public finance initiatives, as well as how PPPs result in illusions in related decisions due to the lack of transparency. The study synthesised findings from other studies and developed a framework useful in analysing PPPs (McQuaid, 2019). Findings in the study revealed several factors that affect decision-makers when choosing the appropriate PPPs. These factors include efficiency and value for money; costs of financing; proclivity to share risks; the processes involved in the procurement and related transaction costs; and the broader effects on the economy, amongst many other factors (McQuaid, 2019). The successful implementation of PPPs in order to mitigate infrastructure financing gaps requires vigorous and clear systems to regulate and govern their implementation (McQuaid, 2019). Transparency is clear for the success of PPPs, including proper accounting and reporting.

Carbonara and Pellegrino (2014) conducted a study to evaluate the opportunities and challenges associated with financing public infrastructure using PPPs in Italy. The focus of the study was on the effects of the financial, institutional, and organisational aspects on the adoption and implementation of PPPs and how these have changed over time (Carbonara & Pellegrino, 2014). The empirical study was conducted using a mixture of quantitative and qualitative data on the factors characterising the financial, institutional, and organisational aspects of PPPs and how they affect the acceptance and effective implementation of PPPs (Carbonara & Pellegrino, 2014). The study found a relatively high level of adoption of PPPs in Italy despite the existence of challenges such as financial challenges, difficulty in regulating risk allocation and complicated high administrative risks, thereby affecting the effectiveness and efficiency in the adoption of PPPs in Italy (Carbonara & Pellegrino, 2014). These challenges may be mitigated through the development of skills and expertise on the management of PPPs, ensuring that there are appropriate risk management guidelines and the development of a framework for assessing the affordability, viability, and sustainability of PPP projects (Carbonara & Pellegrino, 2014).

The successful implementation of PPPs in financing public infrastructure requires well-structured regulatory frameworks and monitoring and evaluation mechanisms to ensure goal congruency and adherence to agreed plans (Owolabi, et al., 2018). It has been revealed by the

studies reviewed above that these are not vibrant in most developing countries. Moreover, PPPs have latent potential to mitigate infrastructure financing gaps, but they are not a panacea to the challenge (Calitz & Fourie, 2010). Most developing countries such as Zimbabwe may fail to attract substantial amounts of PPP investments due to a lack of bankable projects coupled with high sovereign risk, which deters foreign investors (Owolabi, et al., 2018). As a result, PPP risks must be aptly analysed and shared between the partners based on their ability to deal with their allocated risks (Ibrahim, et al., 2006). Therefore, PPPs may not be expected to significantly reduce the infrastructure financing gap in Zimbabwe. The main challenge is the poor implementation of the PPP legal framework as well as other challenges that chase away private capital such as corruption. It is, however, important to be discussing about PPPs in Zimbabwe given their successful implementation in other countries and the significant contributions made in reducing the public infrastructure financing deficit. The following section reviews other innovative financing mechanisms that have been used to finance public infrastructure.

### **5.3.2 Infrastructure Project Bonds**

Babatunde and Perera (2017) conducted a study on the barriers or challenges of financing infrastructure in Nigeria using bonds, employing an inferential statistical analysis. The study was a sequential mixed methods study wherein a comprehensive literature review was used to develop a questionnaire which was circulated to financial experts and financial institutions in Nigeria (Babatunde & Perera, 2017). Using mean score ranking and principal component analysis, the study found five barriers to bond financing of infrastructure, namely governance and institutional capacity challenges, exorbitant costs of issuing bonds, higher risks, petite bond markets' size and strict disclosure requirements (Babatunde & Perera, 2017). These are some of the factors that were identified to be stumbling blocks in the issuing of infrastructure project bonds in Nigeria.

On the other hand, Hutchison, et al. (2016) advocated for the use of infrastructure projects using infrastructure bonds proceeds and further considered the pricing model and the associated risk premium that could be charged on such bonds. The study was a combination of qualitative and quantitative methods whereby desk reviews were combined with interviews

with experts and stakeholders in infrastructure financing (Hutchison, et al., 2016). Investors were found in the study to be keen on investing in infrastructure project bonds, and the market was willing to pay a premium of up to 300 basis points above sovereign bonds (Hutchison, et al., 2016). The authors iterate that the government must however participate through providing guarantees and underwriting the issue of the infrastructure project bonds (Hutchison, et al., 2016). It is evident that the developed markets are more prepared and more likely to use infrastructure project bonds to finance public infrastructure than developing countries where there are market and regulatory challenges. Zimbabwe has seen the possibility of using infrastructure project bonds successfully in financing public infrastructure (IDBZ, 2019). Therefore, it is important to incorporate them in the financing bouquet for public infrastructure in Zimbabwe. The following section reviews empirical studies on crowdfunding in relation to how they can contribute to narrowing the public infrastructure gap.

### **5.3.3 Crowdfunding**

Crowdfunding is conventionally known as a form of financing involving the raising of finance from crowds instead of professional investors for the purposes of financing entrepreneurial start-up ventures (Belleflamme, Lambert and Schwienbacher, 2014). The major forms of crowdfunding have been reviewed in the previous chapter where their theoretical modalities were also reviewed (Belleflamme, et al., 2014). Crowdfunding has however been expanded into the financing of public infrastructure, examples of which include renewable energy generation projects development (Miller, et al., 2018). It has generally been employed in financing projects wherein members of communities believe that they are bound to mutual benefit, such as social infrastructure and renewable energy where members of communities donate for financing such projects.

Renewable energy is envisaged as addressing the growth in demand for environmentally sustainable energy which minimises the effects of power generation on climate change. A study by Miller, et al. (2018) explored how the development of renewable energy projects was financed using innovative financing mechanisms. Multiple case studies from North America were examined, to ascertain how they were financed using various innovative financing mechanisms, including crowdfunding (Miller, et al., 2018). Equity crowdfunding was used

to finance part of the 162 megawatts renewable energy project known as the Crow Lake Wind Project in South Dakota (Miller, et al., 2018). A total of US\$16 million financing of the project was raised from members of the local community (Miller, et al., 2018). Several other smaller renewable energy projects were financed through various forms of crowdfunding across the globe (Lam & Law, 2016).

In the United Kingdom, donation-based crowdfunding was reportedly the fastest growing model of crowdfunding, from raising £2 million in 2014 to £12 million in 2015, followed by equity crowdfunding which raised £332 million in 2015 up from £84 million raised in 2014 (Zhang, Baeck, Ziegler, Bone and Garvey, 2016). Lending-based crowdfunding also raised £179 million, whilst reward-based crowdfunding raised £42 million in 2015 (Zhang, et al., 2016). There is no documented research and consolidated reporting of crowdfunding in Zimbabwe, but it is widely practised. For instance, most religious organisations raised finance for their infrastructure development using donation-based crowdfunding and corporates in Zimbabwe have also raised finances for responding to national disasters such as cyclones and health pandemics using crowdfunding.

However, given the amount of finances raised from crowdfunding globally, about \$34.4 billion in 2015, its contribution to closing the infrastructure financing gap in Zimbabwean may not be a significant amount. This is further complicated by other national financial and economic challenges peculiar to Zimbabwe. Given the insignificant contributions of crowdfunding globally and the poor disclosures this study therefore evaluates how an improvement in public sector accounting disclosures can help in improving the usage of this innovative financing instrument in reducing the public infrastructure gap in Zimbabwe. The following section reviews how diaspora bonds and remittances may be used to mitigate infrastructure financing gaps, particularly in developing countries such as Zimbabwe.

#### **5.3.4 Diaspora Bonds and Diaspora Remittances**

Migration is envisaged by research as positively influencing development in the countries of origin (COO), according to Goodfellow (2020). This relationship has been interrogated by research since the late 1990s after a notable global growth in diaspora remittances, whilst there

was significant growth in transnational networks and communities (Ketkar & Ratha, 2010). In the African context, the diaspora has significantly grown in terms of financial and political influence, with the United Nations (2016) estimating the number of Africans in the diaspora to be nearly 160 million people. There have also been concerns of the economic effects of the global financial crises of 2008/9, especially regarding confidence in financial markets resulting in many countries having challenges accessing private financing from the conventional instruments and mechanisms, such as international bonds (Ketkar & Ratha, 2010).

Countries have resorted to other innovative financing instruments to capture the financial muscle of the diaspora into financial instruments that can be used to develop the COO (Goodfellow, 2020). One such instrument is the development of revenue bonds that are issued to the diaspora community known as diaspora revenue bonds (Boamah, et al., 2017). Several countries, including Israel, India and Ghana have issued diaspora bonds, but they remain under-utilised instruments for financing development. The total value of bonds issued has been growing steadily and reached US\$406 billion in 2012 for developing countries and continues growing (Mishra, 2016).

Ethiopia is a country that has also invested in public infrastructure using innovative finance (Salman, 2016). Construction of the Grand Ethiopian Renaissance Dam which commenced in 2011 was primarily financed from the issue of bonds to Ethiopians in the diaspora, which are diaspora bonds (Tawfik, 2016). Ethiopians at home also contributed to the financing of the mega-dam through crowdfunding (Tawfik, 2016). Additionally, foreign nationals were also allowed to subscribe to the bonds issued to finance the project which upon completion will be the biggest in Africa. Thus, the Ethiopian government is encouraging their citizens to invest in the project (Tawfik, 2016). The project also entails the development of a hydro-electricity generation plant at the dam and is meant to significantly contribute to power generation in Ethiopia (Yihdego, et al., 2016). The dam is not intended to be used for irrigation purposes but hydro-electricity generation only (Salman, 2016).

On the other hand, diaspora remittances to developing countries have also been growing significantly over time, from about US\$164 billion around the years 2004/2005 to approximately US\$308 billion in 2008 (Ratha & Plaza, 2011). The World Bank further reports remittances to Sub-Saharan Africa (SSA) having grown from US\$23.5 billion in 2006 to about US\$34.8 billion in 2015, an amount comparable to the total of foreign direct investments to the SSA (Mugano, 2018). These amounts do not include unofficial remittances, which are estimated to average an additional 45% to 65% of the officially recorded remittances (Gupta, et al., 2009).

Significant effects of diaspora remittances are recognised by scholars, politicians, and the international community in general. Believers in the historical structural theory argue that on the contrary, diaspora remittances create an undesirable dependency syndrome (Adepoju, 2008). Both diaspora bonds and diaspora remittances remain under-utilised by developing countries for purposes of development in the COO, especially for investment in national capital assets such as public infrastructure (Boamah, et al., 2017). Zimbabwe has a relatively huge diaspora and could avail investment opportunities to such whilst at the same time tapping into affordable finance for both economic and social infrastructure given its wide financing gap. The question which arises is whether Zimbabwe is fully utilising her diaspora-based citizenry to finance its infrastructure? This question will be settled in this study. The following section reviews studies related to the use of social impact bonds for the purposes of financing public infrastructure assets.

### **5.3.5 Social Impact Bonds (SIBs)**

Social impact bonds (SIBs) represent one of the new innovative financing mechanisms whose research and scholarly discussion is still in the conceptual formative level, with the first international conference on SIBs in the UK being done in April 2016 (Fraser, et al., 2018 and Tan, et al., 2019). Accordingly, a study meant to widen and expand the scope of available knowledge about SIBs was conducted in the United Kingdom (Tan, et al., 2019). The novelty and innovativeness of SIBs is not arguable, but it is however not clear whether SIBs are a more efficient financing mechanism than conventional public financing mechanisms (Tan, et al., 2019). Due to the lack of clarity, policymakers should be cautious with SIBs due to the

complexity of their associated contracts. It is also a necessity to expand the scope in relation to accountability, governance and transparency related to the issues pertaining to financing public expenditure such as infrastructure (Tan, et al., 2019). In relation to expanding the scope on SIBs, Andersen, et al. (2020), conducted a study to elaborate and investigate the role and responsibilities configurations, modalities for the provision of services, the structure of payments, as well as evaluation mechanisms in the Scandinavian region.

Despite the theoretical configurations of SIBs, such that they pay rates of return obtained in the market, they have however failed to attract investments from private capital markets without additional government guarantees (Warner, 2013). The study was based on a review of literature related to PPP, contracting and the management of performance for purposes of evaluating the institutional designs, transaction costs and performance measurement for SIBs (Warner, 2013). The success of SIBs is premised on the meticulous implementation, monitoring, and evaluation by all the parties involved in the SIBs contract (Chamaki, et al., 2019). This is better achieved by the deployment of the private sector in these processes, thereby eliminating inefficiencies that may be present in the public sector (Chamaki, et al., 2019).

Although SIBs appear more of a social intervention financing, it can also be used to finance economic infrastructure such as water and sanitation, which is sometimes classified as social infrastructure. Furthermore, it can also be used to finance infrastructure that requires positive impacts on society such as ICTs, where technologies may be financed through SIBs and investors repaid upon the technology positively impacting some predetermined social outcome. SIBs are a novel innovative finance mechanism, for which no evidence of its use in Zimbabwe was accessed by the researcher. Therefore, its impact on closing the public infrastructure financing gap may be difficult to establish. The following section reviews literature related to financing public infrastructure through state infrastructure banks.

### **5.3.6 State Infrastructure Banks**

The concept of state infrastructure banks evolved in the USA where it refers to revolving funds for developing transport infrastructure that were capitalised through assistance from the

federal government, whilst states would capitalise the fund with amounts equal to those provided by federal government (Chen, 2016). This innovative infrastructure financing mechanism has been in use for several decades, but not much scholarly research exists on the efficacy of financing public infrastructure through state infrastructure banks (Chen & Bartle, 2017). This concept of state infrastructure banks has since been transformed into financial institutions dedicated to financing public infrastructure (Uzsoki, 2018). The banks are either in the form of national, regional and/or international banks, including the International Bank for Reconstruction and Development (aka World Bank), European Investment Bank, Inter-American Bank, Asian Development Bank and African Development Bank, amongst many other such institutions (Uzsoki, 2018). These banks can either finance infrastructure projects individually or jointly for the purposes of mitigating their risk exposure.

The success of infrastructure banks depends on the ability of the banks to access finance from capital markets, which is enhanced when the banks are backed by the state and have a better credit rating (Uzsoki, 2018). These banks should offer innovative products such as project loans, framework loans, structured finance, and other strategies to de-risk infrastructure projects, which are offered by the European Investment Bank (Uzsoki, 2018). An almost similar concept was applied by the European Union when they developed a European Fund for Strategic Investment after realising market failures resulting from the after-effects of the 2008 global financial crisis (Paterson-Jones, 2019). The fund was able to mitigate project risk and mobilise private investments for the purposes of closing the infrastructure financing gaps identified in member states of the EU (Paterson-Jones, 2019).

However, a study by Whiteside (2017) envisaged the operations of the Canada Infrastructure Bank as an attempt to privatise public infrastructure. In other words, financing public infrastructure by infrastructure banks leads to the commercialisation of public infrastructure, some of which is meant to be social in nature (Whiteside, 2017). The study therefore recommends infrastructure financing that promotes public ownership and control of the infrastructure assets, such as the establishment and expansion of sovereign wealth funds to finance public infrastructure investments (Whiteside, 2017).



This section has reviewed how infrastructure banks have been used as an innovative instrument to finance public infrastructure. Since the concept of state infrastructure banks has changed to include, multilateral, regional and national infrastructure development financial institutions such as the IDBZ in Zimbabwe, the review is important. The role played by the IDBZ as well as the government is evaluated against the successes realised with other infrastructure banks. The following section reviews literature related to the role of the public sector accounting profession and public sector accountants in relation to the provision of finance for public infrastructure investments.

#### **5.4 The role of accountability and public-sector accounting in the financing of public infrastructure investments**

There are several reforms in the public sector happening across the globe with the aim of improving efficiency, effectiveness, responsiveness, and accountability within the sector (Pilcher, 2005). One of the reforms is the adoption of International Public Sector Accounting Standards (IPSAS). The IPSAS are anchored on the Conceptual Framework for General Purpose Financial Reporting by Public Sector Entities (Conceptual Framework), which is part of the Handbook of International Public Sector Accounting Pronouncements that is published annually by the International federation of Accountants. This conceptual framework provides guidance to preparers and users of general-purpose financial reports prepared by public sector entities on the key principles, concepts, components, and elements that should be applied and provided by the general-purpose financial statements (IFAC, 2020).

The conceptual framework recognises that the objectives for most public sector entities may not be motivated by profit but by service provision, hence performance for such entities is only partially evaluated through the statement of financial position, statement of performance or statement of cashflows (IFAC, 2020). However, these general-purpose financial reports should provide a basis for accountability and for enhancing decision-making. These financial reports should provide information such as the efficiency and effectiveness of service delivery and resources at the entity's disposal for future expenditure (IFAC, 2020; Santis, et al., 2018). Moreover, these general-purpose financial statements should disclose restrictions associated with the use of these resources, if any; the extent of change of burden to taxpayers regarding

payment for current services; and the extent to which the public sector entity's capacity to offer services has either improved or diminished (IFAC, 2020).

Since the development of International Public Sector Accounting standards, most public sector entities have been migrating their accounting bases from a cash basis to accrual accounting (Upping & Oliver, 2012). This change is meant to enhance the accountability and disclosure of all transactions, some of which may have been incurred and which would have been omitted from the financial reports based on cash accounting (Upping & Oliver, 2012). The adoption of IPSAS has however been blamed for attempting to impose private sector accounting practices on the public sector (Jaärvinen, 2009). These public finance reforms have been an enhancement of the quality of information to guide decision-makers in the public sector.

A study by Upping and Oliver (2012) sought to assess the factors inhibiting and/or supporting the transition from cash accounting to accrual accounting in Thailand's public universities. The study was done quantitatively using data collected from a mail survey with chief financial officers of 78 Thai public universities (Upping & Oliver, 2012). Findings revealed that the change was motivated by both internal and external factors, with the majority being requirements by new Public Financial Management legislation which made it mandatory for public sector entities to change to accrual accounting (Upping & Oliver, 2012). This change was meant to improve the quality of financial information for planning and control purposes by the management of these universities (Upping & Oliver, 2012). It is therefore envisaged that the transition to accrual accounting is helpful as it enhances public sector entities' ability to attract investors, including private sector capital.

However, Santis, et al. (2018) notes that the transformation to public sector entities preparing and presenting financial statements guided by International Public Sector Accounting Standards (IPSAs) has been a result of attempting to infuse private sector accounting standards into the public sector. Instead, public sector entities rely more on government financial statistics that have been prepared and used to inform decision-making in the public sector (Santis, et al., 2018). Yet, reforms in public financial accounting are advocating for the

adoption of accrual-based financial reporting and accounting (Santis, et al., 2018). The neglect of general-purpose financial statements in the public sector has been because compliance with IPSAs remains optional in most jurisdictions and as a result, auditors do not express an opinion on the compliance of the financial statements with IPSAs (Santis, et al., 2018).

The roles of accountants and the accounting profession are envisaged to be likely to be affected by disruptions caused by the transformation in the manner in which value is created, whereby non-current assets are likely to be overtaken by intellectual assets that are becoming drivers of value creation (Guthrie & Parker, 2016). Another disruption, particularly affecting the public sector accounting profession pertains to austerity. Governments and public sector entities have faced financial challenges lately after the 2008 global financial crisis, which has that led to the introduction of austerity measures by many governments around the world (Tan, et al., 2019).

Heald and Hodges (2015) conducted a study to ascertain how the austerity measures have impacted on financial reporting developments in the European Union. The methodology used in the study is based on a framework for theoretical conceptualisation by Miller and Power (2013), document analysis and interviews (Heald & Hodges, 2015). Findings from the study revealed that based on the Miller-Power framework, role territorialising of accounting in sovereign states leads to an environment facilitating the mediating, adjudicating and subjectivising roles (Heald & Hodges, 2015). Therefore, in times of austerity, there are chances of re-territorialising motivating governments to conceal risks and guarantees, making the comparability of financial reports difficult and meaningless (Heald & Hodges, 2015). It is imperative that during austerity, public sector financial reporting becomes a rhetoric and may not add value in attracting private sector capital, yet it is critical during such times to cover gaps left by the financial challenges faced by the fiscus (Heald & Hodges, 2015).

According to a study by Fombad (2013), accountability in the public sector can be achieved through the financing of public infrastructure using PPPs. Fombad's (2013) study iterates that accountability is a multifarious concept which entails a hierarchical relationship, horizontal accountability, ethics and social value, as well as governance. PPPs therefore require all these

forms of accountability since the partners must account to each other (horizontal), account to their principals (hierarchical), account to the society (ethics and social value), as well as adhere to the principles of good governance. Accordingly, Fombad (2013) highlights that there are accountability challenges associated with PPPs in South Africa, namely a lack of public consultation; a lack of transparency; corruption; a lack of competition; ineffective contract management; failure to monitor performance; inability to ensure value for money; inequitable risk allocation as well as accounting issues such as off-balance sheet finance. These challenges can therefore be addressed by including multi-tier accountability systems in each PPP contract which include internal managerial, communal and public accountability frameworks (Fombad, 2014).

Accountability challenges in relation to corruption and fraud can be addressed by deploying whistleblowing mechanisms (Okafor, et al., 2020). However, whistleblowing as a mechanism for enforcing accountability has challenges in developing countries as there is danger of physical harm to the whistle-blower. Therefore, accountability is key in enhancing the delivery of public infrastructure especially when financed through PPPs (Fombad, 2014). Accountants in the public sector are therefore expected to take leading roles in ensuring that all variants of accountability are enhanced for developing countries to attract more private sector investments into public infrastructure.

Accountability in various forms helps stakeholders in making informed decisions about whether to invest or not, for both private sector investors and governments. This role of public sector accounting is emphasised by Schaltegger and Zvezdov (2015), who reinforces that informed decisions by managers rely heavily on the judicious preparation and interpretation of information, a proficiency expected to be provided by accountants and practitioners in the accounting profession. Similarly, Ball (2011) submits that financial reports and the accompanying disclosures complement each other in eliminating information asymmetry between entity management and other entities who contract with their entity, such as shareholders, providers of finance, customers, employees and suppliers. Moreover, in the provision of finance for public infrastructure investments, public sector accountants are

expected to provide financial statements that represent the situation in the public entities and also minimise errors (Pilcher, 2005).

In addition to accountability, public sector accounting is expected to champion sustainability through championing and participating in environmental and sustainability reporting (Schaltegger & Zvezdov, 2015). This has been motivated by the need for ensuring that the construction industry is responsive to the need for sustainability in their operations (Siew, et al., 2016). As a result, tools for assessing and reporting sustainability for infrastructure assets were developed for the purposes of measuring progress towards the attainment of sustainability goals. Sustainability reporting requirements differ for infrastructure based on the sources of financing, with some financiers more interested in sustainability than others, for example, green bond investors would be more interested in the public sector providing sustainability reports for their infrastructure projects (Siew, et al., 2016). However, a study by Schaltegger and Zvezdov (2015) established that although accountants are usually involved in sustainability accounting practices, they were acting more as gatekeepers instead.

The role of public sector accountants in relation to financial reporting is well articulated in literature in relation to the provision of finance for public infrastructure. However, the researcher could not obtain published research articles on the role of public sector accountants in relation to management accounting and financial management. This is despite the importance of both management accounting and financial management in decision-making by management in both private and public sector entities (Paulsson, 2012 and Juras, 2014). The management accountant is regarded as a key internal business consultant in any organisation and therefore plays a strategic role (Pantea, et al., 2013). This implies that public sector entities that do not have management accountants and their roles clearly stipulated could be missing the value added by these strategic management accountants (Pietrzaka & Wnuk-Pel, 2015).

There is therefore the likelihood of the existence of a gap in the participation of public sector accountants in the financing decision-making process by public sector entities due to the gap in the management accounting personnel (Pietrzaka & Wnuk-Pel, 2015). The financial reporting duties are too many and are likely to cause public sector accountants to neglect

certain key aspects of their duties. This is despite decisions for financing infrastructure assets being critical in enhancing the sustainability of the assets and the investments. The following sections review literature related to some of these key processes necessary in making financing decisions for public infrastructure from both the management accounting and the financial management perspectives.

### **5.5 Public infrastructure project appraisals**

The focus of the study is to develop a framework for assessing the efficiency of financing public infrastructure using a combination of various instruments/mechanisms in Zimbabwe. Since efficacy is the focus of the study, it is important to review empirical studies on the appraisals that are done before investments in public infrastructure are made. Financial management textbooks place more importance on the investment decision than the financing decision (Pogue, 2004). Yet, making the wrong financing decision may threaten the survival of any business when they can no longer obtain financing from disappointed external financiers and stockholders (Pogue, 2004). Therefore, the appraisal of projects and investments as well as capital budgeting are steps key in ascertaining the financial feasibility of any proposed project (IFAC, 2013).

Investment appraisal is crucial in supporting decision-making processes in the allocation of scarce resources. In the public sector, investment appraisals should go beyond returns on investment, which is vital in private sector investment appraisals (Lindvall & Larsson, 2017). Interests of owners/stakeholders for the public sector are different from private sector shareholders' interests. The need for incorporating climate change and environmental impacts into the appraisals have become prevalent for the purpose of achieving the sustainability of investments into public infrastructure (IFAC, 2013 and Lindvall and Larsson, 2017). Due to the demands of the investment appraisals and the difference in stakeholder objectives, this has rendered the conventional investment appraisal techniques recognised in investment theory such as the payback period, average/accounting rate of return (ARR) and internal rate of return (IRR), not suitable for the appraisals (Lefley, 2006). These investment appraisal methods are commonly used in the private sector where all investments are evaluated for the purposes of

establishing their viability in view of the objects of the entities, top of which is shareholder value maximisation and profit maximisation (Lefley, 2006).

For public infrastructure projects, it is acknowledged that not all projects are embarked upon based on their economic value, since some infrastructure is social in nature and therefore may not generate enough economic returns to recover the initial investment outlays (Annema, et al., 2007). Some infrastructure is developed as public services to the extent that no cash receipts are realised from the operation of the infrastructure assets, hence making such methods as payback period assessments impossible. Therefore, literature and studies on public infrastructure investment evaluations recognise that the most used method to evaluate project viability is Cost Benefit Analysis (Beria, et al., 2012). However, the use of Multi-Criteria Appraisal (MCA) is on the increase (Huang, et al., 2011). These methods are therefore reviewed guided by studies in different countries and/or different infrastructure sectors.

Having realised that most of trains run by the Egypt National Railway were operating primarily using diesel trains, a decision was made to invest in the electrification of the railways (Al-Tony & Lashine, 2000). Electrification of the railway line connecting Cairo and Alexandria was evaluated using the cost benefit analysis (CBA) method. A CBA framework that identifies likely direct and indirect costs as well as the associated benefits was used (Al-Tony & Lashine, 2000). The evaluation of various benefits vis-à-vis costs was done using sequential analysis steps (Al-Tony & Lashine, 2000). If the internal rate of return (IRR) is used in the project, the project had a 9% IRR. However, using the CBA showed that the project had more economic benefits, after incorporating more benefits in the evaluation (Al-Tony & Lashine, 2000). Despite challenges in getting information and estimates of costs, the results for the project were comparable to the decisions in Europe in projects of a similar nature. Therefore, public infrastructure is better evaluated using CBA than the conventional appraisal methods such as IRR.

For most public infrastructure projects in Europe, cost benefit analysis plays an important role in the evaluation of projects before they are implemented (Van Wee, 2007). CBA assesses the economic and social effects of government actions, such as public infrastructure investments

on society measured in terms of net social benefits (Gamsakhurdia, 2013). The process of conducting the CBA for European countries appears simple since estimates of costs are readily available, unlike in the case of the Egypt National railway reviewed above, where data was difficult to obtain (Van Wee, 2007). Similar challenges are associated with many other developing countries such as Zimbabwe. The associated benefits are also apparent and include saving traveling time and the increase in consumer surplus caused by induced demand (Van Wee, 2007). However, the process of conducting a CBA is a more complicated process since the readily available estimates of costs and benefits are not usually reliable, as it may be difficult to estimate costs and benefits associated with technology (Van Wee, 2007). Due to challenges associated with evaluating public infrastructure projects based on the CBA, some scholars have advocated using the Multi-Criteria Analysis (Beria, et al., 2012).

The shift towards using MCA has been motivated by the need to expand the scope of considerations for the project so that project selection is enhanced. Therefore, most MCA methods integrate elements borrowed from the CBA. Consequently, the use of the MCA ahead of CBA is motivated by the recognition that infrastructure projects affect society in more ways than the scope of CBA (Barfod, et al., 2011 and Suksri, et al., 2012). The advantage noted for MCA is the capacity to deal with a variety of criteria for making decisions in complicated policy-making environments (Suksri, et al., 2012).

The adoption of the MCA by France in evaluating transport infrastructure projects was a result of CBA's limitations in relation to the stimulation of interactions with stakeholders, thereby prompting public debate. Some of the MCA methods that have been used for several decades include the analytic hierarchy process, analytic network process, multi-attribute utility theory and outranking (Tudela, et al., 2006; Diakoulaki and Karangelis, 2007). Regardless of the MCA technique used, it is important to weigh subjectively using expert judgement in the appraisal process, hence applying processes that are both transparent and systematic is critical (Beria, et al., 2012). This is meant to guard against the weakness of operationalising these intangible criteria.



To improve transparency, rigour, and objectivity in applying the MCA, the application of pair-wise comparisons can be used as a way of eliminating bias in the subjective processes (Barfod, et al., 2011). As a result, the possibility of using the MCA to address multi-dimensional project appraisals, given the ability to include quantifiable monetary and intangible variables transparently, is regarded as a better appraisal methodology by Henn, et al. (2016). This approach therefore allows for the selection of and investment in projects that are in the best interest of society both economically and socially (Henn, et al., 2016).

The methods discussed above are project appraisal techniques used in evaluating the viability of public infrastructure projects. This decision is however different from the financing decision which is the focus of the study. The following section therefore reviews literature on how the decision for selecting the most efficient method to finance public infrastructure projects is arrived at. This review is done with a view of developing a framework for financing public infrastructure that can be used in Zimbabwe. It is therefore important to be guided by literature on how financing decisions have been made in the past and by other countries that have proven to be efficient in terms of managing risk and/or sharing risk with other stakeholders involved in financing public infrastructure.

### **5.6 Selecting public infrastructure financing approaches**

The selection of the source of finance for public infrastructure is usually influenced by the political ideology of the government, as well as the financial situation of the government (Henn, et al., 2016). This has been witnessed in the case of several countries, including China, Britain, Japan, and the USA in their financing of high-speed railways (HSR) infrastructure projects (Henn, et al., 2016). It is noted that there is no consistent evaluation of infrastructure financing, but there is evidence that infrastructure projects are only assessed for economic viability/feasibility (Henn, et al., 2016).

In a world where resources are limited, it is important to enhance effectiveness in the management of public financial resources. One key public financial management practice is to invest public resources in projects that have been evaluated for efficiency and effectiveness in the achievement of value for public money (Gamsakhurdia, 2013). As discussed in section

5.5 above, the most used methods of evaluating public infrastructure economic viability are cost benefit analysis (CBA) and multi-criteria analysis (MCA) (Diakoulaki & Karangelis, 2007). On the other hand, appraisals pertaining to infrastructure delivery have also achieved significant developments that have led to the delivery of public infrastructure methods that yield optimal value for money (Wellman and Spiller, 2012 ; Ball, 2009).

Given the inconsistencies in the evaluation of financing decisions for public infrastructure, it is critical that a framework be developed that helps in ensuring that infrastructure financing decisions are considered seriously. It is noted from literature that most of the time, the financing decision is secondary or tertiary in the evaluation, yet the success or failure of any infrastructure project is linked to financing the project using (in)appropriate mechanisms. The following sections review literature on the key aspects/processes necessary for developing a framework for evaluating public infrastructure financing decisions.

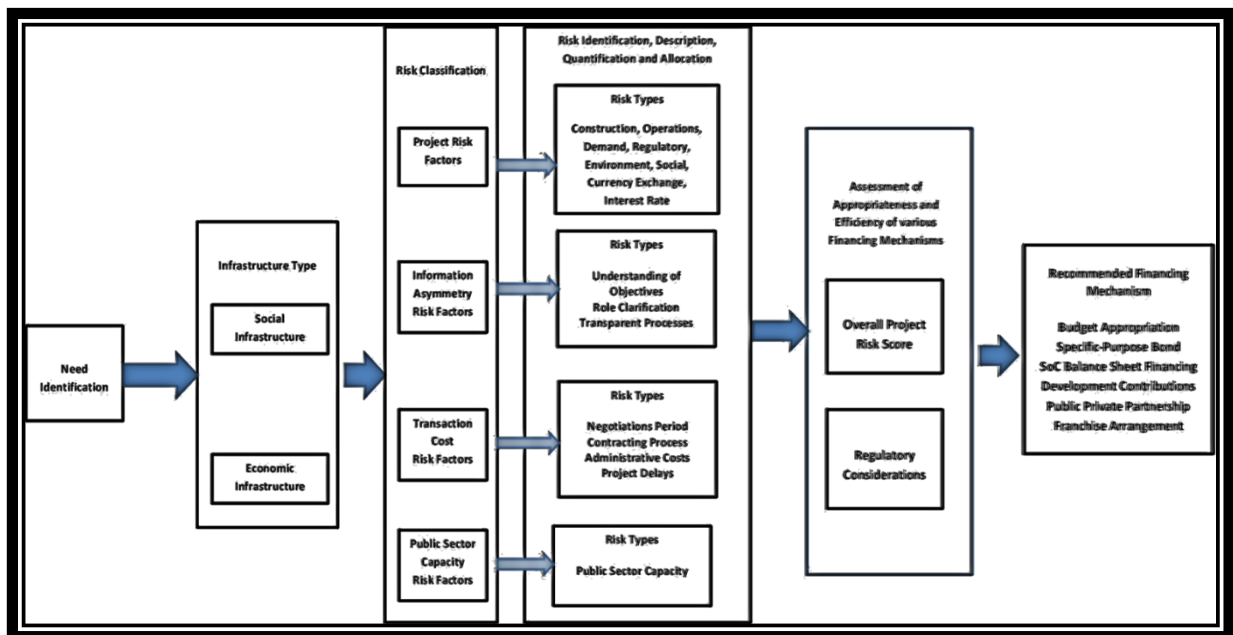
#### **5.6.1 Public Infrastructure financing frameworks**

The financing decision is a key component of the decisions that have to be made before any investment can be undertaken and therefore needs to be made meticulously after considering all the factors affecting financing decisions (Henn, et al., 2016). The best and most efficient approach for financing infrastructure is important as it has many effects such as the cost of financing, future contingent liabilities, and the success of the project. As discussed in the sections above, public infrastructure financing is complicated since there are a variety of sources of financing to be considered, whilst at the same time there are many, sometimes conflicted stakeholders, and the infrastructure projects have economic, social, and ecological factors that must be considered.

Despite the complexity of public infrastructure financing decisions, there are limited studies showing the existence of frameworks for evaluating financing instruments in terms of value to society (Camane, 2013 and Henn, et al., 2016). The same observation was made by (Henn, et al., 2016), that in the OECD countries, there was no comprehensive framework for evaluating financing choices for public infrastructure projects focusing on the value of financing choices to society. A variety of methods for evaluating financing categories and

how these are evaluated is available. Moreover, the term financing is often confused with funding and delivery, this led to the evaluation of either funding or delivery under evaluations of financing choices. The above stated authors developed frameworks for evaluating infrastructure financing suitability and these are reviewed hereunder.

Camane (2013) developed a framework for assessing infrastructure financing in South Africa. The framework firstly establishes the need for public infrastructure, which is classified as either economic or social infrastructure. After this, there is need to classify risks into project implementation, information asymmetry between private sector and public sector players, transaction cost- related risks, as well as incapacity risks of the public sector to facilitate and/or manage the infrastructure project (Camane, 2013). These risks must be scored and quantified using an objective tool, resulting in an overall risk score for the project which gives a benchmark for the project’s rate of return that investors may be expecting from investments into such a project (Camane, 2013). The risk score is the basis of assessing the suitability of the financing mechanism. After the determination of the project, the framework also encourages the evaluation of legislative and policy restrictions which may take precedence in the ultimate selection of the infrastructure financing mechanism used to finance public infrastructure (Camane, 2013). The framework is schematically presented in Figure 5.1.



**Figure 5.1: Infrastructure financing framework** (Source: Camane, 2013)

According to the framework in Figure 5.1, the choice of infrastructure financing mechanism is a function of the project's overall risk score and the regulatory/policy considerations guiding the public sector institution. The outcome of the framework is supported the studies of Inderst (2010) and Chan, et al. (2009), who noted that the efficiency of costs for financing mechanisms is principally guided by the risk-return profile of the public infrastructure project financed. Thus, it is important to firstly understand the risk profile of the project, which gives guidance on the expected return for any possible investor into the project, as depicted by Figure 5.1. According to Camane (2013), the framework gives guidance on how the Total Risk score for proposed infrastructure projects is determined, which is a weighted average of transaction costs risk score (TCRS), project risk score (PRS) and information asymmetry risk score (IARS). The components of these risk scores are explained later under the sub-heading on infrastructure financing risks.

Henn, et al. (2016) on the other hand, developed a framework for assessing the suitability of several infrastructure financing mechanisms. The novel multi-criteria framework for assessing options to finance infrastructure combines elements borrowed from the cost benefit analysis and the multi-criteria analysis into a model that helps decision-makers in choosing the financing choice that optimises benefits to society (Henn, et al., 2016). The framework developed by Henn, et al. (2016) adopted the 'Minto Pyramid Principle' in the development of mutually exclusive and collectively exhaustive (MECE) classes that are critical for ensuring that all the available alternatives are identified before performing the appraisal. This was meant to ensure the chance of selecting an optimal set of instruments to finance infrastructure projects. In this framework, alternative sources of finance are classified as either internal or external to the government or public sector entities and the sources are further sub-categorised into financing instruments classes as shown in Table 5.3:

**Table 5.3: Categorisation of public infrastructure financing instruments**

Internal	External			
Reserves	Capital markets	Financial intermediaries and corporates		
	Public equity	Debt		Private equity
		Bonds	Loans	
Government budget appropriations and Accumulated special levies Reserves and reserve funds (for example retained earnings)	Listed infrastructure and utility stocks/shares	General purpose bonds Special purpose infrastructure bonds	Government loans Development bank loans Commercial bank loans	Privately raised from financial institutions/ corporate investors
	Hybrids: such as convertible infrastructure bonds; subordinated debt			

**Source:** Henn, et al. (2016)

Table 5.3 summarises the major sources of finance for public infrastructure, with internal sources being primarily resources saved by the government from the collection of taxes and levies that are available for spending on the development of infrastructure. All the other possible sources of finance are regarded as external, namely equity, bonds and loans, details of which have been reviewed in literature in the preceding chapter. Henn, et al.’s (2016) framework permits the evaluation of various combinations of categories of financing for infrastructure. Sometimes, due to the size of the infrastructure project, it usually calls for innovativeness when raising finance so that it is possible to finance one project using several financing instruments together. This leads to the selection of the financing approach for public infrastructure that optimises the combinations of instruments.

The appraisal criteria used are classified into monetary and intangible components. The monetary components used are cost of capital, contingent liabilities, costs associated with project delays, credit rating impact, taxes foregone, as well as administrative and transaction costs (Henn, et al., 2016). Furthermore, the intangible components are effectiveness, efficiency, fairness in terms of equality and equity, support by stakeholders, flexibility,

accountability, and transparency, as well as the extent of public control (Henn, et al., 2016). These components are well defined by the authors as they relate to the financing decisions for public infrastructure projects as guided by other scholars.

The components of the criteria elucidated above were operationalised by being scored, with the overall scores being used as the basis for decision-making on the optimal approach for financing public infrastructure (Henn, et al., 2016). Proxies are used for estimating the monetary components used in the framework to calculate the effective cost of financing, whilst the intangibles are quantified using five-point Likert scales (Henn, et al., 2016). This MCA-based framework allows for the consolidation of all the monetary and intangible components before obtaining a single overall appraisal indicator to guide those responsible for making the financing decision (Henn, et al., 2016). Ultimately, desirability for the various financing instruments from the viewpoint of society is based on the weighted average effective financing cost after discounting it for the total intangible benefit overall rating (Henn, et al., 2016). This is also called the net multifaceted cost of financing (NMCF). The monetary and the intangible components must be weighted in terms of their contribution to the overall desirability of financing instruments (Henn, et al., 2016).

The review of the two financing frameworks is critical for this study as the researcher borrows the ideas in these frameworks to develop a framework suitable for Zimbabwe in the current state, as well as in the future. However, both frameworks emphasised the importance of risk and its allocation or sharing in the financing of public infrastructure projects. It is therefore important to review some of the key risks that affect financiers of public infrastructure projects Henn, et al. (2016) and Camane (2013). This will be important in the development of the framework for public infrastructure financing suitable for application in Zimbabwe.

### **5.6.2 Risks affecting public Infrastructure financing decisions**

Public infrastructure assets are usually monopolistic in nature, leading to the possibility of variable returns being estimated with reference to the inherent risk of developing and/or operating these assets. Consequently, it becomes important to obtain an understanding of the key risks affecting the development and financing of public infrastructure projects. Scholars

that include Yescombe (2007), Inderst (2010) and Sawant (2010) noted that the financing of public infrastructure projects is affected by a multiplicity of risks that must be properly allocated and managed. In addition, Chan, et al. (2009) and Inderst (2010) highlight that the allocation of risks requires consideration of each party's capacity to manage their allocated risks cost-effectively. As highlighted earlier, infrastructure financing risks are broadly classified into transaction cost-related risks, information asymmetry-related risks and project risks (Camane, 2013). Reviewed hereunder are some of the risks identified by the above stated authors and were further emphasised by the (World Bank, 2012; Chan, et al., 2009).

#### **5.6.2.1 Construction Risk**

Construction risk is one of the major risks affecting infrastructure projects since the viability of infrastructure projects relies heavily on the effective management of the costs of constructing the infrastructure assets (El-Diraby & Gill, 2006). Construction risk is defined as the risk accompanying the physical construction works and warranty phases during the development of infrastructure assets and it arises from unanticipated problems with designs, costs exceeding budgets and unforeseeable delays in construction work (Chan, et al., 2009).

Most project developers intend to lock certain costs, such as construction materials costs, so that price escalations are eliminated. Any delay in the completion of the construction project by the contractor usually has major implications for the financial viability of the project. It is standard practice to accept variances in project costs of not more than five percent (El-Diraby & Gill, 2006). This also affects the performance of completed projects or parts of such projects. Thus, failure by a project to be in a state and condition necessary for the achievement of planned objectives leads to the project failing to realise the projected cashflows or planned services (World Bank, 2012).

#### **5.6.2.2 Operating Risks**

Operating risk results when planned levels of availability of services from the infrastructure assets eventuates, usually due to the challenges affecting the management of staff, maintenance, or any essentials necessary for the infrastructure asset to be operated effectively (Chan, et al., 2009). This risk surfaces when the operation of the infrastructure assets

commences and is likely to influence the financial viability of the project (World Bank, 2012). Thus, the operating costs may go beyond the anticipated levels, thereby investors and lenders seek extra protection so that their revenue streams are not depleted (Ameyaw & Chan, 2015). This can be achieved through techniques such as hedging, futures contracts and input agreements, as investors require assurances that the variances in the costs will be minimal.

### **5.6.2.3 Demand Risk**

Chances exist that expected demand and revenue from the operation of infrastructure assets may not be achieved when the asset becomes operational (Chan, et al., 2009). Such ‘below expected demand’ could lead to a significant impairment of the infrastructure asset. Demand risk may be a result of faults in the planning or forecasting of the future use of the infrastructure and has the likelihood of affecting the financial viability of the projects (Ameyaw & Chan, 2015).

### **5.6.2.4 Political and Regulatory Risk**

Political risk is also known as sovereign or regulatory risk (Chan, et al., 2009). The level of political risks is relative, with some countries having higher risks than others. Generally, political risk is more substantial in developing countries than in developed countries due to the extent of political interference of the governments and weak regulatory frameworks supporting the protection of investors, including infrastructure project investors (Ameyaw & Chan, 2015). Interferences include decisions by governments to cancel projects or change the terms of project financing contracts, or the renegeing by governments on their guarantees or any other obligations. This risk has limited recourse from commercial insurers as they cannot take political risk, leaving project sponsors resorting to either export credit agencies or multilateral agencies to take on the political risks of financing infrastructure projects (World Bank, 2012).

### **5.6.2.5 Environmental risk**

This type of risk is either included as part of regulatory risk or separately as environmental risk. It emanates from the obligations imposed on infrastructure projects due to environmental legislation and compliance requirements (Zhang, et al., 2020). Most investors, including



international investors, require that infrastructure projects meet the set minimal environmental requirements before they can invest in the projects (Chan, et al., 2009). It is therefore important for project managers to undertake environmental due diligence in order to ascertain the quantum of environmental risks associated with the projects (World Bank, 2012). Certain infrastructure projects have higher environmental risks than others. For instance, airport infrastructure is regarded more environmentally riskier than other infrastructure assets (El-Diraby & Gill, 2006).

#### **5.6.2.6 Social risk**

Social risk refers to the risk of infrastructure projects being impacted negatively by resistance from society, civic society, and consumers due to the actual or perceived impact on their quality of life (Chan, et al., 2009). This usually results in delays in the implementation of the projects, leading to cost escalation negatively impacting the viability of the projects. Projects likely to be affected by this type of risk include construction of water bodies such as dams, electricity generation plants and land-intensive projects such as toll road projects (World Bank, 2012).

#### **5.6.2.7 Currency exchange risk**

Whenever an infrastructure project is financed from foreign financiers, there is a risk that the exchange rate of the local currency against major hard currencies may deteriorate, thereby negatively affecting the value of the investors (World Bank, 2012). This risk also affects project revenue, which is in local currency, whereby investors may face challenges in exchanging the local currency for their preferred currency. Thus, due to the difference in currency of the debt and currency of the revenue, there may be challenges in repaying investors after exchange rate deterioration or devaluation which may threaten the viability of the infrastructure project (World Bank, 2012). This risk can however be managed through hedging against the variations in exchange rates, otherwise investors would require a higher premium for taking this additional risk. This risk is usually considered part of the financing risk (Chan, et al., 2009).

### **5.6.2.8 Interest rate risk**

This category of risk is usually considered part of the financing risk that emanates from the volatility of the interest charged for financing infrastructure projects, thus it varies from market interest (El-Diraby & Gill, 2006). This also emanates when the infrastructure project finance is being charged a highly volatile interest, such as a floating rate of interest, making the service of the finance unaffordable (Chan, et al., 2009). Interest rate risk is mitigated by obtaining infrastructure project finance at fixed rates, hence making the service of the debt finance predictable. Whenever foreign investors are involved, it is important to strike a balance between the fixation of the interest rate and fixing the exchange rate through hedging techniques such as entering forward rate agreements and options, amongst many others (World Bank, 2012).

Outlined above are some of the risks that need to be considered in making financing decisions about infrastructure projects. These are some of the risks that have been considered in the development of financing frameworks by the authors highlighted earlier. The same risks are also considered in this study in the development of a framework for public infrastructure financing in Zimbabwe. The following section reviews literature on the approaches that are used in literature for the purpose of determining the infrastructure financing gaps in several countries.

### **5.6.3 Approaches to Estimating Public Infrastructure Financing Requirements**

Branchoux, Fang and Tateno (2018) observe that approaches for estimating infrastructure financing gaps are broadly categorised based on the methods applied in the estimation of the financing requirements for the infrastructure assets and they are categorised as either the bottom-up approach or top-down approach. These approaches use different methods to estimate the amounts required, as explained hereunder.

The bottom-up approach entails the assessment of the entire infrastructure services demanded through studying project-level financing requirements demand (Branchoux, et al., 2018). This method involves an examination of the costs of implementing individual infrastructure projects in order to determine the sectoral and/or national total requirements. The method has

constraints in obtaining the required data at project level since project plan data is usually unavailable and private. Due to such data limitations, the project costs must be estimated using different assumptions derived from past related best practice scenario infrastructure projects (Branchoux, et al., 2018).

The alternative approach is the top-down approach, which is a quantitative based approach that applies econometric methods in the estimation of the amounts required for financing national infrastructure requirements. The approach is empirically guided by the scholarly works of Fay (2000) and Fay and Yepes (2003) who developed an econometric model for forecasting financing infrastructure requirements. This model has since been applied in several other studies by Bhattacharyay (2010), Ruiz-Nuñez and Wei (2015), ADB (2017) as well as Branchoux, et al. (2018). Using the top-down approach, sectoral infrastructure requirements are estimated using projected growth rates in the demand for infrastructure assets after assessing the relationship between demand for infrastructure services and economic and/or demographic variables.

After forecasting infrastructure demand, standard international best practice unit costs are applied to estimate new infrastructure financing requirements (Branchoux, et al., 2018). The model estimates the financing requirements for maintenance, together with investments to expand the coverage of infrastructure assets. The major limitation of the top-down approach is that the forecasts use estimated unit costs which ignore several national and/or regional specific requirements, since past experiences in some countries are hardly a good predictor of future experience in other countries (Fay & Toman, 2010). However, regardless of this limitation, the top-down approach has been used in several contemporary multi-country infrastructure financing requirements estimates because the data requirements are relatively modest (Branchoux, et al., 2018).

There is an econometric OLS model used to estimate the public infrastructure financing requirements for several regional and international groups of countries (Branchoux, et al., 2018). The modified linear model used in the study to estimate future infrastructure demand as follows:

$$I_t^j = \alpha_0^j + \alpha_1^j I_{t-1}^j + \alpha_2^j y_t + \alpha_3^j A_t + \alpha_4^j M_t + \alpha_5^j U_t + \alpha_6^j P_t + \alpha_7^j t + \varepsilon \quad \text{Equation 5.1}$$

Where  $I_t^j$  represents the infrastructure stock of type j needed in the country at time t.

With  $y_t$ ,  $A_t$ , and  $M_t$  representing the GDP per capita and shares of agriculture and manufacture value added in GDP for the country, respectively.

$U_{i,t}$  and  $P_{i,t}$  representing the urbanization rate and the population density, respectively.

$t$  is a time trend used to capture time effect; and

$\varepsilon$  represents the error of the model or the outcome of the model not explained by the variables in the model

One of the principal studies that developed the top-down approach to estimating infrastructure financing requirements by Fay and Yepes (2003) used the following variables in the econometric model: telephone mainlines (lines per 1000 persons); mobile phones (subscribers per 1000 persons); KW of installed electricity generating capacity per capita; km of railway per 1000 persons; km of paved road per km<sup>2</sup> of land; and percentage of households with access to water and sanitation. The study also used land rather than population as the deflator for roads since it yielded a slightly better fit. Similar variables were also used in subsequent studies by Yepes (2008), Bhattacharyay (2010), Ruiz-Nuñez and Wei (2015), ADB (2017) and Branchoux, et al. (2018). Therefore, the methodology has been tried and tested in several studies. Although there has been slight modification of the variables to address additional requirements or mitigate the weaknesses observed, the basis for the model has however remained similar. Some of the studies conducted using the top-down approach are highlighted hereunder.

Bhattacharyay (2010) in a working paper study for the Asian Development Bank Institute, estimates the demand for infrastructure in Energy, Transport, Telecommunications, Water and Sanitation in Asia and the Pacific for the period 2010 to 2020. The study by Bhattacharyay (2010) applies both the “top-down” and “bottom-up” approaches, which is a more comprehensive estimation than other studies. The study estimates that developing countries in Asia require total financing of US\$776 billion per year, of which US\$747 billion is for

national financing requirements, whilst US\$29 billion is for regional infrastructure between 2010 and 2020 to meet growing demand (Bhattacharyay, 2010).

Ruiz-Nuñez and Wei (2015), in a policy research working paper study for the World Bank Group's Public Private Partnership Group, estimates infrastructure investment demands in emerging markets and developing economies. Ruiz-Nuñez and Wei (2015) estimate infrastructure using the model by Fay (2001), incorporating the improvements to the model by Yepes (2008). The study estimates resource flow requirements of US\$836 billion per annum over the period 2014 to 2020 to meet new demand and for maintenance of existing infrastructure. Furthermore, a gap of US\$452 billion per year is identified which, when compared to the requirements, implies doubling of the investments in infrastructure (Ruiz-Nuñez and Wei, 2015).

The Asian Development Bank (2017) applied the top-down approach to obtain baseline estimates of infrastructure needs, like Fay and Yepes (2003), Bhattacharyay (2010) and Ruiz-Nuñez and Wei (2015). The estimates relate infrastructure inventory to key drivers of demand and/or supply, such as economic activity and demographic factors. More factors included in obtaining the estimates entail per capita gross domestic product (GDP), population density, share of urban population and the shares of agriculture and industry in GDP. This was followed by an adjustment of the baseline infrastructure investment estimates to incorporate costs of climate mitigation and adaptation, giving climate change adjusted estimates (ADB, 2017).

Branchoux, et al. (2018), estimate the infrastructure financing needs in 71 Asia-Pacific Least Developed Countries (LDCs), Landlocked Developing Countries (LLDCs) and Small Island Developing States (SIDS) to meet the Sustainable Development Goals up to 2030. The framework developed considers financing requirements to close existing gaps, growing demand for new infrastructure, maintaining existing infrastructure, as well as mitigating climate-related vulnerabilities (Branchoux, et al., 2018). Results of the study estimate financing requirements to cover the four infrastructure types for the period 2018 to 2030 in the Asia-Pacific LDCs, LLDCs and SIDS to be more than US\$700 billion, translating to

US\$57.6 billion annually in terms of 2010 dollars (Branchoux, et al., 2018). Branchoux, et al. (2018) also found that most of the finance required in the LDCs and SIDS is to meet existing shortages in transport and energy infrastructure. The study also concluded that meeting infrastructure financing requirements requires the engagement of the private sector.

## **5.7 Chapter Summary**

The chapter has reviewed empirical studies related to all the objectives of the study. Firstly, a review of studies on how public infrastructure has been financed over time has shown that different countries have different courses of financing public infrastructure. Some countries such as the United States of America have traditionally had the private sector active in the financing of certain classes of public infrastructure such as railways, whilst for developing countries and the emerging markets, the public sector has been leading the provision of public infrastructure, including the financing thereof. However, almost all countries have almost gone full cycle in the shift from public sector to private sector financing. Due to the widening gaps, the private sector has increased their participation in the financing of public infrastructure.

The transition from full public sector provision to private sector financing of public infrastructure has created some innovative arrangements between the public sector and the private sector. The most used such innovative financing arrangement is public private partnerships (PPPs). There is however still scope for more PPPs in developing countries, but the challenge has been the lack of bankable infrastructure projects. Moreover, developing countries are regarded as much riskier when it comes to the attraction of international partners in the PPPs, or some other innovative financing arrangements. Some of these innovative financing arrangements are used to a lesser extent for financing public infrastructure investments, such as crowdfunding, diaspora bonds and social impact bonds. Therefore, innovative finance has limited capacity for closing public infrastructure requirements in developing countries such as Zimbabwe.

In relation to the role played by public sector accounting and accountants in the financing of public infrastructure investments, it is clear from empirical studies that it is playing a limited

role. The clearly defined role pertains to accountability and financial reporting which is guided by the framework for financial reporting by public sector entities, as well as other frameworks such as the public finance management legal framework. On the other hand, in relation to supporting decision-making such as in public management accounting, public sector accountants play docile roles. As a result, there is scope for expanding the knowledge of public sector accountants with skills that enhance their participation on the evaluation of public infrastructure financing alternatives and help decision-makers in making informed choices.

Given the limited roles played by public sector accounting in the financing of public infrastructure investments, it is critical to develop a framework for assessing financing alternatives for public infrastructure financing. Literature reviewed showed limited studies on frameworks for evaluating infrastructure financing alternatives. As part of such a framework, it is important to assess the risks associated with each financing mechanism and select the financing arrangement that optimises value for public money. In addition to assessing the risk for incorporation into the frameworks, it is critical to ensure that financing requirements are estimated using robust methods. Therefore, the review showed that there are basically two methods of estimating public infrastructure financing requirements: the bottom-up approach and the top-bottom approach.

The empirical studies reviewed above show the methodology and the models adopted in each of the studies. This forms an important part in guiding this study in ensuring that the objectives of this research are achieved. Therefore, the following chapter presents the methodology used in the study as guided by the empirical studies reviewed in this chapter. Overall, most studies have been used either a quantitative methodology or mixed methods. As a result, this study was conducted using mixed methods. The study used both qualitative and quantitative methods, with one of the quantitative models presented as equation 5.1 above. The details of the methodology used and how the methodology was applied is presented in the following chapter.

## CHAPTER SIX

### RESEARCH METHODOLOGY

#### 6.1 Introduction

This chapter outlines the methodology used in conducting the study regarding the collection of data and the analysis and interpretation thereof. The chapter thus discusses the processes, tools and steps used in undertaking the research study. As presented in Chapter One, the aim of this study is to develop and recommend an appraisal framework for use in the evaluation of financing tools for public infrastructure financing requirements in Zimbabwe to ensure the efficiency of the financing tools. Specific objectives of the study were: to determine the main sources of public infrastructure financing in Zimbabwe; to establish innovative finance's capacity to close the public infrastructure financing gap in Zimbabwe; and to assess the role played by public-sector accounting in attracting appropriate and efficient mechanisms to finance public infrastructure in Zimbabwe. Ultimately, the study sought to recommend a framework for selecting suitable and efficient mechanisms to finance public infrastructure in Zimbabwe.

Overall, the study uses a mixture of research methods, with some objectives addressed using qualitative research methods whilst other objectives are addressed using quantitative methods. This is meant to ensure that each objective was addressed using suitable research methods. This mixture was necessary given the extent of the study, wherein it was necessary to address objectives with data that was appropriate to the specific objectives of the same study.

The mixed method ensured that the perspective of the study was guided accordingly, with both primary and secondary data used in the development of the framework for evaluating infrastructure financing choices. It is important to note that the methodology used in this study is guided by the empirical studies reviewed in the previous chapter. Some of the studies reviewed used quantitative methods and/or mixed research methods. The research methodology discusses the processes, tools and steps used in conducting the research. The chapter also presents the details of the model specification and estimation procedures used in



the estimation of the public infrastructure financing gap in Zimbabwe. The outline of the sections in the chapter are guided by the research onion, which states the research methodology must clearly outline the research paradigm, approach, methods, and strategy (Saunders, et al., 2015). The methodology must also show the time horizon of the study and the data collection methods used (Saunders, et al., 2015). There was, however, some rearrangement of the onion layers to ensure a flow of the methodology aspects as guided by other research methodology scholars.

## **6.2 Research Paradigm**

The study sought to develop a theoretical framework that may be applied in the decision making regarding the financing of public infrastructure in Zimbabwe, hence it follows that the study ultimately sought to develop a theory to some extent. It is important to clearly outline the research philosophy used in each study so that readers understand the paradigmatic underpinning of the study (Shannon-Baker, 2016). Therefore, a theory building research methodology was used in the study guided by the interpretivism research philosophy. This philosophy, as outlined by Saunders, et al. (2015), recognises that research involving humans as social actors derives meaning from their interpretation of their roles. This philosophy recognises that situations are both complicated and unique and therefore require the researcher to adapt to the conditions prevailing in each study (Saunders, et al., 2015). Hence, conducting this study required an appreciation of the prevailing situation in Zimbabwe's financing of public infrastructure to develop a framework that addresses the situation specific to Zimbabwe.

There is however a continuous debate regarding the association of research paradigms and the appropriate research designs (McChesney & Aldridge, 2019). The basis for the debate is that there is a binary relationship between research philosophies and methods, with quantitative and qualitative research designs being associated with specific philosophical underpinnings whilst some argue for flexibility, thereby advocating for a combination of paradigms, especially in studies that used mixed research methods (McChesney & Aldridge, 2019). Mixed methods studies in the past have been conducted based on the post-positivist philosophy, but McChesney and Aldridge (2019) combined interpretivism and social

constructivism paradigms in a mixed methods study. It is fundamental that the research philosophy and the research design used are appropriate for addressing the research objectives and questions that the study wishes to address. This study therefore used the interpretivism philosophy guided by McChesney and Aldridge (2019) and details of the research design used are outlined in the following section. The selection of the research design and methods used in the study are guided by empirical studies reviewed in the previous chapter, particularly other theses related to this study. Firstly, the research approach is presented followed by the research design.

### **6.3 Research Approach**

Literature records that researchers can broadly choose between the deductive and inductive approach to research, although there is a third approach known as abductive research approach (Saunders, et al., 2015). This study used the inductive approach, which entails the researcher starting by collecting the data relevant to the study followed by an analysis based on the interpretivism paradigm selected for the study. After analysis, the framework is developed in the penultimate chapter presenting the results of the study (Saunders, et al., 2015). Development of the framework amounts to the theory development highlighted in the inductive approach to research.

### **6.4 Research Design**

Several scholars have defined the research design differently, but there are some scholars who concur and define a research design as “the logic that links the research purpose and questions to the processes for empirical data collection and data analysis, in order to make conclusions drawn from the data” (Ponelis, 2015; Yin, 2014; Bloomberg and Volpe, 2008). The research design is therefore the blueprint of how the study is conducted and is highly dependent on the paradigm chosen for the study (Saunders, et al., 2015). The study therefore used the case study research design, which is suitable for the interpretivist philosophy adopted for the study (Ponelis, 2015).

#### **6.4.1 Case study Research Design**

A case study research design is defined by Stake (2005) as the process of investigating and analysing one or more cases, intending to capture the intricacy of the objectives of the study. Yin (2012) and Farquhar (2009) concur as they outline that as a research design, a case study provides a comprehensive applied enquiry of an event in an unmodified genuine situation. Ponelis (2015) notes that the objective of using a case study as a research design is to obtain an in-depth account and scrutinise either single or bounded units located in a given locality for purposes of appreciating the reality of the subject under study (Merriam, 2009 ; Pickard, 2013). The study therefore examined how financing decisions were made for the selected public infrastructure projects.

It is notable that the case study as a research design is valuable in applied disciplines wherein the problems, processes and programs require examination to obtain a better understanding which informs improved practice (Ponelis, 2015). Therefore, Yin (2012) identifies the prominence of case studies in social sciences research, such as the current study on infrastructure financing decisions. The advantages of conducting case study research include the ability of the researcher to apply a variety of methods; the level of interaction between the researcher and the subjects; the researcher's ability to obtain detailed insights; as well as the ability of the researcher to obtain generalisable and transferable descriptions (Ponelis, 2015). Creswell (2013) notes the critical role of case study research designs in studies within management discourse research. There is evidence of the suitability of case study research designs in PhD studies as Hyett, et al. (2014) observe that in Sweden, case study research designs are the fundamental empirical base for PhD theses in most of their business schools.

Yin (2014) and Zawawi (2017) further aver that the case study research design is particularly appropriate when the research questions deal with "How?" or "Why?". Although this study does not have research questions, the research hypotheses under study would translate into this type of questions. The case study design is particularly relevant when the researcher believes the context to be highly pertinent to the subject under study (Yin, 2014). Thus, the study is pertinent to Zimbabwe as the government is seized with infrastructure development challenges and therefore selecting the best financing options is critical. Moreover, several

empirical studies reviewed have used the case study approach. Examples include: Annamalai and Hari (2016); Abiad, et al. (2018), Mostafavi, et al. (2014), and Zawawi, et al. (2016).

Development of the financing framework was based on case studies of infrastructure projects undertaken by the Zimbabwean government during the ten-year period between 2009 and 2018. The infrastructure projects case studies are spread across the four economic infrastructure sectors, namely transport, water and sanitation, information communication technology and power, which were the focus of the current study. Therefore, the study to develop a framework for public infrastructure financing in Zimbabwe is a wide-ranging study which requires focus by selecting case studies that focus on a few infrastructure projects undertaken in Zimbabwe and establish how their financing decisions were made. Table 6.1 presents the case studies identified, selected and used as a basis for developing the infrastructure financing framework for Zimbabwe. This process is supported by Yin (2014), who describes the case study research design as a distinctive means of empirical enquiry particularly suitable for exploring the how and why of contemporary phenomena within a real-life context.

**Table 6.1: Infrastructure Projects Financing Case Studies**

<b>Project</b>	<b>Sector</b>	<b>Financier(s)</b>	<b>Value (US\$ million)</b>
Plumtree-Harare-Mutare Road	Transport	Loan ex DBSA	206.0
Harare airport road dualization	Transport	Treasury	68.6
Kariba South Power station extension	Power	Loan- ex China Exim, bonds and Nampower loan	533.0
Harare power station repowering	Power	Afrexim bank loan, Bond and Loan ex India Exim bank	104.0
Victoria falls International airport	Transport	Loan- ex China Exim	150.0
JM Nkomo international airport	Transport	Treasury	36.6
Hwange thermal power station	Power	Loan- ex China Exim	1 600.3
Tugwi-Mukosi dam	Water and sanitation	Treasury	340.0
Water and sanitation improvement in growth points	Water and sanitation	Zim-REF (development assistance)	20.0
Marovanyati dam	Water and sanitation	Treasury	33.0

Harare city water improvement project	Water and sanitation	Loan- ex China Exim	144.0
R. Mugabe international airport expansion (phase 2).	Transport	Loan- ex China Exim	153.0
E-governance project	ICTs	Treasury	42.6
Community information centres	ICTs	Treasury and POTRAZ-USF	14.0
Optic fibre backbone (TelOne)	ICTs	Treasury (PSIP funds), own resources and China Exim bank loan	143.6
NetOne network expansion-Phase 1	ICTs	China Exim bank loan	45.0
Underserviced areas mobile phone network expansion project	ICTs	POTRAZ Universal Service Fund (USF)	20.0
Mthabezi pipeline project	Water and Sanitation	Treasury	23.3
Urgent Water Supply and Sanitation Rehabilitation Project	Water and Sanitation	ZIMFUND (development assistance grant)	35.99
Emergency Power Infrastructure Rehabilitation Project	Power	ZIMFUND (development assistance grant)	67.94
Mutange dam	Water and sanitation	Treasury	8.2
Semwa dam	Water and sanitation	Treasury	140.0
Gwai-Shangani dam	Water and sanitation	Treasury	121.7
ZETDC Prepaid metering	Power	Infrastructure bond	45.0
Rural electrification	Power	Rural electrification fund	21.0
NetOne network expansion	ICTs	Loan ex China Exim bank	218.9
Harare-Gweru road dualization and Manyame bridge	Transport	Treasury	13.6
Harare-Masvingo road dualization and Mukuvisi bridge	Transport	Treasury	8.6
R.G. Mugabe International Airport- Phase 1	Transport	Treasury	34.0
Beitbridge water supply	Water and sanitation	Treasury	11.4

Source: Interviews (2020); (IDBZ, 2018) and (IDBZ, 2019)

The selection of the projects shown in Table 6.1 was meant to ensure representativeness of the economic infrastructure sectors. The projects were identified from the interviews conducted, as well as from secondary data records such as publications by the Ministry of Finance and Economic Development, the World Bank, the African Development Bank and the Infrastructure Development Bank of Zimbabwe. Therefore, a total of 30 projects were included in the risk assessment stage of the development of the public infrastructure financing framework for Zimbabwe. These infrastructure projects are applied in the development of the public infrastructure financing selection model presented in section 6.5.3. The research methods used in the study are presented in the following section.

## **6.5 Research Methods**

Research studies are usually informed and guided by certain hypothetical postures known as methodologies. Thus, a research methodology deals with the wide-ranging theoretical viewpoint of the research, that being the general nature of the study activity (Saunders, et al., 2015). It outlines the perspective or the angle that the researcher wishes to take on the research questions asked. Pickard (2013) outlines that there are fundamentally two research methodologies: qualitative and quantitative, but there is a possibility for a third methodology, which is a mixture of the qualitative and quantitative methods and which is known as mixed methods, also supported by Halcomb and Hickman (2015). This study was a mixed methods research study.

In order to identify financing mechanisms used for infrastructure financing, the researcher conducted a literature search and interviewed practitioners in government ministries responsible for providing infrastructure, as well as the ministry of finance and economic development for the Government of Zimbabwe. This part of the study used the exploratory research design, which was necessary for the researcher to understand the research problem in the context in which the study was conducted. The same multiple staged research design methodologies were also used by Henn (2015) in a thesis of almost a similar nature. This was important in order to guide the study in the development of a framework that addresses an existent problem, instead of a theoretical or imaginary problem. It therefore resulted in the researcher being in a better position to develop a framework for evaluating financing

alternatives for financing public infrastructure (Henn, 2015). The mixture of research methods in the study are explained hereunder.

The selection of research methods used in a study requires choosing methods that enhance the robustness of the study, by minimising the deficiencies of individual methods (Oji, 2015). Berman (2017), citing Fetters, Curry and Creswell (2013), observes that discretely, qualitative research methodologies are useful when exploring why or how a phenomenon occurs, for purposes of theory development, or a description of the nature of individuals' experiences, whereas quantitative methodologies best address questions pertaining to causality, generalizability, or the magnitude of effect. To enhance the robustness of study results, the study took advantage of the strengths of either method by adopting mixed research methods. Mixed methods research is defined as the combination of two or more research methods in a single research study/project, usually incorporating quantitative and qualitative methods (Greene, 2008; Teddlie and Tashakkori, 2009). Mixed methods are either used throughout the entire study or in parts of the study and the blend of the methods is done either synchronously or sequentially (Creswell & Plano Clark, 2011). As observed by McChesney and Aldridge (2019), researchers that use mixed methods have separate objectives addressed using qualitative methods and other questions solely addressed using quantitative methods.

Creswell and Plano Clark (2011) assert that using mixed methods in one study requires that both qualitative and quantitative strands of data are collected and analysed distinctly, and/or combined to answer the research question(s). Choice of the mixed method for this study is based on the intricacy of the study due to the variables under study coupled with the challenges consistent with emerging field research in Africa, where there is a challenge in obtaining data. Given these conditions, a mixed methods study is regarded as appropriate to adequately address the research questions and objectives. Therefore, fixed sequential mixed methods were selected to broadly explore and understand the practices and procedures for financing public infrastructure in Zimbabwe, with qualitative research findings being used to guide the quantitative methods.

Sequentially, the qualitative methods were used to address the following objectives: to determine the main sources of public infrastructure financing in Zimbabwe; to establish innovative finance's capacity to close the public infrastructure financing gap in Zimbabwe; and to assess the role played by public sector accounting in determining appropriate and efficient mechanisms to finance public infrastructure in Zimbabwe. This is followed by the quantitative methods to: determine and/or confirm the public infrastructure financing gap in Zimbabwe; as well as recommend a framework for selecting suitable and efficient mechanisms to finance public infrastructure in Zimbabwe. A similar mixed methods approach was also used in a study of the same nature by (Chotia, 2017). The components of the mixed research method are presented in detail in terms of the procedures undertaken during the study and the analyses undertaken in the following sections.

### **6.5.1 Qualitative research methods**

As part of the mixed methodology, qualitative research methods were used to address the following objectives:

- a) To determine the main sources of public infrastructure financing in Zimbabwe.
- b) To establish innovative finance's capacity to close the public infrastructure financing gap in Zimbabwe; and
- c) To assess the role played by public-sector accounting in attracting appropriate and efficient financing for public infrastructure in Zimbabwe.

To achieve these objectives, data was collected using semi-structured interviews from key informants from the economic ministries of the Government of Zimbabwe, as well as public entities which include parastatal enterprises and public utilities that provide or manage the provision of economic infrastructure. Interviewees were drawn from the following institutions: Ministry of Finance and Economic Development, Ministry of Transport and Infrastructure Development, Ministry of Information and Communication Technology Services, Ministry of Energy and Power Development, as well as development partners such as the International Monetary Fund and the African Development Bank offices in Zimbabwe.



Assessing the role played by public sector accounting in determining appropriate and efficient mechanisms to finance public infrastructure in Zimbabwe, data was collected from accountants in the aforementioned entities. The purpose is to establish if public sector accountants play any role in the determination of sources of finance for public infrastructure. Wherever interviews could not be conducted, the researcher used documentary analysis focusing on the same objectives, as well as for corroborating the data collected through interviews. Specifically, documentary analysis was used for the following institutions: the African Development Bank, Infrastructure Development Bank of Zimbabwe and the Ministry of Finance and Economic Development. The documents used in the study include financial statements and annual or periodic reports. Newspaper articles were also used to further interrogate facts obtained during the interviews. After the qualitative analysis of the data, the next stage of the study is the quantitative method as explained in the next section. Details about the sample selected, data collected and the procedures for analysing the data are provided hereunder.

#### **6.5.1.1 Qualitative sampling strategy**

In all research, sampling is very important as it enables researchers to collect data from participants who provides sufficient information about the phenomenon under study (Punch, 2014). For quantitative studies, emphasis is placed on the sample's representativeness of the population. However, in qualitative studies, importance is placed on reaching data saturation, that is, the researcher no longer obtains any new insights from the data collection process (Elmusharaf, 2012). Achieving data saturation with smaller or larger samples depends on the researcher's careful selection of study participants (Elmusharaf, 2012). Thus, qualitative research sampling is defined as the selection of sources from which data are collected in order to adequately address the objectives of the research (Gentles, et al., 2015). Appropriate sampling techniques must therefore be used in order to ensure that there is data saturation with an economic sample. The choice of sampling methods is also influenced by the research philosophy and the research design used in the research (Gentles, et al., 2015).

Since this study employed sequential mixed methods with primary data for the qualitative part of the study being collected through in-depth interviews, it was important to select interview

participants using suitable methods. The study used purposive and snowball sampling as the sampling techniques to select study participants, which are some of the sampling methods widely used in qualitative studies (Elmusharaf, 2012; Babbie, 2014; Gentles, et al., 2015 and Creswell and Creswell, 2018). Purposive selection involves the selection of participants in a study more likely to possess pertinent knowledge and experience to sufficiently address the research questions (Patton, 2015). Therefore, interviews were purposively conducted with directors responsible for finance in the target ministries, with subsequent interviewees being snowballed by the targeted directors and/or deputy directors.

In the Ministry of Finance and Economic Development, interviews were conducted with directors/deputy directors in the Public Sector Investment Program (PSIP) who are responsible for handling all public sector investments for the Government of Zimbabwe. In cases where the directors were not in the office due to the COVID-19 lockdown with working from home arrangements, replacement interviewees were snowballed by the targeted interviewees. Interviews were also conducted with participants drawn from parastatals responsible for economic infrastructure, namely transport, energy, and ICT. For water and sanitation infrastructure, data was collected from local authorities, particularly the Municipality of the city of Harare. The purpose of conducting interviews with participants from the parastatal entities and local authorities was to corroborate data collected from the government ministries and hence improve the reliability of the findings for the study. Table 6.2 presents the sample of the study participants drawn for the study.

**Table 6.2: Interviews participants sampling frame**

<b>Sector</b>	<b>Significance/role of participants</b>	<b>Number of participants</b>
Government Ministries	Responsible for implementation of public infrastructure projects	12
Government Departments	Implement public infrastructure projects on behalf of their parent Government Ministries.	3

Parastatal Entities	Implement public infrastructure projects on behalf of their parent Government Ministries.	7
Local government (Municipalities)	Responsible for implementing infrastructure projects in their areas of jurisdiction.	4
Development partners	Active Financiers through provision of Official Development Assistance (ODA)	4
<b>Total</b>		<b>30</b>

As shown in Table 6.2, the study envisaged having a sample of participants representing government ministries responsible for public infrastructure, government departments with infrastructure responsibilities, parastatal entities in the above stated ministries, municipalities, and development partners. The study had initially included private sector companies involved in the provision of or with investments in economic infrastructure, which were however dropped from the sampling frame after an in-depth review of literature. This was meant to ensure that the study was focused on the provision of public infrastructure by public sector entities and therefore the study results become more focused and robust. Private sector entities were only included as investors and not as study participants. The following section outlines how the data was collected in terms of the data collection procedures.

#### **6.5.1.2 Data collection procedures**

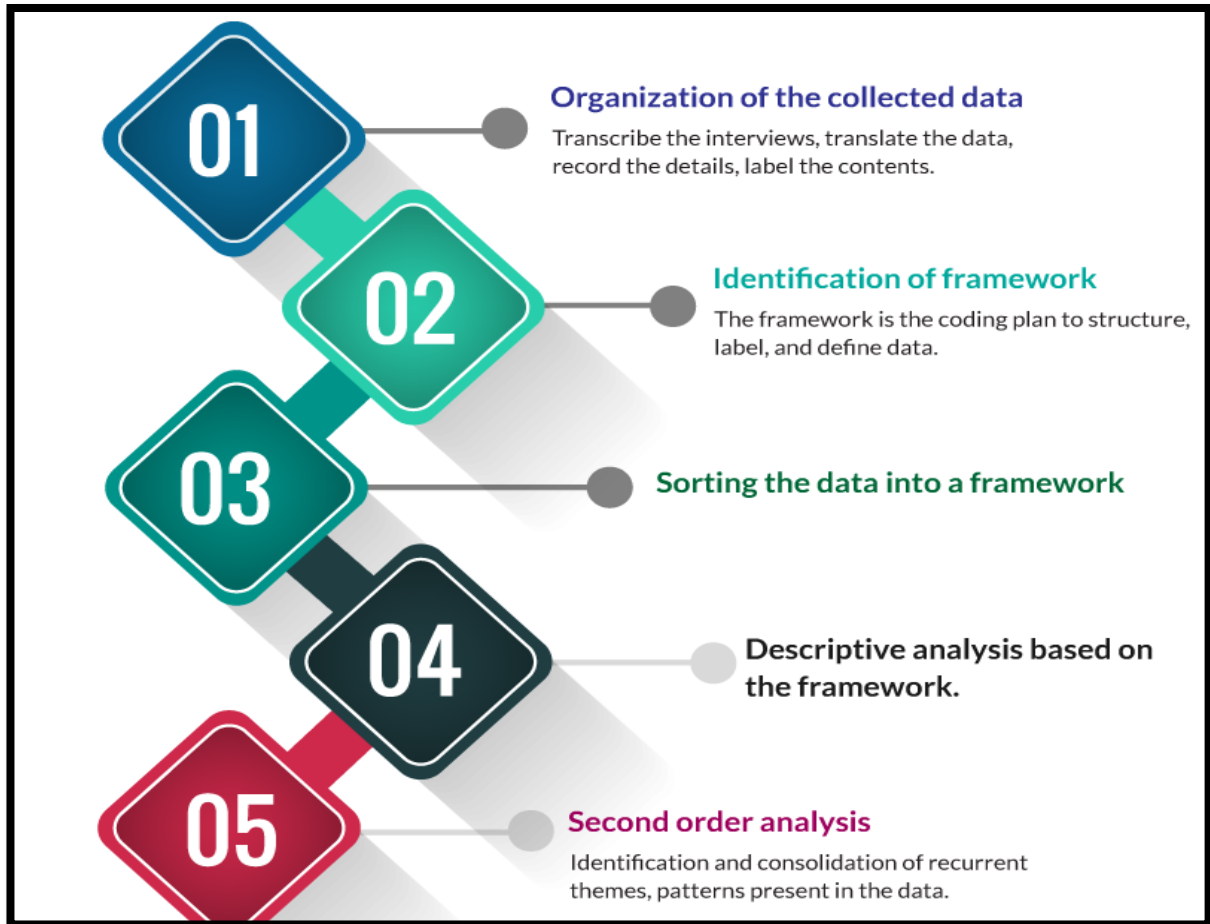
According to Tracy (2012) qualitative data can be collected through interviews, focus group discussions, observation of participants and/or documentary analysis. The study therefore used interviews and documentary analysis to address the objectives earmarked to be addressed using the qualitative research methods. Qualitative data was initially collected through face-to-face interviews and telephone interviews. Although the study had envisaged conducting all the interviews face-to-face, the COVID-19 pandemic resulted in a lockdown in Zimbabwe causing most office-bearers and employees to work from home. This led to the revision of the data collection protocol, with the researcher resorting to telephonic interviews in order to

comply with the social distancing requirements. Interviews were scheduled and participants were orally requested for permission to be recorded at the initiation of the interviews as the consenting protocol for the study. All participants consented verbally since it was no longer feasible for them to sign the consent forms.

Some organisations refused the researcher permission to conduct the study, citing COVID-19 restrictions in their organisations where they no longer allowed visitors to their premises as well as authorising any studies at all, or for some other reasons that were not disclosed to the researcher. Examples of targeted organisations that refused to grant the researcher permission to conduct research at their institutions include the Zimbabwe National Road Administration and the Civil Aviation Authority of Zimbabwe. The procedures for analysing the qualitative data are presented in the following section.

### **6.5.1.3 Qualitative data analysis procedures**

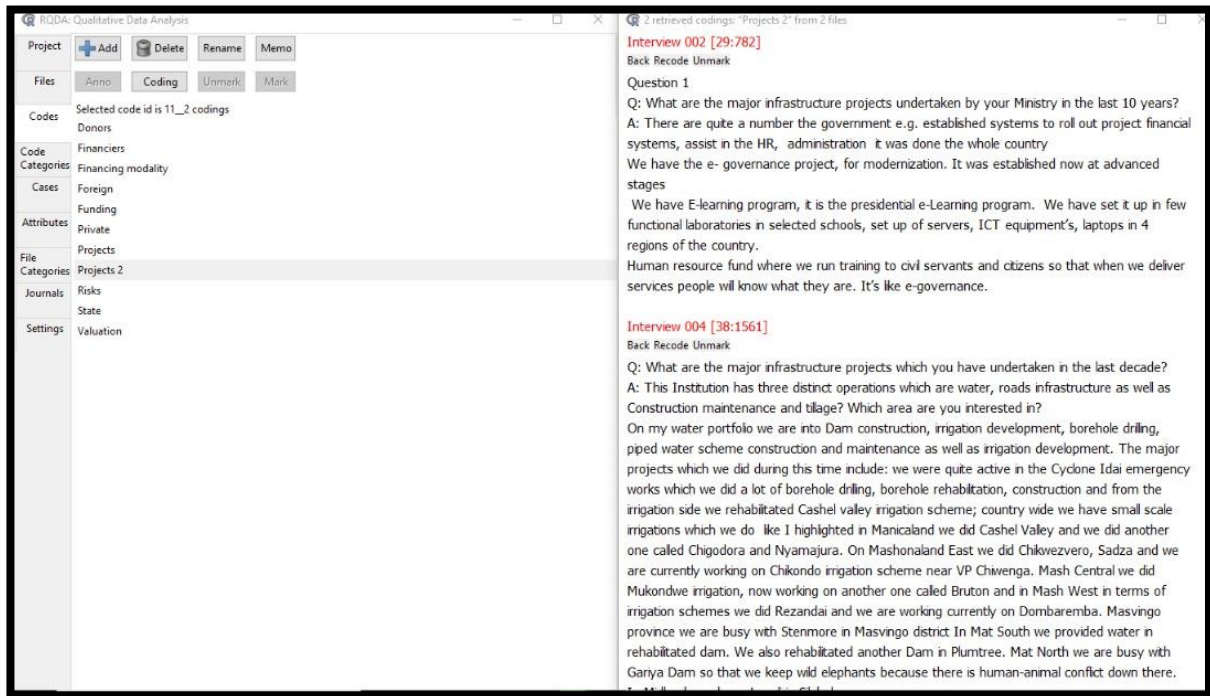
The data analysis process in qualitative research entails summarising and providing a descriptive narrative of the findings obtained from the interviews and documents used as sources of data (Lacey & Luff, 2007). Qualitative data analysis is also defined as the process of classifying and interpreting data collected in the form of either linguistic or visual material for the purpose of making statements about the implied and expressed meanings of the materials and what is represented in it (Flick, 2013). Therefore, the process of analysing qualitative data is both subjective and interpretative and consequently, the researcher must be an integral part of the process, regardless of whether data analysis software is used or not (Babbie, 2015; Chandra and Shang, 2019). Despite the process being so involving, the researcher used a package known as R for the qualitative data analysis process. The data analysis process was guided by the research paradigm adopted for the study, namely interpretivism (Chandra & Shang, 2019). This implies that the data collected, and documents analysed relied heavily on the researcher's interpretation, given the experiences gathered during the study. Logically, the procedures undertaken during the analysis of data are highlighted in Figure 6.1 in what is called a 'framework analysis' (Belotto, 2018).



**Figure 6.1: Data Analysis framework** (Source: Belotto, 2018)

As shown in Figure 6.1, the first step of the data analysis processes was the organisation of the data collected through a combination of face-to-face and telephonic interviews. The interviews were transcribed verbatim and edited for grammar before they were coded thematically using software called RQDA (Chandra & Shang, 2019). This represents a very important process in the analysis of qualitative data, known as data organisation. The R package for Qualitative Data Analysis (RQDA) is an open-source computer-assisted qualitative data analysis software (CAQDAS)-based package developed by Huang Ronggui for qualitative textual data analysis (Chandra & Shang, 2019). RQDA supports data importing in various languages. The software was used to conduct thematic coding once the data was converted into text format (after transcription). Each interview was saved as a transcript and imported into RQDA for additional coding and analysis.

The first step in coding the data was to develop a framework for the coding. Coding refers to the creation of labels that best describes a sentence or a paragraph based on the researcher's understanding of the literature (Chandra & Shang, 2019). The transcribed text was coded as guided conceptually by Figure 1.1 in Chapter 1 and Figure 4.2 in Chapter 4, which were used to define, structure, and label the data (Belotto, 2018). Text was coded to identify the nature of investments, sources of financing (amounts and types), monitoring mechanisms and the proposed methods of financing public infrastructure. A two-step coding process was adopted that firstly includes open coding which involves breaking down the data analytically and conceptually so that similar text was group together into similar data chunks (Vollstedt & Rezat, 2019). Once the initial grouping was done, similar codes were then grouped based on similarity. Figure 6.2 shows an extract of coded text files from three different interviews, each coded to show the project financiers.



**Figure 6.2: Coded text extracts from RQDA**

The second order codes were then exported for inclusion in the report. In the presentation of findings and analysis, the codings are presented in the context of broader evidence and

triangulated against the other sources of evidence, which include newspaper articles and information obtained from official statistics. The following section presents the research methods applied to the quantitative aspect of the mixed methods study which sequentially followed the qualitative part of the study.

### **6.5.2 Quantitative Methods**

After the interviews and documentary analysis that sought to address the objectives highlighted in the sections above, quantitative methods were used to develop and recommend the framework for selecting suitable and efficient mechanisms to finance public infrastructure in Zimbabwe. Sequentially, from the interviews' results, infrastructure projects done in the decade between the years 2009 and 2018 were identified and used as case studies for developing the financing framework. The projects included both completed and incomplete projects since the financing decisions have already been taken and can be useful in the process of developing the framework. Therefore, quantitative methods adopted in other studies are adopted in the development of the framework, with the key studies guiding the process being Henn (2015), Henn, et al. (2016) and Camane (2013). Details of these quantitative methods are highlighted in the following sections.

#### **6.5.2.1 Computation of infrastructure financing requirements**

The African Development Bank estimated that Zimbabwe requires US\$4.2 billion to finance public infrastructure between 2010 and 2020, an amount which was extrapolated to US\$40 billion for the period 2012 to 2032 (AfDB, 2011). The African Development Bank also estimated that Zimbabwe requires investments of about US\$33.7 billion between the period 2019 to 2030, using a method almost similar to the 'bottom-up' approach (AfDB, 2019). The development of the framework for public infrastructure financing therefore requires a cost-effective method of estimating the financing requirements for Zimbabwe as part of the decision-making process. Branchoux, et al. (2018) observe that methodologies for estimating infrastructure gaps are broadly categorised based on the methods applied in the process of estimating infrastructure requirements, as either the "top-down" or "bottom-up" approaches.

The bottom-up method entails an assessment of the entire range of infrastructure services demanded through studying project level financing requirements (Branchoux, et al., 2018). This method involves an examination of the costs of implementing individual infrastructure projects to determine the sectoral and/or national total requirements. The method has constraints in obtaining the required data at project level since project plan data is usually unavailable and generally kept private and confidential. Due to these data limitations, the project costs must be estimated using different assumptions derived from past related best practice scenario infrastructure projects (Branchoux, et al., 2018).

The alternative approach is the top-down method, an approach which uses econometric analysis methods to quantitatively estimate national infrastructure requirements. The approach is empirically guided by the scholarly works of Fay (2000) and Fay and Yepes (2003) who developed a model to forecast infrastructure requirements. The model has since been applied and refined in several other subsequent studies, which include Bhattacharyay (2010), Bhattacharyay (2012), Ruiz-Nuñez and Wei (2015), ADB (2017) as well as Branchoux, et al. (2018). Using the top-down approach, sectoral infrastructure requirements are estimated using projected growth rates after assessing the relationships between demand for infrastructure services and economic/demographic variables (Branchoux, et al., 2018).

The top-down approach has been used in several contemporary multi-country infrastructure financing requirements estimates because the data requirements are relatively modest (Branchoux, et al., 2018). Therefore, the top-down approach was used to develop a model for estimating the infrastructure requirements for Zimbabwe in this study. The model is useful in the determination of future infrastructure requirements which can be converted into monetary financing estimates, as done by several other studies highlighted above.

#### **6.5.2.2 Quantitative Estimation Methodology**

Zimbabwe is a developing country that faces great dearth in some basic infrastructure but is advanced in other infrastructure (Branchoux, et al., 2018). As part of the infrastructure financing decision-making process, it is important to develop a methodology that is useful for forecasting infrastructure requirements in terms of infrastructure stock as well as in financial



terms. This is an integral part of the study addressing the objective that develops the framework for public infrastructure financing in Zimbabwe. The top-down approach has proven to be useful and cost-effective since it has modest data requirements, some of which are easily accessible (Bhattacharyay, 2010; Bhattacharyay, 2012; Ruiz-Nuñez and Wei, 2015; ADB, 2017 and Branchoux, et al., 2018).

To estimate the infrastructure financing requirements, the following steps were used by Branchoux, et al. (2018), without incorporating the costs of climate change proofing the infrastructure:

- i) Physical infrastructure requirements for the various infrastructure types are forecast up to the required future year using a dynamic data panel model to address population growth, rise in urbanisation and changes in economic growth rates.
- ii) Shortages in current infrastructure are estimated using current access levels per infrastructure type.
- iii) To calculate the financing requirements, the unit costs are applied on the estimated infrastructure shortages, requiring construction of additional facilities by the future time; and
- iv) Costs for maintaining the current stock of infrastructure are added to estimates from (iii) above.

However, since this study was meant to develop a model for estimating future infrastructure requirements (gaps), only steps i) and ii) are incorporated herein. The rest of the steps are only given for the purpose of showing the subsequent steps necessary to estimate financing requirements.

The estimation methodology is guided by Branchoux, et al. (2018) who incorporated works by Fay (2000); Fay and Yepes (2003); Bhattacharyay (2012); Ruiz-Nuñez and Wei (2015) and ADB (2017) makes the following assumption:

*“There is a correlation between the physical stock of infrastructure and several variables which includes the lagged values of the stock of infrastructure, gross domestic product (GDP) per capita, industrial and agricultural shares of value added*

in GDP, population density as well as the rate of urbanisation” (Branchoux, et al., 2018).

Branchoux, et al. (2018) firstly estimated the financing needs for meeting the growth in demand using the top-down approach detailed above. However, the model used by (Branchoux, et al., 2018) was for a multi-country study and was therefore modified to be suitable for a single country estimation model that was useful for this study. The demand for infrastructure is for both consumption by individuals as well as inputs for the production process as used in the studies by Fay (2000), Fay and Yepes (2003), Bhattacharyay (2010), Bhattacharyay (2012), Ruiz-Nuñez and Wei (2015) as well as Branchoux, et al. (2018).

Projecting each infrastructure indicator is performed using an Ordinary Least Squares (OLS) regression. Although, theoretically, using the instrumental variables (IV)/generalized method of moments (GMM) estimator is more appropriate than OLS given the presence of the lagged variables in the model, the ADB (2017) found that its explanatory power was lower than OLS and that the performance in out-of-sample forecasting was uneven and unsatisfactory (Branchoux, et al., 2018). The linearized model by Branchoux, et al. (2018) is modified into a single country model that forecasts infrastructure stock requirements. The modified linear model used in the study to estimate future infrastructure demand is as follows:

$$I_t^j = \alpha_0^j + \alpha_1^j I_{t-1}^j + \alpha_2^j y_t + \alpha_3^j A_t + \alpha_4^j M_t + \alpha_5^j U_t + \alpha_6^j P_t + \alpha_7^j t + \varepsilon \quad \text{Equation 6.1}$$

Where  $I_t^j$  represents the infrastructure stock of type j needed in the country at time t.

With  $y_t$ ,  $A_t$ , and  $M_t$  representing the GDP per capita and shares of agriculture and manufacture value added in GDP for the country, respectively.

$U_{i,t}$  and  $P_{i,t}$  representing the urbanization rate and the population density, respectively.

t is a time trend used to capture time effect; and

$\varepsilon$  represents the error of the model or the outcome of the model not explained by the variables in the model

Results from prior studies showed that there is no consistent a priori relationship between the variables in the model. Different studies produced different relationships. The sources of data

used in developing the infrastructure demand estimation model are outlined in the following section.

### 6.5.2.3 Data Framework, types, and sources

Estimating the infrastructure financing requirements for Zimbabwe is an integral step towards developing a framework for selecting an infrastructure financing mechanism. The data used in the study was downloaded from the World Bank’s World Development Indicators databank website. The databank contains several development indicators and most of the indicators necessary for estimating the financing requirements are available. Those indicators used in the study as guided by prior studies that have used the top-down approach to estimate financing requirements and their sources are shown in Table 6.3.

**Table 6.3: Sources of indicators used in the model for estimating infrastructure demand**

<b>Indicators</b>	<b>Source of data</b>
Rail lines (total route km per 1,000,000 people)	World bank- development indicators
Paved roads (total route km per 1,000 people)	World bank- development indicators
Unpaved roads (total route km per 1,000 people)	World bank- development indicators
People using at least basic drinking water services, urban (% of urban population)	World bank- development indicators
People using at least basic drinking water services, rural (% of rural population)	World bank- development indicators
People using safely managed sanitation services, urban (% of urban population)	World bank- development indicators
People using at least basic sanitation services, rural (% of rural population)	World bank- development indicators
Access to electricity (% of population)	World bank- development indicators
Electric power consumption (kWh per capita)	World bank- development indicators
Fixed telephone subscriptions (per 100 people)	World bank- development indicators
Mobile cellular subscriptions (per 100 people)	World bank- development indicators
GDP per capita (current US\$)	World bank- development indicators
Agriculture, forestry, and fishing, value added (% of GDP)	World bank- development indicators
Manufacturing, value added (% of GDP)	World bank- development indicators

Population density (people per square km of land area)	World bank- development indicators
Urban population (% of total population)	World bank- development indicators

**Source:** Compilation by the author (2020)

The selection of the indicators of infrastructure used in the quantitative model is guided by the literature reviewed, which shows that similar indicators were used for approximating infrastructure financing requirements. The indicators extracted are for the period 1990 to 2018 inclusive for all other indicators except for mobile phone subscriptions, which does not have data for the entire period. Due to the constraints of data availability for some of the indicators, three-year-averages are used rather than annual data. The use of three-year-averages is representative enough of the nature and process of developing infrastructure which takes longer to develop. To fill gaps where data is missing, linear extrapolations and linear interpolations are performed to ensure that the panel data is balanced, as similar processes were done by (Branchoux, et al., 2018). This was a refinement of the model adopted by Bhattacharyay (2012) who used unbalanced panel data to make the estimations.

As part of the framework developed and proposed later in Chapter 10, the model explained above and represented by Equation 6.1 is incorporated into the initial step of the framework where infrastructure gaps exist. The next quantitative approach is proposed to be part of the risk assessment for the purpose of informing the selection of infrastructure financing sources. The process involved is outlined in the following section.

### **6.5.3 Public Infrastructure Financing selection model**

Studies by several authors concur that the financing of public infrastructure is achieved either through corporate finance (debt and/or equity financing) or project finance (cashflow financing) (Esty, 2003; Calitz and Fourie, 2010; Chan, et al., 2009 and Sawant, 2010). There is also another classification of how public infrastructure financing can be achieved, which can be either internally financed (reserves, budget appropriations and retained funds) or externally financed (bonds, loans, public equity) (Henn, et al., 2016). Given these two categories of infrastructure financing classifications, the study opted for the internal vs

external financing classification Henn, et al. (2016), resulting in dichotomous financing outcomes.

To appropriately establish if public institutions in Zimbabwe apply a common framework when selecting the appropriate financing option between internal financing and external financing, the study assumed the existence of a direct relationship between the choice of financing option and the associated key risk factors (Camane, 2013). The identified risks are broadly classified into project risk, transaction costs risk, as well as information asymmetry risk (Camane, 2013). The outcome relationship is depicted using the following regression model:

$$P_i = \alpha + \beta_1 PRS_i + \beta_2 TCRS_i + \beta_3 IARS_i + \varepsilon \quad \text{Equation 6.2}$$

Where  $P_i$  is the probability of a public institution choosing internal financing options to finance an infrastructure project ( $i$ ); the associated assessed project risk is depicted by  $PRS_i$ , with transaction cost risk of the project being  $TCRS_i$  and the risk emanating from information asymmetry being represented by  $IARS_i$ . Accordingly,  $P_i = 1$  if internal financing option is chosen whilst  $P_i = 0$  if external financing is chosen ahead of internal financing for financing the selected infrastructure projects.

The relationship between the choice of a financing option (dependent variable) and the scores for the project risk, transaction costs risk and information asymmetry risk (independent variables) were tested by checking the statistical significance of the extent of magnitude by which the coefficients of the independent variables in the regression model are greater than zero at the 5% significance level (Camane, 2013). Similar tests were used in the study by Camane (2013). However, Gujarati (2003) is of the view that Equation 6.2 should be presented as a cumulative logistic distribution function (LOGIT model) as follows:

$$L_i = \ln\left(\frac{P_i}{1-P_i}\right) = \alpha + \beta_1 PRS_i + \beta_2 TCRS_i + \beta_3 IARS_i + \varepsilon \quad \text{Equation 6.3}$$

Where:

$P_i$  is the probability that Internal Financing option is chosen, with the values of independent variables for project  $i$  and  $Y = 1$  when Internal financing option is selected.

$1 - P_i$  represents the probability of not choosing the internal financing given the values of independent variables for project  $i$

$\ln$  is the natural logarithm

$PRS_i$  represents the Project Risk Score for project  $i$

$TCRS_i$  represents the Transaction Cost Risk Score for project  $i$

$IARS_i$  being the Information Asymmetry Risk Score for project  $i$

$\beta_j$  (for  $j=1,2,3$ ) being the coefficients of variables (PRS, TCRS, IARS) which measures the change in L (log of odds) for a unit change in the independent variable score,

$\alpha$  is the y intercept (constant) = value of L (log of odds) when the value of all risk scores is equal to zero; and

$\varepsilon$  represents the error term of the regression model

The Risk Scores used in the model is the Average Risk Rating divided by 5, calculated as outlined in this section. For each case study infrastructure project, a risk factor for the above stated risks, namely Project Risk, Transaction Cost and Information Asymmetry, is subdivided into sub-criteria of risks. Each risk sub-criterion is evaluated qualitatively and is assigned a Likert scale rating of 1 (very low risk), 2 (low risk), 3 (average risk), 4 (high risk) or 5 (very high risk). These Likert scales are meant to quantify the qualitative assessment of the risks for the case study infrastructure projects. A simple average rating is then calculated for each Risk Factor, assuming all sub-criteria carry the same weight. A risk score is then calculated by dividing the average rating by the maximum possible score (5) using this formula:  $[\frac{Average\ Rating}{5}]$ . A Total Risk Score (TRS) for each case study project is then calculated assuming equal weightings for the three risk factors. The quantitative data collection methods used in the study are outlined in the following section.

### **6.5.3.1 Quantitative data collection methods**

When conducting case studies, Yin (2009) outlines six methods of collecting data as including documentation, archival records, interviews, direct observation, participant observation and physical artefacts. However, Yin (2009) highlights the suitability of direct observation, participant observation and physical artefacts for sociological studies, therefore making them

irrelevant for this study. Thus, the available methods of collecting data are documentation, archival records and interviews. To ensure triangulation, all three methods were used in the data collection process for the purpose of developing a framework for assessing financing decisions for public infrastructure projects.

Data for developing the public infrastructure financing selection model was collected from both archival records and from participants completing questionnaires (documentation). The questionnaires sought to obtain risk assessments of the infrastructure projects undertaken during the decade between 2009 and 2018 by several public entities in Zimbabwe. The projects were identified from the interviews conducted and further details about the projects were obtained from archival records to establish if the findings obtained from the questionnaires were consistent with already available public information. Details of the infrastructure projects case studies used have been presented earlier in table 6.1, where a total of 30 case studies were selected for the purpose of developing the model for selecting infrastructure financing sources after consideration for risk has been made.

### **6.5.3.2 Quantitative data analysis procedures**

The quantitative data collected from the World Bank's development indicators for developing the model to estimate public infrastructure requirements were analysed using the ordinary least squares (OLS) regression model. The regression model was used to establish the influence of the independent variables on the eleven measures of the four economic infrastructure sectors. The independent variables used in the regression model are GDP per capita (current US\$); Agriculture, forestry and fishing value added (% of GDP); Manufacturing value added (% of GDP); Population density (people per square km of land area); and Urban population (% of total population).

The dependent variables or measures of infrastructure on the other hand were: Rail lines (total route km per 1,000 people); Paved roads (total route km per 1,000 people); Unpaved roads (total route km per 1,000 people); People using at least basic drinking water services, urban (% of urban population); People using at least basic drinking water services, rural (% of rural population); People using safely managed sanitation services, urban (% of urban population);

People using at least basic sanitation services, rural (% of rural population); Access to electricity (% of population); Electric power consumption (kWh per capita); Fixed telephone subscriptions (per 100 people); and Mobile cellular subscriptions (per 100 people). In the regression models, the effect for time was also included in the model and the lags of the dependent models were incorporated into the regression models as well. In total, eleven models were developed for each dependent variable given above.

For the selection of the financing mechanisms to be used, data was collected from a total of twenty case study infrastructure projects undertaken between 2009 and 2018 and was analysed using a binary logistic regression model represented by Equations 6.2 and 6.3 presented above. Sources of finance for the infrastructure projects were assigned a dichotomous outcome; internally financed or externally financed. Data for both regression models was analysed using Stata version 15. The diagnostic test results for the model are presented below.

### **6.5.3.3 Model Diagnostic tests**

In order to eliminate spurious regressions, the regression models and the collected data are generally diagnosed for their consistency with model assumptions. The general diagnostic tests are designed to test for normality, linearity, homoskedasticity and independence. This study tested the data and models for homoskedasticity (heteroskedasticity) and goodness of fit. Goodness of fit for the infrastructure requirements models was tested using the Ramsey RESET test, whilst heteroskedasticity was tested using the Breusch-Pagan/ Cook-Weisberg test. These tests are briefly discussed below.

#### **i) Heteroskedasticity test**

Ordinary least squares regression always assumes that the error term of the regression model is constant, that is, there is homoskedasticity. This must be proven by conducting the Breusch-Pagan/ Cook-Weisberg test for heteroskedasticity. This test is designed to detect the existence of any linear heteroskedasticity in the model's error term. A bigger chi square value indicates the presence of heteroskedasticity. The same test was conducted for the OLS regression model to estimate public infrastructure requirements in Zimbabwe.



## **ii) Goodness of Fit test**

The purpose of the goodness of fit test is to ascertain the extent to which the model fits into the data collected (Maydeu-Olivares & Garcia-Forero, 2010). The test summarises the discrepancies between the values and expected values from the model. This study used the Ramsey RESET test, developed by Ramsey in 1969. The Ramsey RESET test is a general mis-specification test meant to detect variables omitted from the model as well as the unsuitable functional form of the variables (Shukur & Mantalos, 2004). This test was run for the OLS model to estimate infrastructure requirements using Stata version 15.

After conducting the diagnostic tests for the model regression, results are presented summarising the coefficients of each independent variables in each regression model. The presentation and discussion of results were infused and simplified in order to make the model easy to apply to the financing decisions for infrastructure projects. The sources of data used in the study are briefly outlined in the following section.

## **6.6 Sources of data**

Given the research methods highlighted above, which entail a combination of qualitative and quantitative research methods data used in the study was collected from primary and secondary sources as outlined hereunder.

### **6.6.1 Primary Data**

Primary data for the study was collected using interviews as highlighted in section 6.4.1.2 and the administration of a survey questionnaire to the interview participants. Interviews were conducted through the telephone due to COVID-19 restrictions on face-to-face meetings. Interview were the main source of primary data used to address qualitative objectives of the study. The survey questionnaires were circulated electronically, and respondents returned electronic copies of completed questionnaires representing the main source of primary data for addressing the quantitative part of the study.

### **6.6.2 Secondary Data**

To corroborate and triangulate data collected from interviews secondary data was collected from documentary analysis. Documentary analysis is a preferred method of collecting data

from a wide range of organisations since the reports/documents are readily available and for public organisations are readily available in the public domain (Cardno, et al., 2017). The main documents analysed in the study are periodic reports, financial reports and newspaper reports on the infrastructure projects identified during interviews. In addition to the above reports the development of the model to estimate infrastructure requirements used data collected from the World Bank's development indicators database.

### **6.7 Ethical Considerations**

Ethics generally refers to doing what is good or wrong and researchers are anticipated to adhere to good ethics through allowing participants voluntary participation in the study, obtaining consent from participants (Denzin & Lincoln, 2011) after informing them of all possible dangers of participating in the study, protection of the interests of study participants as well as conducting the research with integrity (Babbie, 2014). Moreover, in pursuit of the ethical conduct of researchers, it is important for the researcher to ensure the protection of participants from either physical or emotional harm, ensuring the anonymity of the participants and protecting participants' confidential information (Babbie, 2014).

The researcher also obtained further guidance on the ethical conduct required from researchers from the Policy on Research Ethics from Nelson Mandela University, as well as the Code of conduct for researchers at Nelson Mandela University. Accordingly, the study did not involve vulnerable persons and groups as study participants. The study was approved for ethics by both the Faculty of Business and Economic Sciences Research ethics committee (human) as well as the Nelson Mandela University Research Ethics Committee (human), with reference **H 20-BES-ACC-004**. To adhere to the ethical approval granted, research participants were given information about the study and the purpose thereof.

The researcher had to obtain approval from the gatekeepers for the targeted participants and approval was obtained from the Public Service Commission (for conducting research in government ministries and departments), the City of Harare, TelOne (Pvt) Ltd, Zimbabwe Electricity Transmission and Distribution Company, as well as the Postal and Telecommunications Regulatory Authority of Zimbabwe (see appendices). Only individual

participants who consented to participating in the study were interviewed, since consent is a key cornerstone of ethical conduct in research (Denzin & Lincoln, 2011). The way in which results are going to be presented in the subsequent chapters of this thesis are highlighted in the following section.

### **6.8 Presentation of results**

Results for the study are presented and discussed in the following four chapters (Chapter 7 to Chapter 10), with results for each objective making up a chapter. The presentation and discussion of results will be guided by the methodology used and considered effective in addressing each objective. Accordingly, the first three objectives of the study are addressed using qualitative research methods, whilst the fourth and last objective of the study was addressed using both quantitative and qualitative research methods. Thus, the research methods were sequentially mixed. The last chapter of the thesis summarises conclusions drawn from the study for each objective of the study and makes recommendations for policy makers and for further academic research.

### **6.9 Limitations of the study**

The study envisaged the development of a framework for public infrastructure financing in Zimbabwe. The main respondents for the study were representatives of government ministries, government departments, local government municipalities and parastatal entities. The following are some of the challenges encountered in conducting the study, but which did not invalidate the study:

- a) The collection of data was affected by the lock-down instituted by the Government of Zimbabwe which was meant to contain the spreading of the corona virus leading the COVID-19 disease. Due to the fear associated with COVID-19 and the lock down measures put in place, interview participants were unwilling to be interviewed face-to-face or had resorted to working from home. Interviews were therefore changed from face-to-face to telephonic interviews. This resulted in the escalation of the data collection costs.
- b) As a result of the change of the interviewing process from face-to-face to telephonic interviews, the consenting process was also changed from the use of the designed

consent form to a new verbal consenting process where interviewees had to be asked for consent before the commencement of the interviews. This ensured that the researcher adhered to the ethical requirements of the study.

- c) As a result of the COVID-19-related alterations to the methodology, some participants opted for self-completion of the interview guide, which resulted in some respondents failing to respond to questions that were not clear to them. The interviewer also could not probe for further responses. The responses were however sufficient to address the objectives of the study.
- d) The authority to conduct the study was granted by the Public Service Commission, which is responsible for the approval of international studies for the Government of Zimbabwe. The approval was granted with a limitation in scope whereby respondents could provide ‘de-classified information’. This meant that key informants could not disclose any information they thought was classified and respondents were also unwilling to disclose information where they were not sure. The gaps left by the restriction were however filled using secondary data sources.

Highlighted above are some of the limitations that affected the study, but all the limitations were overcome, and the study was conducted successfully. The following section summarises the chapter.

## **6.10 Chapter Summary**

The chapter has outlined the methodology used in the study. Firstly, the research philosophy used in the study was interpretivism, which was guided by the research design: a case study design. The case study research design requires the author to be embedded in the study context and understand the participants in the study and their situations in order to appropriately interpret the findings from the data collected. Therefore, the researcher gained insights into the operations of the Government of Zimbabwe through the interactions with the key informants, as well as closely following news related to public infrastructure financing from the print media and radio and television news and documentaries.

The study combined qualitative and quantitative research methods sequentially. Thus, the study was conducted using mixed methods. This was meant to ensure that the objectives of

the study were achieved. Objectives number one to three were addressed using the qualitative research methods, whilst objective number four was addressed with a combination of qualitative and quantitative methods. Data used in the qualitative method was collected through face-to-face and telephone interviews, as well as secondary/documentary sources. Quantitative data was collected using a survey questionnaire issued to the interviewees and from online databases which include the World Bank's World Development Indicators.

The quantitative methods were immersed in the development of the public infrastructure financing framework, results of which are presented in Chapter 10. Two sets of models were developed using the data collected, as highlighted above. The first model was incorporated into the infrastructure gap identification is an ordinary least squares (OLS) regression model and the second model used in the selection of infrastructure financing sources based on the risk assessment was a logistic regression model. The results of both models are presented in Chapter 10 at the appropriate stages of the proposed infrastructure financing framework useful in the Zimbabwean scenario for making infrastructure financing decisions.

The results of the study are presented in four chapters, with results for each objective being presented as a separate chapter. Thus, the four objectives resulted in the four chapters presenting and discussing results from the study. The major limitations encountered in the study were related to COVID-19 and the lockdown instituted to contain the spread of the disease. The limitations led to a change in some of the originally planned methodologies, but the study was however conducted effectively. The following chapter presents the results of the first objective of the study, which sought to establish the main sources of public infrastructure financing in Zimbabwe. The results are presented and discussed concurrently in order to ensure that the results are discussed to the right depth.

## CHAPTER SEVEN

### SOURCES OF FINANCING FOR PUBLIC INFRASTRUCTURE IN ZIMBABWE

#### 7.1 Introduction

The previous chapter highlighted the methodologies used in conducting the study, showcasing the research paradigm, research design, methods, the data collection, and analysis procedures for both the qualitative and quantitative aspects of the study. This chapter presents the main sources of financing for public infrastructure in Zimbabwe between the years 2009 and 2018. The study focused on economic infrastructure, which comprises power/energy, transport, information communication technologies (ICTs) and water and sanitation. The chapter answers the question set out in objective number one of the studies, namely: what are the main sources of financing for public infrastructure in Zimbabwe? Primary data to address this objective was collected through interviews with key informants from government ministries and departments, as well as from parastatal enterprises. Secondary data was also collected from documentary analysis. Data from interviews were corroborated through the examination of financial statements and reports for infrastructure projects wherever available and newspaper reports about infrastructure projects. Thus, primary data was corroborated by secondary data in order to improve the validity, robustness and reliability of results.

Zimbabwe's public sector developed many infrastructure projects between 2009 and 2018, which were implemented through the Infrastructure Development Bank of Zimbabwe (IDBZ), government ministries, government departments, parastatal enterprises, development partners, municipalities and rural district councils. The list of the public infrastructure projects undertaken by the government through the IDBZ are provided on the IDBZ website. Projects undertaken by the entire spectrum of implementing institutions were reported in the Ministry of Finance and Economic Development's infrastructure investment plans presented annually since the year 2017, as highlighted by key informant F1. Infrastructure projects undertaken ranged in size from small projects to mega projects. Many of the projects were completed during the period under study, whilst a few are yet to be completed. Infrastructure

development projects undertaken include projects in all the four economic infrastructure sectors.

In the power/energy sector, the projects undertaken include the expansion of the Kariba South power station; expansion of the Hwange thermal power station; and the re-powering of the Harare, Bulawayo and Munyati power stations. In the transport sector, projects undertaken include the expansion of the JM Nkomo International Airport, Victoria Falls International Airport, RG Mugabe International Airport and the Plumtree-Harare-Mutare Road, amongst many others. In the ICT sector, projects undertaken include the fibre optic backbone installation, e-government project, and computerisation of rural schools. Moreover, in water and sanitation, projects undertaken include the completion of Tugwi-Mukosi Dam, Marovanyati Dam, refurbishment of the Morton Jaffray Waterworks in Harare and the refurbishment of waterworks in many towns.

The IDBZ is a parastatal enterprise established in 2005 after taking over the operations of the Zimbabwe Development Bank. The mandate of the IDBZ is to ensure improvement in the quality of life of Zimbabweans through the development of infrastructure, including transport, ICTs, water and sanitation, power, and housing. The IDBZ is therefore used as an implementing entity for infrastructure projects financed by the Ministry of Finance and Economic Development (MoFED) of the Government of Zimbabwe through its public sector investment program (PSIP). The implementation of the PSIP infrastructure projects was through an agency agreement between the MoFED and the IDBZ, where the agreement period lapsed in 2019.

The current chapter is organised as follows: results of the main sources of finance for each infrastructure sector are presented and discussed concurrently, with the emphasis being on the source of financing for the infrastructure projects highlighted. The presentation of results incorporates direct quotations of interviewees as well as text boxes for capturing long quotations and similar quotations from different interviewees. Together with the results presentation, a discussion is incorporated relating the findings of this study to findings from

the literature reviewed. The interpretation of the findings is anchored on the epistemological orientation of the study, which was detailed in the methodology chapter, that is, interpretivism.

## **7.2 Main sources of power/energy infrastructure financing in Zimbabwe**

Power/electricity infrastructure in Zimbabwe is mainly provided by the public sector through a parastatal enterprise (utility company) known as Zimbabwe Electricity Supply Authority (ZESA) holdings. ZESA holdings has an electricity generation subsidiary known as Zimbabwe Power Company (ZPC) and a power distribution subsidiary known as Zimbabwe Electricity Transmission and Distribution Company (ZETDC), which is the sole distributor of electricity (monopoly) in Zimbabwe. There are a total of 89 licensed private power producers of electricity, collectively known as independent power producers (IPPs), of which only 18 are operational as at the end of September 2020 (ZERA, 2020). The IPPs should be licensed before they can produce electricity in Zimbabwe, with the key regulator being the Zimbabwe Energy Regulatory Authority (ZERA). IPPs in Zimbabwe are primarily operating small-scale power generating projects, which are not directly competing with ZPC but complementing the utility. Furthermore, they cannot sell electricity to individual consumers but to the sole electricity distributor, ZETDC. This implies that before any IPP can start producing electricity, they should enter into a power purchase agreement (PPA) with ZETDC.

Power infrastructure in Zimbabwe is financed from an array of sources which include private sector financing in the form of commercial loans, bilateral concessionary and non-concessionary loans, infrastructure bonds, development financial institutions loans and the Government of Zimbabwe's treasury support to a limited extent. The Zimbabwean government faces constraints in terms of the variety for options of sources of financing of public infrastructure, which has led to opportunities for private sector participation through either investing in independent power production projects or financially partnering with public sector entities in the sector. Details of the financing mechanism currently being used are expounded in the following sections.

There were several electricity generation infrastructure projects undertaken by both the public sector and the private sector during the decade between 2009 and 2018. The public sector



projects included the expansion of the Kariba Hydroelectric power station; expansion of the Hwange thermal power station; and re-powering of the Harare thermal, Munyati thermal and the Bulawayo thermal power stations. There was also a refurbishment of the Hwange power station, as well as the development of the Batoka Gorge hydroelectric power project which was highlighted by interviewee ND as “an examined project”. Most of the highlighted projects were completed, and a few are still under construction, whilst in the distribution of electricity, the major project undertaken was the migration from post-paid to prepaid metering by the electricity distribution utility, ZETDC. On the other hand, private sector power projects included the Harava Solar photovoltaic project, Centragrid solar project and several mini-hydroelectricity and solar projects located in Zimbabwe’s eastern highlands in Inyangani and Chimanimani. The above stated projects were highlighted by both key informants EM and ND.

As highlighted above, public sector power/energy infrastructure projects undertaken by the Government of Zimbabwe through the power utility production company ZPC are Kariba South expansion, Hwange expansion, Harare power station re-powering, Munyati re-powering and the Bulawayo re-powering. The expansion projects were undertaken for the purpose of expanding power generation capacity for the ZPC, whilst re-powering projects were undertaken for the purpose of revitalising the power generation capabilities of these power stations as power generation equipment had deteriorated and output had significantly declined against the installed capacity.

Zimbabwe heavily relied on the China Exim Bank for the financing of most of the power/energy infrastructure. This fact was confirmed by key informant interviewees EM and ND from the Ministry of Energy and Power Development. For the Kariba expansion project, a concessionary loan from China Exim Bank was supplemented through private sector financing, that is, infrastructure bonds issued by the IDBZ and a commercial loan. The total financing for the project was about US\$500 million. The concessionary loan from China Exim Bank amounted to US\$320 million, which was unlocked after the ZPC had raised US\$38.8 million locally through infrastructure bonds issued by the IDBZ, which was a set condition precedent (IDBZ, 2020). China Exim Bank has been significantly financing power

infrastructure in other African countries such as Ethiopia and Kenya, where there was significant growth in infrastructure financing commitments between the years 2007 and 2015 (Jalles d'Orey & Prizzon, 2017). The subscription to infrastructure bonds amounts to private sector financing as highlighted by Chan, et al. (2009), who notes that private sector financing includes subscription to bonds issued by the central government and local government of other sub-sovereign institutions such as IDBZ, which is a parastatal enterprise.

As additional financing for the Kariba project, ZPC entered into a power purchase agreement with Nampower, the Namibian power utility, to securitise a loan from Standard Bank amounting to US\$150 million (NewsDay, 2015). Standard Bank was re-financed for this loan by the Development Bank of Southern Africa (DBSA). The financing arrangement for the Kariba expansion project was therefore a hybrid of a variety of instruments. Accordingly, the financing arrangement may be classified as a category of innovative finance as explained by Sandor, et al. (2009), as including new ways of pooling together public and private sector resources for the purpose of achieving developmental goals of the nations.

China Exim Bank is the main financier for power/energy infrastructure development in Zimbabwe in terms of monetary amounts contributed. This is confirming the findings by Jalles d'Orey and Prizzon (2017), who observed the exponential growth of China Exim Bank's financing of power infrastructure in Africa, notably in countries such as Ethiopia and Kenya. Development of the Hwange thermal power station expansion project commenced in March 2019. China Exim Bank advanced a loan of US\$1 billion, whilst the Afrexim Bank advanced a loan of US\$76 million and Standard Bank also provided another loan of US\$40 million. The total value of financing for the project is therefore about US\$1.2 billion. The loans from Afrexim Bank and Standard Bank represent another form of private sector financing through commercial loans by financial institutions.

The financing of the project was done using another hybrid financing arrangement, almost similar to the financing arrangement of the Kariba project. The Hwange project is expected to be completed by the year 2022. The project was reported to be about 40 percent completed in April 2020 and is expected to reach around 60 percent by the end of the year 2020 (The Sunday

Mail, 2020). Repayment of the China Exim Bank loan is supposed to be made from the proceeds of the sale of electricity to users in Zimbabwe, whilst the Standard Bank loan is to be repaid through proceeds of a power purchase agreement signed between ZPC and NamPower. The NamPower financing deal is risk hedged with ZPC guaranteeing power supplies to Namibia and the proceeds which are in foreign currency being used to settle the debt. Thus, the NamPower financing was structured from a private sector perspective, unlike the China Exim Bank and the Afrexim Bank deals which are provided by bilateral/multilateral institutions with political interests. However, the loans from China Exim Bank and Afrexim Bank were not availed on the budget, but off the budget, with the China Exim Bank being able to influence who would implement the projects. This was meant to mitigate the risks associated with financing long-term assets in Zimbabwe, which is unlike the general risk perspective for investments into infrastructure that are anticipated to be more stable and not moving in sync with the markets and with returns likely to be less than market returns (Platz, 2009).

Another major power infrastructure project highlighted by the key informant from the IDBZ was the prepaid metering project undertaken by ZETDC (IDBZ, 2020). The infrastructure project was entirely financed through the IDBZ issuing US\$30 million, 10% per annum infrastructure development bonds in 2012, followed by an additional US\$15 million, 8% fixed rate Infrastructure Development Bonds issued in 2014 (IDBZ, 2020). Both bond issues were successful and therefore the private sector contributed to the financing of the power distribution infrastructure to a total of US\$45 million. The re-powering of the Harare thermal power project was also partly financed through the issue of infrastructure bonds by the IDBZ amounting to US\$11.2 million and the India Exim Bank providing a concessionary loan of about US\$70 million (IDBZ, 2020). The existing power generation units at Hwange power station were also refurbished through a development assistance grant from the ZimFund, a multi-donor trust fund administered by the African Development bank (AfDB). The project was undertaken as an emergency power infrastructure rehabilitation project at a total cost of about US\$35 million (AfDB, 2018).

The findings in relation to the financing of power infrastructure in Zimbabwe are therefore consistent with tenets of the risk-return theory, whereby the private sector is willing to invest in infrastructure assets when there is a trade-off between the risk and the anticipated returns (Sharpe, 1964; Lintner, 1965; Black, 1972; Platz, 2009). Thus, due to the higher risks, the private sector is not willing to commit huge investments into power infrastructure development. In order to attract more and bigger private sector investors into public power infrastructure requires more incentives and strategies by the government through mitigating the risks associated with investing in this type of infrastructure assets. The limited participation of the private sector in Zimbabwe's public infrastructure has also been affected by the market dis-incentives introduced by the government, such as the challenges in the electricity power distribution sector which make the sector unattractive to private sector investors (Ehlers, 2014). The high-risk profile of investments into public infrastructure in Zimbabwe is confirmed by the development partners opting to offer infrastructure financing assistance off the budget, which is unusual.

After establishing the sources of financing for the major power projects, it was important to establish the criteria used to evaluate the financing options in order to choose the mixture of financing instruments used in these projects. Key informant interviewees indicated that the procurement process for delivery of the power infrastructure was through lowest cost bidding/tendering. As part of the tender evaluations, bidders were expected to possess both the technical capacity and financial capacity to undertake the projects. Thus, the tendering parties were expected to have financing partners or arrangements in place as part of the tender submissions. However, it is not clear how both the Kariba and Hwange expansion projects were awarded to a turnkey engineering, procurement, and construction (EPC) contractor, Sinohydro, a Chinese state-owned company. On the other hand, the financing had been separately negotiated bilaterally between the Zimbabwean government and the Chinese government, which started as part of the mega deals negotiated by the former president of Zimbabwe, Robert Mugabe, and finalised by his successor Emmerson Mnangagwa.

Given the circumstances surrounding the financing deals for the infrastructure financed by China Exim Bank where heads of state were involved, it is likely to have compromised the

tender evaluation processes. Political power was more likely to unduly influence and overpower the technical evaluations of the tenders. Due to Zimbabwe having limited financing options, the China Exim Bank financing deals were messianic as the country was faced with a need that it could not finance and evaluation of financing to ascertain efficiency was likely to be regarded as luxurious. To ascertain this, the researcher evaluated responses given by the key informants in the Ministry of Energy and Power Development regarding the financing evaluations undertaken. Box 7.1 shows the responses given in respect of the financing evaluations for the power infrastructure projects undertaken.

### **Box 7.1: Power infrastructure financing evaluations**

**Question:** To what extent is your ministry involved in the evaluation of such projects, particularly, looking at the financing decision?

**Responses:**

Interviewee PN said, “The only part that the ministry gets involved is voltage-checking through facilitation otherwise certain decisions pertaining to whether the project is viable to be funded are taken by the Ministry of Finance and Economic Development.”

Whilst interviewee EM had this to say; “Went to tender for the project and one of the conditions of the tender was the financing of the project and who won the tender was the Chinese, so we had already approached their government because it’s part of the tender process to specify the provision of the financing”. After probing EM further, with the question on other available options and how they were evaluated to establish the cost of financing and the associated efficiency of the financing used. The response given was “You know it’s difficult to get financing in Zimbabwe.”

From the responses highlighted in Box 7.1, it appears that the evaluation of financing options for the projects was not regarded as important due to the financial challenges faced by the Government of Zimbabwe, which has limited choices in terms of financing options. The challenges of financing public infrastructure are not unique to Zimbabwe only but were confirmed by Henn (2015), who emphasised the existence of infrastructure financing gaps in developed countries (Subacchi, et al., 2014). The extent of the financing gaps is different

between developing and developed countries, with developing countries wanting more to finance the development of basic infrastructure (AfDB, 2015), whilst developed countries are financing the modernisation of their infrastructure (United Nations, 2015).

The response by EM suggests that financing is negotiated before the flighting of the tender, yet the usual process is starting with tendering and financial closure later. As a result, the infrastructure projects are financed by whoever was willing to bear the risks associated with Zimbabwe. The financing options limitations become apparent when there are capital intensive projects that the government cannot finance using their own resources. This fact was also confirmed by EM, who whilst referring to the Hwange project said, “Well for these large projects, if the government cannot fund them .... There is no way the government was going to finance such projects on its own given that Hwange project is almost US\$1.4 billion and that’s a huge outlay which I don’t think we have the capacity.” Given the limited financing choices, the evaluation of financing options and evaluation of tenders becomes procedural instead of it being an objective integral part of the decision-making process before implementation of the projects.

As part of a response mechanism to the lack of capacity by the public sector for financing infrastructure requirements, coupled with limited options from international development financiers, the Government of Zimbabwe had to liberalise the power generation sector. This created investment opportunities for some private sector investors, diversifying their investments through taking up portfolios in the power/energy infrastructure in Zimbabwe as independent power producers (IPPs). IPPs have been investing into small projects, which include several small hydroelectric projects in Zimbabwe’s eastern highlands in areas such as Inyangani and Chimanimani. The private sector projects are supportive of the sustainable development goals which seek to increase the use of renewable energy such as solar. Projects that are at advanced stages of development include the Harava project in Seke, an investment by Invest Solar Africa amounting to about US\$25 million that is expected to provide 20MW of electricity upon completion to Zimbabwe’s main grid in pursuit of a power purchase agreement signed with the national distributor, ZETDC (Africa Inc., 2019).

There is another private sector investment into the Centragrid photovoltaic solar power project by Centragrid (Pvt) Ltd in Mount Hampden near Harare. The project is expected to develop ten units, producing 2.5MW each of electricity to the national grid at an estimated total cost of about US\$30 million obtained through domestic and offshore loans (The Herald, 2019). The first unit was completed in August 2019 and is already supplying electricity to the national grid. These projects were highlighted by both key informants from the Ministry of Energy and Power Development to be some of the privately-owned power infrastructure projects undertaken between 2009 and 2018. Both projects are expected to produce electricity using solar technology. These private sector investments into power infrastructure are in addition to subscriptions to the infrastructure bonds issued by the IDBZ that have been highlighted above (Dailami & Leipziger, 1998). The meagre amounts of private sector investments into public infrastructure in Zimbabwe are consistent with the existing patterns where developing countries fail to attract private sector capital due to perceived sovereign and regulatory risks (OECD, 2019 and Owolabi, et al., 2018). Therefore, most developing countries rely on public sector financing and international financiers due to weak macro-economic and business fundamentals (Carter and Tyson, 2015 and Bationo, et al., 2018).

There is a proportional relationship between the capital outlays required and the anticipated electricity output. To exhibit efficiency in the financing of public infrastructure projects, there must be a proportional relationship between the amount invested and the electricity output in projects undertaken by public sector entities. This appears to justify the need for assessing the suitability and efficiency of the financing mechanisms used, especially in relation to financing costs. This is premised on the belief that private sector participation in public infrastructure development is expected to reduce costs due to the existence of competition (Gravito, et al., 2017 and Vining and Boardman, 2008). Therefore, a framework for use in such an evaluation would be useful, especially for public sector entities. The following section presents and discusses findings on the main sources of financing for transport infrastructure in Zimbabwe.

### **7.3 Sources of financing for transport infrastructure**

Major transport infrastructure projects undertaken by the Government of Zimbabwe between 2009 and 2018 were highlighted as including the expansion of the Victoria Falls, Joshua

Nkomo (Bulawayo) and Robert Mugabe (Harare) international airports. In the road sub-sector, the projects undertaken include re-surfacing and widening of the Plumtree-Harare-Mutare road, Harare-Masvingo-Beitbridge road, Harare airport road dualization and Harare Chirundu project. Details of the infrastructure projects are summarised in Table 7.1.

**Table 7.1: Major transport infrastructure projects**

<b>Transport infrastructure project</b>	<b>Financing Amount (US\$ million)</b>
R. Mugabe International airport expansion (phase 1)	34.0
R. Mugabe International airport expansion (phase 2)	153.0
Victoria falls international airport expansion	150.0
J. Nkomo international airport expansion	36.6
Plumtree-Harare- Mutare road	206.0
Harare airport road dualization	68.0
Harare-Masvingo- Beitbridge road (phase 1)	650.0

**Sources:** IDBZ (2018); IDBZ (2019) and Interviews (2020)

Some of the transport projects undertaken are shown in Table 7.1, with the details of how they were financed also shown. Transport infrastructure projects presented and discussed include projects in the road sub-sector as well as the air transport sub-sector. However, it is noted that no railway transport infrastructure was developed during the period covered by the study, although there were proposals for refurbishing the railway infrastructure which remain in the pipeline.

The Plumtree-Harare-Mutare (Forbes) road rehabilitation was financed by the Development Bank of Southern Africa (DBSA) through a loan amounting to US\$206 million (NewsDay, 2012; KPMG, 2016 and Business Weekly, 2020). Notable circumstances surrounding the financing of the project are that this financing deal was structured during the tenure of Zimbabwe’s government of national unity, when there was stability, and the international community was regaining confidence in Zimbabwe’s political landscape. This represents the only major infrastructure project financed by an international development financial institution. The delivery of the project was implemented through a special purpose vehicle, a



joint venture company called Infralink, formed by the Zimbabwe National Roads Administration (ZINARA) with 70% control and Group Five International Limited's subsidiary Intertoll Africa, a South African company controlling the remaining 30% stake (NewsDay, 2012 and Business Weekly, 2020).

It was noted during interviews that respondents were confusing the financing from the delivery of the project, with respondents saying that the project was financed through a public private partnership (PPP). This observation was made in relation with all key informants that highlighted the Plumtree-Harare-Mutare road project. For instance, interviewee T1 said, "Of the projects that I have mentioned, there is only one which has got a different financing model which is the Plumtree – Harare – Mutare road rehabilitation which was done through PPP". This confusion was confirmed in a variety of newspaper articles that reported about the project (The Herald, 2018 and Business Weekly, 2020). Thus, the confusion that exists in relation to the interrelated concepts of financing, funding and delivery of infrastructure was found to be widespread, including from literature (Maxwell-Jackson, 2013 and Henn, 2015). Therefore, in the quotations from the interviewees, whenever respondents mentioned funding, they meant financing. For the Plumtree Harare-Mutare road, where key informants talked about PPP as a financing mechanism, it was in fact the delivery mechanism.

Implementation of the construction works for the Plumtree-Harare-Mutare road project was therefore undertaken through a PPP, wherein the public sector organisation was ZINARA, and the private sector entity was Group Five International. These two entities entered into an agreement whereby Group Five was responsible for the development of the road and wherever there were sub-contractors engaged, Group Five was responsible for managing the project. In addition to the construction of the road, Group Five was also given the responsibility for maintenance of the road for a period of 10 years (Business Weekly, 2020). Repayment of the loan financing was to be done through the collection of toll fees from tolling booths erected on the same road. An excerpt from key informant T1,

*"Like I said, the PPP on Plumtree – Harare – Mutare project ... The road is currently under the control of the private sector because they are currently maintaining the road*

*and collecting toll fees and taking interest and their capital outlay back from the toll fees.”*

According to the transport sector key informants, all the other road projects were financed by treasury, inclusive of both regional trunk roads, national highways, and rural roads. The maintenance of Zimbabwe’s road network is financed from the road fund created by the Roads Act (Chapter 13:18) which established ZINARA and mandates it with the responsibility of maintaining roads in Zimbabwe. This fact was confirmed by interviewee T1, who said, “The mandate of ZINARA is mainly on the rehabilitation and maintenance of the roads. They are not really involved in the construction of new roads. For construction of new roads, we normally get funding from the MoFED, although they also finance rehabilitation of existing roads”. Therefore, treasury has financed the greater part of the road projects and all the interviewees noted that in terms of contributions for all their projects, some of which are not mentioned in this presentation, the Ministry of Finance was the financier.

The financing of road construction by the public sector MoFED, as well as the financing of road maintenance by ZINARA, is consistent with both theories and empirical literature (Chan, et al., 2009; Calitz and Fourie, 2010; UNECE, 2017 and Chotia and Rao, 2018). Roads represent a typical public good which from public finance theories must be financed by the public sector (Gannon and Smith, 2009 and van der Ploeg, 2006). The public sector in Zimbabwe is handicapped in terms of options from which the public sector finances public goods such as roads, which is not only unique to Zimbabwe, but is common in many other countries due to limited fiscal space (Woetzel, et al., 2016). These have traditionally been known to be funded from development financial institutions, public institutions, multilateral institutions, and export credit agencies (Ray, 2015). However, for Zimbabwe, the budget appropriations are mainly funded from taxes whilst development partners, developmental financial institutions and multilateral financial institutions have either suspended funding for Zimbabwe, or they are funding off the budget.

Concessionary bilateral loans from China Exim Bank were the main source of finance for airport infrastructure. This was established from an examination of airport expansion projects,

where the expansion of the Victoria Falls International Airport and the Robert Mugabe International Airport were all financed through loans from the China Exim Bank (IDBZ, 2018). Only the expansion of the Joshua Nkomo international airport was financed by treasury (IDBZ, 2018). China Exim Bank financed the Victoria Falls International Airport to a total of US\$150 million and the second phase of the expansion of Robert Mugabe International Airport to an amount of US\$153 million (The Herald, 2020). Treasury on the other hand financed the first phase of the expansion of Robert Mugabe International Airport at a total cost of US\$34 million (IDBZ, 2018) and the Joshua Nkomo International Airport for an amount of US\$36 million, which was completed in 2013 (IDBZ, 2018).

The first phase of the expansion of Joshua Nkomo International Airport expansion was completed in 2013, after a prolonged delay when the project had commenced in 2003 with an 18-month target of completion from the date of commencement (Zimbabwe Independent, 2007). The Victoria Falls International Airport on the other hand was completed in December 2018, after a three-month delay, given its planned completion target of September 2018 (New Zimbabwe, 2014). The second phase of the Robert Mugabe airport is scheduled to be completed in 2021. From the completed airport projects, it is apparent that financing decisions influence the delivery of the infrastructure project in terms of expected timelines. It therefore becomes important to evaluate project financing decisions before the commencement of these projects.

Airport infrastructure financing in Zimbabwe is indicative of the heavy reliance on China for financing transport infrastructure, the results of which are confirmed by a study by Jalles d'Orey and Prizzon (2017), who noted that China Exim Bank was a major financier of power and transport infrastructure in Ethiopia and Kenya. China has remained the major bilateral financier for infrastructure in Zimbabwe after the withdrawal of most bilateral and/or multilateral financiers due to the non-repayment of loans. The only other financier of airport infrastructure is the government, which has no option as it has a responsibility to provide public infrastructure (Gruber, 2007; Abelson, 2008 and Rosen and Gayer, 2014). The results are showing a gap in the financing architecture for airports as there is scope for private sector financing. The possible reason for the absence of private sector financiers could be the

sovereign risk. Private sector financiers or private sector partners would consider risk before committing to finance any project and after considering the risk profile, higher risks are charged higher interests according to the tenets of the risk-return theory (Sharpe, 1964; Lintner, 1965; Black, 1972; Platz, 2009). Therefore, there is scope for improving the macroeconomic fundamentals in Zimbabwe in order to make the infrastructure financing sector more attractive to private sector investors.

The researcher enquired from the key informants on the main considerations before financing and some of the responses are presented in Box 7.2 below.

**Box 7.2: Key considerations before financing infrastructure projects**

**Question:** What are the mechanisms that you use to evaluate the suitability of a project financing option?

**Responses:**

T1 said, “For example, if we are starting a new project and it doesn’t require huge amounts of money, it means that project can be financed probably through taxpayers (treasury). Then when it comes to maintenances, that is where ZINARA comes in. For construction, we engage Ministry of Finance and Economic Development but if it is in a position not to fund the project, that’s when we are supposed to look for PPPs in a way that the private company will get back its money with profit. In the case of the Plumtree – Harare – Mutare road project, the private company constructed toll gates along the road and collects toll fees as part of repayment.”

Whilst T2, said, “We just submit the requirements and do the quote of figures and then take it to the Ministry of Finance and the Ministry will see if possible, to do project based on figures they have”.

The responses shown in Box 7.2 suggest that user ministries do not evaluate infrastructure financing decisions for merit, but that financing decisions are based on convenience, meaning the capacity of the government or lack thereof. This made it apparent why the Plumtree-Harare-Mutare road and the Victoria Falls and Robert Mugabe airports were all financed through loans. The government had no capacity to finance these bigger projects and only financed the smaller projects they could afford. As a result of these circumstances, the evaluation of financing is likely to be neglected.

Some of the transport infrastructure in Zimbabwe's rural areas falls under the purview of the District Development Fund (DDF). The DDF is responsible for road and bridges construction, refurbishment, and maintenance. Furthermore, the DDF is responsible for the maintenance of about 32 000 kilometres of Zimbabwe's total road network of about 88 000 kilometres (AfDB, 2011). Zimbabwe was affected by a tropical cyclone named Idai in the eastern side of the country towards its border with Mozambique in March 2019 (IFRC, 2020). This affected about 90% of the roads and bridges, which required reconstruction and repairs (IFRC, 2020). Therefore, the DDF was involved in the emergency reconstruction of roads and bridges in the Cyclone Idai affected areas. According to the key informant from the DDF, most of this road infrastructure refurbishments and others across the country were all financed by the Government of Zimbabwe through treasury, including the Cyclone Idai projects.

However, further corroboration of the source of financing established a variety of innovative financing mechanisms which entailed donation-based crowdfunding by citizens, churches, corporates and other local as well as international donors (IFRC, 2020). Several countries made donations in cash and in kind for purposes of helping the victims of the cyclone and the reconstruction work including the roads and bridges. Other notable financiers of the Cyclone Idai recovery project includes the World Bank through a special allocation of \$72 million to the Zimbabwe Idai Recovery Project (ZIRP), although there is no specification of the amount from the ZIRP, which financed road and bridge reconstructions (World Bank, 2020).

In addition to financing from treasury, the DDF is also financed by the ZINARA road fund for purposes of maintaining its road network. However, the Ministry of Finance remains the main financier of road infrastructure, as noted by the key informant when he said, "the funds for road construction, we have been getting from the Ministry of Finance as well as ZINARA as the road authority, but the bulk of the money was from Ministry of Finance." Challenges of delays in the completion of projects were also common in the provision of transport infrastructure in rural areas, whereby some places become inaccessible by road due to bridges that take years to construct.

Financing challenges were also noted in the provision of transport infrastructure in rural areas, where the key informant cited the depletion in their road maintenance equipment:

*“And in terms of the equipment DDF is no longer adequately capitalised you move into the various workshops throughout the country and see dilapidated tractors, graders like there have been a war but these came after Independence. The road construction was at the peak from the support of KfW from Germany, these had 4 complete road units per province and each unit composed of a grader, a dozer, front end loader and excavator as well as water pump. So, you can multiply by 4 per province and multiply by 8 rural Provinces we have in the country then look at activities done that time when we were funded by the Germans under KfW.”*

In the transport infrastructure sector, there is limited participation of private sector investors. From the interviews conducted, the key informants indicated that the participation by private sector entities was mainly through their corporate social responsibility (CSR) activities. Examples cited for such CSR activities include the development of access roads and their maintenance by private sector companies in pursuit of their business ventures, for instance by mining companies as well as mobile phone network operators. Key informant T1 called these roads ‘private roads’. The observations by key informant T1 were also buttressed by the DDF key informant who said, “there is NetOne, for example under the digital program, they funded the construction of access roads to their mobile phone base stations throughout the country”.

The nature of road infrastructure limits the scope for private sector investments in transport infrastructure. There is no business case for investing in private roads in Zimbabwe because it may be difficult to recover the initial outlays due to the non-excludability feature of roads, especially in rural areas. Therefore, the results confirmed the need for the public sector being the major financier of public infrastructure as roads are a key public good that must be provided by the state (Gannon and Smith, 2009 and van der Ploeg, 2006). This is however not the case with air transport infrastructure, which has the potential to attract private sector investors who can either develop private infrastructure or partner with the public sector. This has led to China being motivated to finance airports for the purpose of facilitating trade with most African countries, including Zimbabwe. Zimbabwe is failing to attract private sector

investors due to its perceived political, regulatory and sovereignty risk levels (Ameyaw & Chan, 2015). Private sectors do not see their investments being safe as highlighted by the World Bank (2012), hence leaving export agencies such as China Exim Bank to finance investments in high-risk destinations.

The other way in which the private sector in Zimbabwe participated in financing transport infrastructure is through their subscription to infrastructure bonds issued by the IDBZ, or any borrowings by either central or local governments. However, during the period under study, there was no record of the issue of bonds, or any other debt instruments whose proceeds were earmarked for financing transport infrastructure. The following section presents results on the main sources of financing for water and sanitation infrastructure based on responses from interviews as well as documentary information.

#### **7.4 Sources of financing for water and sanitation infrastructure**

The major infrastructure development projects in the water and sanitation sector include the construction of dams, refurbishment, and expansion of water reticulation facilities, as well as refurbishment of sewerage collection and treatment facilities. Major projects undertaken are the Harare City water and sewerage improvement project, Tugwi-Mukosi Dam, Marovanyati Dam, Semwa Dam and Causeway Dam. Infrastructure projects in water and sanitation were financed through a combination of treasury loans and development assistance grants.

Dam construction in Zimbabwe was mainly financed by treasury through the Public Sector Investment Programme (PSIP). Dam projects financed from treasury include Tugwi-Mukosi, which was completed in 2016 at an estimated total cost of between US\$300 million (Newsday, 2018) and US\$500 million (Reliefweb, 2017); Marovanyati Dam, completed in 2020 at a cost of US\$33 million and Semwa Dam as well as Causeway, which are yet to be completed (IDBZ, 2018). As noted with transport projects financed by the government, the projects were completed after their set schedules and exceed the budgeted resources. For instance, the Tugwi-Mukosi Dam was started in 1998 and was expected to be completed in 2004, but was only completed in 2016, about 12 years after the originally planned completion timeframes. Other dams financed by the government were similarly affected in terms of delayed

completion and exceeding initial budgets. These projects include Marovanyati and Semwa dams. The repetitious nature of delays in completion and budget overruns for treasury-financed projects implies the need for developing a framework for evaluating sources of finance for public infrastructure in Zimbabwe.

Water and sanitation infrastructure are classified as either economic or social infrastructure. The essence of classification as social infrastructure is its level of compliance with the key features of public goods whose development has traditionally been financed by the public sector, especially the government. This fact was confirmed by the financing of all dam projects by the Government of Zimbabwe (Gannon and Smith, 2009 and van der Ploeg, 2006). Other sub-sectors of water and sanitation infrastructure were financed from either bilateral financiers or development partners. Results for these are presented hereunder.

Infrastructure for the provision of improved potable water and sanitation facilities have been financed through a combination of loans, grants, and official development assistance. The project to improve the water and sanitation facilities for the city of Harare was undertaken using a loan advanced by China Exim Bank, which was ratified by the city's council in 2013 and was expected to run for 36 months to its completion. The project was meant to improve the pumping capacity at the city's Morton Jaffray waterworks by 214 megalitres per day, as well as refurbish the Prince Edward water treatment works and the Crowborough and Firl sewer works at a cost of US\$144 million (Zimbabwe Independent, 2018). However, a breach of the contract terms led to the renegeing in disbursement of the full amount by the financier (Zimbabwe Independent, 2018). This project therefore remains incomplete to date due to the challenges encountered in adhering to the loan covenants by the guarantor of the loan.

Financing for emergency water supply and sanitation rehabilitation projects was obtained through official development assistance. The African Development Bank (AfDB) administers a fund created in 2010 by several donors known as the Zimbabwe Multi-Donor Trust Fund (Zim-Fund) for purposes of supporting recovery activities by the Government of Zimbabwe (AfDB, 2015). Donors that contributed to the Zim-Fund include the UK's DFID, Germany's KfW, Swedish Development Agency, Australia, and Denmark. Contributions to the Zim-Fund



by the year 2015 amounted to US\$140 million (AfDB, 2015). The purpose of the Zim-Fund was to finance urgent water supply and sanitation stabilisation in six cities and towns, namely Harare, Chitungwiza, Mutare, Chegutu, Masvingo and Kwekwe (AfDB, 2015). The same fund also financed emergency power infrastructure rehabilitation projects.

In addition to the Zim-Fund, the World Bank also created a country-specific Multi-Donor Trust fund in 2015, named the Zimbabwe Reconstruction Fund (ZIMREF), which by the end of 2019 had received a total of about US\$47.5 million from donors (World Bank, 2019). Donors to the ZIMREF includes the UK's DFID, the governments of Sweden, Switzerland, Denmark, Norway, and the European Union who partnered with the World Bank (World Bank, 2019). The fund, amongst many other projects, embarked on a national water project that targeted seven growth points across Zimbabwe and financed water and sanitation infrastructure amounting to about US\$20 million (World Bank, 2019). The objective of the fund in embarking on the national water project was to improve access and efficiency in water services, as well as strengthening the planning and regulation capacity for the water and sanitation sector in the targeted areas. The project is being implemented through the Zimbabwe National Water Authority (World Bank, 2019).

The reason for the creation of ZIMREF was highlighted by a key informant at the World Bank's Zimbabwe country office who said, "The World Bank's lending programme in Zimbabwe is inactive due to arrears and the role is now limited to technical assistance and analytical work through Trust Funds..." The World Bank key informant signposted the researcher to the ZIMREF webpage on the World Bank's website for details of the scope of the work currently being done by the World Bank in Zimbabwe. Similar sentiments were also shared by other international development financial institutions such as the International Monetary Fund and the African Development Bank, who stated that they were currently not actively financing infrastructure in Zimbabwe.

Water and sanitation projects cut across the urban divide and include projects and activities in rural areas. Water and sanitation infrastructure in rural Zimbabwe are managed by the Rural District Councils, together with the District Development Fund (DDF). An interview

conducted with DDF1 showed that financing for water and sanitation was from the government, development assistance and a few cases of CSR activities. The key informant interviewee highlighted that the main financier of water and sanitation in rural areas in Zimbabwe was the Government of Zimbabwe through the MoFED. The scope of work done by the DDF in the provision of water and sanitation as highlighted by the key informant is, “On my water portfolio we are into dam construction, borehole drilling, piped water scheme construction and maintenance as well as irrigation development”. These activities are the core of water and sanitation infrastructure provision.

The key informant also highlighted that development agencies such as UNICEF were also active in financing water and sanitation in rural areas. Key informant DDF said, “We are quite active in borehole drilling as well as borehole rehabilitation which the DDF is the chair of the subcommittee on Rural WASH program started by UNICEF which work through inter-ministerial committee with former district administrators as coordinators that are part of the team which works through various structures in borehole drilling and installations.” Therefore, UNICEF is active in financing water and sanitation infrastructure in rural areas under the auspices of the rural WASH programme and its operational modalities were highlighted by key informant DDF as follows. “Also, as I indicated there is Rural WASH programme funded by UNICEF and Department of International Development (DFID) from UK and Swedish Bilateral Partner, but the money does not come through MoFED, the mechanism is that it goes through UNICEF”. The official development assistance (ODA) is not on-the-budget financing, but off-the-budget.

Moreover, development partners also financed water and sanitation infrastructure in disaster affected and disaster-prone areas. Such areas include the Cyclone Idai affected areas of Zimbabwe’s border with Mozambique. However, some of the resources for responses to Idai were channelled through the Department of Civil Protection (DCP) in the Ministry of Local Government and Public Works. These resources were used to finance water and sanitation and the DDF key informant confirmed this when he said, “Let me also highlight for works which were done from Cyclone Idai and Bing disaster, Civil Protection Unit provided the funding.” The amounts channelled through the DCP were not publicly declared.

The lack of sufficient financing hampers the provision of improved access to water and sanitation in Zimbabwe. The insufficiency was revealed by the DDF key informant who said, "... even water infrastructure, we have about 60 000 boreholes/watering points throughout the country but only about 33% are working because of lack of resources for maintenance". The financing challenges are therefore a serious handicap to meeting the UN's Sustainable Development Goal (SDGs) Number 6 in relation to the universal access to improved water and sanitation by 2030 (SDG Tracker, 2018). The lack of finance was further compounded by the challenges associated with the budget implementation mechanisms whereby resources allocated to government departments and ministries are being disbursed on a piece-meal basis. The Government of Zimbabwe migrated its budgeting system towards the cash-budgeting basis whereby disbursements are based on the resources available at hand and regardless of projects having been budgeted for their implementation, only depends on the available resources. The key informant had said, "inasmuch as we have funding challenges, we try to do the best with the means we have".

In addition to financing from treasury, ODA, there is limited financing of water and sanitation infrastructure from the private sector. This is because the law in Zimbabwe does not support private investments in water resources as all surface water and underground water is controlled by the government through the ZINWA. Therefore, isolated cases of private sector financing are through disaster relief donations and corporate social responsibility activities, as noted by the DDF key informant who said, "Yes, but here and there support for instance Econet Wireless Limited by identifying communities which requires water, and normally paid money for the borehole drilling service. We also have ZIMPLATS who also chip in on borehole drilling under their corporate social responsibility element." Therefore, the extent of private sector financing of water and sanitation infrastructure is nearly negligible.

In addition to the aforementioned water and sanitation financing methods, a report by UNICEF identified consumer financing (UNICEF, 2019), which refers to consumers who pay water tariffs to statutory bodies and local authorities for accessing or using water resources, as well as when they make investments into water and sanitation infrastructure such as the

drilling of private boreholes. The amount of the contributions to the financing of water and sanitation infrastructure is not clear as statistics are not available.

As shown in the results presented, the biggest monetary amounts for the financing of water and sanitation in Zimbabwe were from the government, followed by bilateral loans from China Exim Bank which was however not completed due to contractual breaches. There is also a notable contribution from development partners through multi-donor trust funds which also financed water and sanitation. The financing is supporting the need for the government's financing of water and sanitation, which is a basic human right, hence qualifying the infrastructure as public goods (Grigg, 2019; Gannon and Smith, 2009 and van der Ploeg, 2006). In the rural areas, the lack of finance which has led to poor access to water and sanitation is analogous in most developing countries in general, especially Africa and including Zimbabwe as confirmed by the results of the study (Ahmad et al, 2016 and Kativhu, 2016). The following section presents and discusses results pertaining to the financing of ICT infrastructure in Zimbabwe.

### **7.5 Sources of financing for ICTs infrastructure**

Information communication technologies (ICTs) are critical for economic activity in the 21<sup>st</sup> century. The ICTs sector in Zimbabwe is made up of players such as mobile network operators, fixed telephone operators and internet service providers. Operations in this sector are regulated by the Postal and Telecommunications Regulatory Authority of Zimbabwe (POTRAZ). To establish the main sources of financing for ICT infrastructure, interviews were conducted with staff from the Ministry of Information, Communication Technology, Postal and Courier Services in Zimbabwe. Authority to conduct interviews with personnel from TelOne (Pvt) Ltd, a parastatal responsible for providing fixed telephone services, was granted but participants did not consent to participate in the interviews. Therefore, data from TelOne was collected from the financial reports published during the period under study. However, consent to study NetOne Cellular (Pvt) Ltd, another parastatal enterprise, could not be obtained. Therefore, only publicly available data is presented.

The data from interviews was supplemented by documentary information obtained from the MoFED and POTRAZ. Interviews were also conducted with staff from the industry regulator, POTRAZ. Furthermore, it is also noted that this sector is dominated by private sector companies which control most of the ICTs and are regarded as direct competitors to parastatals in the sector. Given the market leadership of the private sector companies in the ICT sector, reference is also made to the private sector's financing of ICT infrastructure, although the focus of the study was on the public sector. Private sector companies are the market leaders Econet Wireless Ltd and Liquid Telecomm Ltd. This was meant to ensure that robust and comprehensive results were obtained and presented with details to the extent that ensures that the results presented are as informative to readers as possible. Combined data from the interviews and documentary analysis is presented and discussed in this section.

Several infrastructure projects were undertaken in the ICTs sector in Zimbabwe, as identified by both key informants during the interviews, some of which include the e-government project; construction of base stations in both urban and rural areas; development of community information centres; and the development of the fibre backbone for Zimbabwe. Some of these projects were implemented by the ministry, whilst some were implemented by parastatal entities in the ministry. The financing of the projects included the treasury, development agencies and retention funds.

The e-Government project is the main ICT infrastructure implemented by the Ministry of ICTs and Courier services during the period under study. The project was the backbone to other projects undertaken by the ministry. Thus, the e-government project also entailed the community information centres project, high performance computing centres project, computerisation of schools (ICT lab per school) project and a project for the computerisation of government ministries and departments. The project was financed by treasury and has been receiving annual budgetary appropriations to an amount of US\$42.6 million. As part of the e-government project, Potraz was responsible for the community information centres under its universal service fund projects known as the 'connect a school, connect a community' project, estimated to cost US\$14 million (Daily News, 2019). The e-government project is still ongoing, and the total amount may change as the scope of work for the project may be varied.

Details about some of the other ICT projects could not be obtained as their implementation was combined with political activities. For instance, the computerisation of rural schools ended up being used as part of the campaign materials for political parties.

ICT infrastructure projects undertaken by parastatal entities includes the construction of base stations for expanding network coverage. Details of some of the ICT projects are summarised in Table 7.2.

**Table 7.2: Main public sector ICT infrastructure projects undertaken**

Project	Amount (US\$ million)	Financier
NetOne network expansion (phase 1)	45.0	Treasury- MoFED
NetOne network expansion (phase 2)	218.0	China- Exim bank
Base stations in underserved areas (2 phases)	30.0	Potraz's Universal Service Fund (USF)
TelOne Fibre optic backbone project	17.9	Treasury- MoFED
	25.7	TelOne own resources
	98.0	China- Exim bank

**Source:** (Data collected, 2020)

As shown in Table , ICT infrastructure was financed through a combination of bilateral concessionary loans (China Exim Bank) and MoFED's treasury, in addition to the investments of own resources by public sector enterprises. In terms of the value of ICT infrastructure projects, China Exim Bank was the leading financier after financing the TelOne fibre optic backbone project for an amount of US\$98 million, as well as financing the expansion of the mobile network for NetOne amounting to US\$218 million (ITWeb Africa, 2019). The possible reason for China financing ICT infrastructure in Zimbabwe is for trade purposes as through the right ICT infrastructure, trade between China and Zimbabwe can be enhanced and at same time, Chinese companies were engaged in the implementation of the projects. The provision of infrastructure finance by the Chinese to Africa is not unique to Zimbabwe alone as the Infrastructure Consortium of Africa confirmed that China is the overall second largest financier of infrastructure in Africa (ICA, 2018).

Contrary to the findings available from documentary evidence, key informant ICT1 highlighted that most of the projects in the ICT sector were financed from development partners such as the UNDP and the African Development Bank (AfDB). This assertion by key informant ICT1 could not be verified by the documentary secondary evidence as no project was identified that was financed by development partners. This is a likely indication of the non-disclosure of public infrastructure financing in Zimbabwe, which has led to the country facing challenges of accessing financing from conventional sources.

Although the focus of the study was on the financing of public infrastructure, the leading providers of ICT infrastructure are private sector companies. Respondents were asked about the extent to which the private sector has been involved in the financing of ICT infrastructure and key informant ICT1 said:

*“If we look at fibre the private players, we have, are competitors to Telone (Pvt) Ltd, for example, Liquid Telecom. They do not bring funds to the Ministry, but they finance their own projects which are run parallel to the government. We want to acknowledge the part played by private sectors because the government alone would not achieve much.”*

This confirmed the presence of private sector entities and their market leadership in the ICT sector. The leading mobile network operator by subscribers is Econet Wireless Zimbabwe Ltd, which a direct competitor of NetOne Pvt Ltd, a parastatal enterprise; whilst Liquid Telecom Ltd is the leading provider of fibre optic network infrastructure in Zimbabwe, directly competing with TelOne (Pvt) Ltd (ITWeb Africa, 2019).

The private players were in some instances disclosing their sources of financing of their infrastructure projects, since they are public limited companies, for instance, in 2015, Liquid Telecom disclosed that it had obtained a cash injection of US\$180 million for fibre optic network expansion across Africa (News24, 2018). This project was therefore equity financed as the transaction resulted in the financier getting a 10% equity stake in Liquid Telecom (News24, 2018). Infrastructure projects are capital-intensive and therefore most of their expansion projects were financed through loans, as indicated in Liquid Telecom’s 2018 financial statements where they reported that they had borrowed US\$730 million and 8.5%

senior secured notes (Liquid Telecom, 2019). Besides Econet Global and its subsidiaries, there are also several smaller private sector entities providing ICT infrastructure such as Telecel (Pvt) Ltd, Africom (Pvt) Ltd and Powertel (Pvt) Ltd, amongst many others active in the provision of ICT infrastructure in Zimbabwe.

As shown in the results, the ICT infrastructure sector has the potential to attract private sector investors because of its nature of service, which can hardly be classified as a public good but is more of a commercial service. The presence of the public sector in financing ICT infrastructure is for purposes of safeguarding strategic national information. Therefore, financing options available in the ICTs infrastructure sector is not only limited to public sector financing but includes private sector financing such as commercial loans, syndicated loans, corporate bonds, and project bonds, amongst many others (Chotia, 2017 and O'Brien and Pike, 2015). The major limiting factor to access to financing for public infrastructure in the ICT sector is investible projects (Ehlers, 2014). This position is confirmed by the results of the study.

The preceding sections have presented and discussed results obtained from the interviews conducted and documentary analysis for the main sources of financing for infrastructure in Zimbabwe. This has presented the results based on projects highlighted in the interviews and synthesised the results and discussed the findings of the study with a view to locating Zimbabwe's infrastructure financing spectrum from the literature perspective. It is however important to summarise and present an overall picture of how economic infrastructure was financed in Zimbabwe during the period focused upon by the study. Therefore, Table 7.3 summarises the findings for the study without highlighting the monetary amounts, some of which have been presented in the prior sections.



**Table 7.3: Summary of infrastructure financing results (truth table)**

Infrastructure sectors	Financing instruments and sources						
	Treasury or own funds	Bilateral loans	Commercial loans	Grants	CSR	Private sector	ODA
Transport-Roads	√				√		
Transport-Airports	√	√					
Power/energy	√	√	√	√		√	
Water and sanitation	√	√		√	√		√
ICT	√	√		√		√	

**Source:** Compilation by author from data collected (2020)

Table 7.3 indicates the various sources of financing that have been used in financing public infrastructure in Zimbabwe. As shown by the ticks, sources of finance that are common across all the economic infrastructure sectors are treasury, followed by bilateral loans and the rest are almost used to the same extent.

Overall, the results summarised in Table 7.3 are consistent with the theory of public policy whereby the government must safeguard public interests and social welfare through the active provision of public goods (Gruber, 2007; Abelson, 2008 and Rosen and Gayer, 2014). Therefore, the Government of Zimbabwe is providing finances for the construction of dams and roads in order to ensure that their public interests are safeguarded. Moreover, in such infrastructure sectors such as water and sanitation as well as transport, treasury financing is critical as it is regarded to be the provision of public goods that requires the involvement of the government in order to minimise inefficiencies in their provision, whilst minimising market failures likely to result from allowing the private sector to provide these important infrastructure services (Nelson, 2005; van der Ploeg, 2006; Abelson, 2008 and Gannon and Smith, 2009).

The Zimbabwean Government's leading role in financing public infrastructure is consistent with practices in all other countries where the government is expected to take leading roles in providing finance for public infrastructure (Chan, et al., 2009; Calitz and Fourie, 2010; UNECE, 2017 and Chotia and Rao, 2018). Literature observes that where countries are cooperative with donor countries, official development assistance, or support from multilateral financial institutions is often received for budgetary support to cover budgetary deficits (Kingombe, 2011). This is however not the case with Zimbabwe as the government is in arrears and the international and multilateral financial institutions are only financing emergency/disaster relief projects, such as the ZIMREF by the World Bank and the ZIMFUND administered by the AfDB. However, limitations in terms of fiscal space have led to the private sector actively financing public infrastructure in Zimbabwe to a limited extent in most of the sectors, but leading in the ICT sector (Gutman, et al., 2015 and Dreher, et al., 2017). The following section presents a summary of the results that were presented, interpreted, and discussed in this chapter.

## **7.6 Chapter Summary**

This chapter has presented and discussed results on the main sources of financing for public infrastructure in Zimbabwe. Infrastructure in Zimbabwe is financed from a variety of sources, which includes budgetary appropriations, loans, grants, bonds, and the private sector, which is also active in infrastructure sectors that have been liberalised. Some infrastructure projects are financed by several financiers, yet the scale of the project should ideally have been financed by a single financier. For instance, the Kariba South project was financed through a combination of a concessionary loan from China Exim Bank, a commercial loan from Standard Bank and proceeds of Infrastructure bonds issued by the IDBZ. This indicates that there are challenges in accessing sufficient finances for investing in the development of infrastructure in Zimbabwe.

According to the findings from the study, the Government of Zimbabwe through the MoFED is the leading financier of public infrastructure as it financed infrastructure across all the four economic infrastructure sectors. This is followed by bilateral concessionary loans where China is the leading financier, having financed infrastructure in all four sectors but leading in

the power/energy sector and the transport (airports) sectors. The ICT sector is predominantly run by private sector enterprises and therefore, the main financier in the ICT sector is the private sector, which includes commercial financiers. On the other hand, the water sector is mainly financed by budget appropriations from MoFED, with the other active financiers including concessionary loans from China as well as some small grants from development partners through multi-donor trust funds.

The following chapter presents results on the capacity of innovative finance to mitigate the infrastructure financing gap existing in Zimbabwe. The chapter presents results based on the researcher's interpretation of the findings presented in this chapter. Thus, the concept of innovative finance is re-emphasised in order to accurately present and discuss the results.

## CHAPTER EIGHT

### INNOVATIVE FINANCE'S CAPACITY TO CLOSE ZIMBABWE'S INFRASTRUCTURE GAP

#### 8.1 Introduction

The purpose of this chapter is to present results that address the second objective of the thesis' study: to establish the possibility of Zimbabwe closing her infrastructure financing gap through the deployment of innovative finance and innovative financing mechanisms. To clearly present and discuss these results, it is important to emphasise the concept of innovative finance in this introductory part of the chapter. This is key for guiding the interpretation of the concept of innovative finance and hence sufficiently addressing the objective of the study.

Despite the concept of innovative finance lacking a universally agreed upon definition, it broadly entails governments or public sector entities integrating private capital with public sector systems for the purpose of financing global challenges in a cost-effective way that is mutually beneficial to all players involved, but most importantly making acceptable returns on investment for private sector investors (Keohane & Madsbjerg, 2016). Innovative finance is therefore a source of finance complementing the conventional sources of finance for development and it is also a way of linking financing to results, thus redistributing risk, using technology, enhancing working capital availability, and enhancing the efficiency and effectiveness of finance (Elmer, et al., 2018). The most highlighted examples of innovative financing include public-private partnerships (PPPs), crowdfunding, green bonds, social impact bonds and diaspora bonds, amongst many others. Given the evasiveness of the concept of innovative finance, the presentation of the results on the potential of innovative finance in closing the public infrastructure financing gap in Zimbabwe is based on the researcher's interpretation of the variety of definitions available in literature, most of which have not been highlighted here.

The layout of the chapter includes the presentation and discussion of results for each of the four categories of economic infrastructure under study. Firstly, results on the use of innovative finance in transport infrastructure are presented and discussed, followed by power/energy infrastructure, which is followed by water and sanitation infrastructure. Lastly, results on the use of innovative finance in financing ICT infrastructure are presented and discussed. Since interpretivism is the underlying philosophy of the study, it is key to note that in the process of deriving meaning from the results of the study, infrastructure financing shall be classified into innovative finance, when there is need to classify the sources of finance.

## **8.2 Innovative Financing of Transport Infrastructure in Zimbabwe**

Transport infrastructure in Zimbabwe is currently being financed through budget appropriations and bilateral loans obtained from the China Exim Bank. For road infrastructure, treasury is the main financier, although there is one major road project undertaken during the period under study that all key informants highlighted as having been financed through a PPP. However, the researcher's evaluation and interpretation concluded that the road had been financed through a loan. Respondents stated that the Plumtree-Harare-Mutare road had been financed through a PPP, yet the financing was obtained from the DBSA through a loan. It was only the *delivery* of the infrastructure that was executed through a PPP, whereby ZINARA partnered with Group Five and created a special purpose vehicle company that borrowed US\$206 million to finance the project from DBSA. Given this confusion, it is important to technically demarcate the concepts of financing, funding, and delivery in relation to the development of infrastructure assets. The same confusion was highlighted in literature by (Henn, 2015), yet authors such as Ernst and Young (2011) and van der Ploeg (2011) had clearly distinguished between the concepts of financing, funding, and delivery in relation to infrastructure.

Despite the status quo in the financing of public infrastructure in Zimbabwe, innovative finance has the scope to mitigate the gap, since road infrastructure in Zimbabwe has the capacity to self-fund through the erection of tollgates and the collection of toll fees therefrom. It is important to note the observations by key informants of the study when pursuing innovative financing of transport infrastructure. For instance, key informant T1 said, "...for

which in the future, I wouldn't recommend a PPP with an outside company. This is because for civil engineering works, only 15 percent of materials require foreign currency, and the 85 percent comes from local resources. So, we don't recommend a situation where we invite a foreign company and utilizes 85 percent of our local materials who will then take away all the money outside the country". This observation is critical as the nature of road infrastructure development mainly uses domestic resources. Therefore, in order to contribute significantly to closing the infrastructure financing gap, there is need to develop transport infrastructure projects that are attractive to domestic private sector investors.

Policymakers in the public sector should ensure that there is a supporting framework to attract the private sector into financing infrastructure projects in the transport sector. Currently, the transport sector is not attractive to private investors unless they are entering into a purely financing arrangement which requires licensed financial services providers. Moreover, there is need for policy stability and consistency from the public sector partners so that private sector investments in public infrastructure are secure from unfavourable policy fluctuations, especially in relation to exchange rates. Thus, it is important to have a framework that supports and preserves private investments.

In relation to the creation of a supporting framework for innovative financing of public infrastructure through PPPs, the key informant from the IMF said,

*"The main reason why we don't have any meaningful PPP's is because of the risk. Look at what has happened to the currency situation today, in relation to the exchange rate management situation. Let us say you enter into a PPP for example, the Group Five road, the Mutare, and Plumtree one. That's a perfect road and it was meant to be financed through a PPP, and how does the private partner recoup their money, they get the toll fees from ZINARA but when that road was constructed between 2011 and 2013 it was purely a USD economy and they made the arrangements that if I drive my small car through that tollgate I would pay US\$1, but as time went on it become 2 Zim dollars, some meaningless amount didn't fulfil what PPP partners wanted. Say for example now I do not know how much they are charging but a USD dollar now is equal to 82 Zim dollars, but for ZINARA to charge it must go through Cabinet, or Statutory Instruments that we are increasing toll*

*fees because of this and that. So, you also consider the socio-economic constraints in Zimbabwe, are people able to pay ZW\$82 to pass through a tollgate so that we buy the US\$1 to repay to Group Five?”*

The situation presented above clearly demonstrates some of the hinderances to private sector's willingness to finance public infrastructure in Zimbabwe. There is no supporting legal and policy framework for attracting innovative financing mechanisms into Zimbabwe's transport infrastructure. Evidence from the data collected does not exhibit an uptake of private resources in public transport projects. Moreover, innovative financing is also not currently being used for financing major infrastructure projects in transport sectors such as road transport, railway, and air transport. The closest case of the usage of innovative finance in the form of PPP reported in the study was the Plumtree-Harare-Mutare road project, which was mistakenly classified by key informants as having been financed through a PPP. Therefore, no transport infrastructure was financed using PPPs in Zimbabwe during the period under study.

PPPs have however been found to be successful in financing transport infrastructure in developing countries after their resounding success in developed countries (Olusola and Perera, 2017 and Osei-Kyei and Chan, 2016). South Africa has reportedly been able to successfully finance the development of major highways using PPPs, such as the N4 toll road connecting South Africa and Mozambique (Maputo corridor) (Osei-Kyei & Chan, 2016). Nigeria has also successfully financed transport infrastructure using PPPs, with the most outstanding success story being the Lekki toll road concession (Osei-Kyei & Chan, 2016). During the period under study, no railway infrastructure was financed using innovative finance in Zimbabwe. Similarly, no air transport infrastructure was financed using innovative finance. The rest of the other innovative financing mechanisms, besides PPPs, have not been used in Zimbabwe and no literature was reviewed that showcased their success stories in developing countries.

Zimbabwe's transport infrastructure has been failing to attract private sector resources into public infrastructure as the leading countries in the SSA region have been found to be South Africa, Ghana, Kenya, Ethiopia, and Nigeria (Gutman, et al., 2015). Given the potential

success of financing transport infrastructure using innovative finance in the form of PPPs, Zimbabwe must pursue innovative financing of the transport infrastructure, especially using PPPs, given that there is a law meant to support the private financing of public projects including infrastructure. This is according to a study to assess the factors affecting the successful implementation of PPPs in developing countries, namely financial, economic, political, legislative and management prerequisites (Kang, et al., 2019). Zimbabwe should ensure that there is a framework to support the use of innovative finance in general and specifically PPPs in the transport infrastructure sector. The following section presents and discusses results on the potential of innovative finance closing or mitigating the financing gap in power/energy infrastructure in Zimbabwe.

### **8.3 Innovative financing of Power/energy Infrastructure**

Power/energy infrastructure development in Zimbabwe has been financed using bilateral loans obtained from China's Exim Bank, infrastructure bonds, commercial loans, development assistance grants and treasury/budget appropriations. There is also private sector participation in the generation of electricity, whereby investors are licenced by ZERA and enter into power purchase agreements with the sole distributor of electricity ZETDC before they can produce electricity and feed it into the national grid. Contributions by the private sector have been found to be low and are currently financing the development of small hydro-electric and solar projects (renewable energy). The scale of private power projects is indicative of the private sector's diffidence to commit substantial investments as they could still be testing the sustainability of running a power generation business that cannot sell electricity to the ultimate consumers. This business model is unlike private sector businesses that believe in competition in the market. Thus, there is need for liberalising the entire value chain so that investors have alternatives of either investing into power generation and/or power distribution.

An examination of the major power infrastructure projects that have been undertaken shows some innovation, especially in the way a variety of financing instruments were combined to achieve the financing requirements of the projects. Expansion of the Kariba South power station was mainly financed through a concessionary loan from China Exim Bank to an amount of US\$320 million. The IDBZ issued infrastructure development bonds and used



US\$38.8 million of the proceeds for the same project to unlock the China Exim Bank financing and a loan of US\$150 million was raised from Standard Bank, repayable through sale proceeds of electricity to Nampower. There is innovation in the way the various financing instruments were combined to finance one project. Moreover, the financing obtained from Standard Bank-Nampower entailed innovation in that it has risk mitigation strategies embedded in the financing arrangement. This project may therefore be concluded as having been financed using innovative financing.

The Hwange thermal power station is still under expansion and the main financier is China Exim Bank. In addition, there are also finances from the Indian Exim Bank, with the Afrexim Bank and Standard Bank also advancing loans. The grand total financing for the Hwange project is about US\$1.6 billion. This is a huge amount that the Government of Zimbabwe had no capacity to finance from treasury/budget appropriations. Therefore, there is innovation in the way the various financiers jointly financed this project. Innovations in the combination of different financing arrangements and mechanisms can also be classified as entailing innovative financing. For the Kariba and the Hwange expansion projects, there was a combination of private sector finances with bilateral financing arrangements, which are therefore classifiable as innovative finance based on the definition by the OECD (Sandor, et al., 2009).

In terms of the typically classified innovative financing mechanisms, there is no power/energy project that was financed using innovative mechanisms during the period under study. The major reason observed by the researcher could be the lack of access to the market for power generation businesses. There is only one proposed project likely to be financed partly through a PPP, which is the Batoka hydroelectric power station which entails the building of a dam and subsequently the power station. The project is indicated as going to be financed through a PPP with General Electric (GE), an American private sector company, leading amongst many other financiers that have indicated interest to finance the project, namely China Exim Bank, the World Bank, African Development Bank, and the DBSA (AU-PIDA, 2020). The power project is proposed to be implemented as a BOT arrangement. The possible reason for the attraction of the PPP and other multilateral financiers is that the project is jointly run by

the Zimbabwean and Zambian governments, which have shared risk. Thus, the risk associated with financing such a project could have been mitigated by the participation of the two governments through risk sharing. However, Zimbabwe is failing to attract meaningful private sector resources into power infrastructure financing.

Zimbabwe is one of the many African countries that are failing to attract innovative finance to mitigate their public infrastructure financing gaps. Other countries facing challenges using innovative finance include Uganda (Mawejje & Munyambonera, 2017) and Ghana (Badu, et al., 2012). Ghana, on the other hand, is known to be among the leading countries in Africa in terms of being attractive to private capital (Gutman, et al., 2015). Power has been observed to be attracting the largest amount of private sector financing when compared to other sectors in Africa, as highlighted by the African Development Bank, showing that it attracted 11 out of the 17 PPP deals in the whole of Africa during the year 2016 (AfDB, 2018). This shows that in Africa, power infrastructure financing was attracting the biggest number of innovative financing deals.

One of the possible reasons for the poor attraction of private sector capital into financing power infrastructure, besides regulatory/sovereign risk as highlighted earlier, is corruption. There have been reported cases of corruption involving the possible financing of public infrastructure projects by the private sector in Zimbabwe (AfDB, 2011). Cases that are constantly mentioned include a US\$200 million Gwanda solar project which was a case of high-profile corruption where tenders were awarded on a political basis rather than the technical and financial capability of the private sector entities (Zimbabwe Independent, 2018). There are also reports of private sector investors that were requested to pay bribes to Zimbabwean government officials before there could be awarded contracts to provide infrastructure projects, including the financing thereof. The cases of alleged corruption and bribery have a negative effect on private capital (AfDB, 2011).

Given the corruption allegations in the procurement of public infrastructure financing deals, this has the potential to become a major stumbling block in attracting the private sector to partnering with the Government of Zimbabwe in the financing of public infrastructure.

Corruption is a major risk that private capital does not want to be associated with (Wagenvoort, et al., 2010). To attract private sector capital, the Government of Zimbabwe has embarked on a reformation of the legal framework. Thus, in pursuit of private sector and innovative financing mechanisms, the Government of Zimbabwe had initially enacted the Joint Ventures Act (Chapter 22:22) in 2016 and after failing to attract meaningful private sector investors into joint ventures with the public sector, the Act was repealed in 2020. The Joint ventures Act and other related Acts were replaced by the Zimbabwe Investment and Development Agency Act (Chapter 14:37) in 2020.

The legislative reform shows the importance of private sector resources in the achievement of government objectives such as the provision of infrastructure, given the dearth of resources to meet the financing requirements of the government (Mostafavi, et al., 2014). There is need for more private sector investments in power in Zimbabwe and other countries in the SSA region since this is the electricity power-poorest region of the world (ACBF, 2016). In the region, an average of just above sixty percent of the population having access to electricity (World Bank, 2017). Given the power gap, it is important to ensure that there is a framework to support the private sector and innovative financing of power infrastructure. The following section presents and discusses results on the use of innovative finance in water and sanitation infrastructure provision in Zimbabwe.

#### **8.4 Innovative Financing of Water and Sanitation Infrastructure**

Water and sanitation infrastructure in Zimbabwe are mainly financed from treasury through the public sector investment programme, particularly for the construction of water bodies such as dams. For potable water supplies in towns and cities, there has been a combination of various financing sources and instruments. The AfDB's administered multi-donor Zim-Fund financed the improvement of water treatment and distribution works through development assistance grants in town and cities, including Harare, Kwekwe, Mutare and Masvingo (The Standard, 2020). The creation of the Zim-Fund was in response to the cholera outbreak in Zimbabwe in 2008 (The Standard, 2020). An examination of the financing arrangement is innovative because since the donors who partnered to create the Zim-Fund are not cooperating, there was need for innovative financing arrangements that has been financing

water and sanitation infrastructure on a multi-year basis (Sandor, et al., 2009). The fund has been in existence since 2010.

The ZIMREF, administered by the World Bank, also development assistance grant-financed water and sanitation infrastructure in several smaller growth points across Zimbabwe, including Lupane, Gutu, Nembudziya and Madziwa among others (ZIMREF, 2020). These finances were provided through grants from development partners after challenges in the provision of potable water had been observed in these places. There is also innovation in the use of development assistance through the creation of an innovative trust fund which has helped in mitigating potential humanitarian disasters resulting from poor access to potable water in Zimbabwe (Sandor, et al., 2009). This fund was created in 2014 and was likely motivated by the continual recurrence of water-borne diseases in Zimbabwe, such as cholera.

The infrastructure financing obtained through grants were supplementary to treasury financing and own resources, such that municipalities and the central government had financed water and sanitation infrastructure in Zimbabwe. In rural areas, development partners are also active in financing the development of water and sanitation infrastructure. UNICEF has been actively drilling boreholes and refurbishing defunct boreholes and piped water schemes in order to increase access to water and sanitation (UNICEF, 2020). UNICEF is accessing donor funds that should have been directed through the Government of Zimbabwe but due to the poor relations between Zimbabwe and the donor countries, the donors are deciding to finance the projects off the budget. There is evidence of innovation through which the public infrastructure sector accessed developmental assistance grants from the few donors that are still financing infrastructure in Zimbabwe.

The definition of the concept of innovative finance entails a mixture of specifically designed instruments and practices for augmenting conventional approaches and sources of financing in order to achieve international development goals (Heinrich-Fernandes, 2019; Elmer, et al., 2018 and Mostafavi, et al., 2014). This innovative finance has been exhibited through the way development assistance has been accessed in financing public infrastructure. However, the amounts being accessed are negligible given the infrastructure financing gap in the water and

sanitation infrastructure sector in Zimbabwe. Thus, the extent of the magnitude of the challenges faced in Africa and the other developing countries including Zimbabwe far outweighs the public and philanthropic resources allocated to these challenges (Tomalty, 2007). There is therefore scope for doing more to attract innovative financing mechanisms in the financing of water and sanitation infrastructure.

The lengthy time taken to complete water infrastructure financed by the government is a good reason to consider the liberalisation of the supply of water and sanitation services. Such liberalisation should make the water and sanitation infrastructure sector attractive to private sector investments, or for partnering with the public sector through innovative financing of water and sanitation infrastructure. For instance, key informant F1 cited the existence of opportunities that require financiers, but there may be challenges in reaching consensus between the government and the private sector as highlighted below:

*“I am sure you have heard about Kunzvi Dam which always remains in the pipeline simply because the funding has not been confirmed and it is only when you confirm funding that you put it on the investment plan.”*

There are challenges in the provision of potable water in almost all the major towns and cities in Zimbabwe. Moreover, the waste management systems in most towns and cities in Harare are below standard. These present opportunities for the private sector that may be available for financing by them.

However, water and sanitation infrastructure are more social infrastructure in nature than economic and as a result, it is challenging to either commercialise or privatise the provision of water and sanitation services. Therefore, the private sector may not be interested in financing social infrastructure unless they are financing such infrastructure as part of their corporate social responsibility (CSR) activities. The financing of public infrastructure development through CSR activities is not sustainable for the long-run and therefore may not be considered suitable according to the definition of innovative finance, unless the public sector has strategic partnerships that guarantees continuity in the provision of finance (Sandor, et al., 2009).

To make water infrastructure attractive to the private sector requires creativity and innovation by constructing water bodies such as dams in strategic locations where hydro-electricity generation plants can be developed (Salman, 2016). This had led to the Batoka Gorge dam project attracting private sector and other multilateral financial institutions. Similar inferences can be drawn for the Grand Ethiopian Renaissance Dam currently under construction, which was primarily financed using innovative finance with Ethiopians in the diaspora subscribing to bonds issued by the Ethiopian government and crowdfunding from local Ethiopians who were convinced to invest part of their income into the dam project (Tawfik, 2016). China financed the power generation equipment for the hydro-electric power plant to be installed at the dam. The total cost of the dam is expected to be about US\$4.8 billion, with about US\$3 billion being financed using innovative finance (Salman, 2016).

Lessons can be learnt by Zimbabwe on how to make infrastructure financing attractive to private sector investors and to innovative financiers. The development of multi-faceted water bodies can attract private capital as highlighted by Grigg (2019), as the water bodies are used for other economic activities with commercial capability and which enhances the value of the water body, which in turn can be regarded social infrastructure. The following section presents and discusses results on the potential use of innovative finance in the development of ICT infrastructure in Zimbabwe.

### **8.5 Innovative Financing of ICT Infrastructure**

The ICT infrastructure provision sector in Zimbabwe is dominated by the private sector, with the public sector playing a market follower's role. Given the presence of both the private and public sector in this infrastructure sector, it is possible and ideal to combine private sector resources and public systems in order to enhance efficiency in the provision of ICT services. There are no projects that have been financed using innovative ways during the period under study, yet the ICT sector is expected to be leading in innovations, including financial innovation. ICT infrastructure controlled by the public sector was financed using treasury resources, retention funds and/or bilateral loans from the China Exim Bank whilst the private players have accessed financing from offshore commercial loans. The financing arrangements were revealed by all the key informants, who however stated that the main financiers for

infrastructure in the sector were development partners, yet no public records were available to substantiate that claim.

The relationship between the private and public players in the ICT infrastructure sector is seen as being more that of competitors than complementors. This was highlighted by key informant ICT1 who said, “If we look at fibre the private players, we have, are competitors to Telone e.g., Liquid Telecoms. They do not bring funds to the Ministry, but they finance their own projects which are run parallel to the government”. The insinuation of projects running parallel implies that there is no cooperation between the players in the sector. This could be one of the reasons for the unavailability of innovative financing of infrastructure in the sector. Yet, there is need for collaboration between the public and private players in the ICT infrastructure sector in order to mitigate the financing gap in the sector and to improve the available ICT infrastructure for economic development in Zimbabwe.

The challenge that was observed for infrastructure projects- delays in completion for infrastructure financed through treasury finances- was also observed in the ICT sector, as noted by key informant ICT1 who said, “The works we do they extend the projected completion date and it’s a major setback. Most projects are affected by that for example a project will be projected to be for 6 months, but it ends up extending to 2 years or so, so it affects everything”. The nature of the industry requires the completion of projects in the shortest possible time before technologies have evolved further. This therefore presents an opportunity for collaboration between the public sector and the private sector. ICT projects are of strategic importance to the country because if delayed, the country is negatively affected by the poor financing mechanisms. The following section discusses the results presented above in the context of established theoretical frameworks and other studies that have been conducted before.

## **8.6 Overview of the use of innovative financing of public infrastructure in Zimbabwe**

The extent to which the private sector has been financing infrastructure projects has not been uniform across all sectors, with some sectors attracting much less private sector financing than others. Notably, water and sanitation infrastructure financing in Zimbabwe receives

insignificant to no private sector financing, an observation similarly made by Bationo, et al. (2018), who observed that only 7% of the total private sector financing of infrastructure in Africa during the decade leading to 2017 was invested in water and sanitation. This is despite the presence of many glaring financing opportunities for projects that have imminent demand and an acceptable return likely to be achieved only if the customers are willing to pay. This is the main challenge related to investing in projects that are more social than economic. Due to the low private sector financing, there is a likelihood of the innovative financing of water and sanitation being low to none.

China's presence in the financing of infrastructure in Africa, and particularly in Zimbabwe, is strategic as China is taking advantage of the vast unprocessed natural resources that are necessary for their manufacturing industry (Gutman, et al., 2015). Therefore, financing arrangements/deals for infrastructure financing are negotiated at a political level, that is, at a head of state level and therefore, no other private sector player can compete in projects that involve China Exim Bank or be able to win the contract. There is need for fair play in order to attract meaningful private sector partnerships with the public sector.

Corruption and the perceived sovereign risk attributable to Zimbabwe are a major hurdle in attracting financiers from the international arena. Key informant F1 highlighted the effects of the risk when he said, "...Also note because of the fiscal risk of the country, the private sector has not come in a big way to fund some of our critical infrastructure, so the burden is always on the government to fund those." Thus, Zimbabwe is not one of the countries in the SSA region that is known for attracting private sector financing, where South Africa, Ghana and Nigeria are amongst the leading countries (Gutman, et al., 2015). The risk has been exacerbated by the after-effects of the land reform which happened in the early 2000s, which remains a watershed in relation to the protection of investments. This was also highlighted by key informant F1 who stated that after the land reform, the Government of Zimbabwe has literally been abandoned by international financiers so that the government has had to finance the major projects using their own resources and a few Asian financiers that include China, India and other smaller countries (Gutman, et al., 2015).



The Government of Zimbabwe in their investment plans prepared annually by the Public Sector Investment Programme (PSIP), a department in the MoFED, shows that the main sources of financing that have been reported during the past three years according to key informant F1 have been financed through treasury (funded from taxes), loans, grants and other international financiers, of which China is leading (ACBF, 2016). There are no estimates about the use of innovative finance for financing public infrastructure in Zimbabwe. The major innovation that has been witnessed was the change from traditional financiers that included international development financial institutions like the World Bank and the AfDB to focus on non-conventional financiers, which includes focusing on the Asiatic financiers, with China taking a leading role.

Other innovative financing mechanisms that have been used by the government have been sporadic and the data about their contributions to the financing of public infrastructure remains evasive and is not reported in the financial reports. Diaspora bonds were issued by the CBZ Bank on behalf of the Government of Zimbabwe, but how the proceeds were applied is also not reported in literature. These diaspora bonds represent an important source of finance for public infrastructure (Akkoyunlu & Stern, 2012). For instance, water and sanitation was financed through crowdfunding after cholera outbreaks in Harare (TECHZim, 2018) and the amount of finance raised and how it was used is not reported by the public sector entities, such as municipalities that received the finances. Poor accountability could be another contributor to the poor participation of the private sector in Zimbabwe for financing public projects such as public infrastructure. Transparency is a key factor supporting innovative financing in the form of PPPs and therefore, to attract innovative finance, it is important to improve on accountability and financial transparency (UNDP, 2019).

Developed countries have successfully utilised innovative financing for financing their development of infrastructure and PPPs have been leading in the financing of public infrastructure (Carbonara and Pellegrino, 2014; Noman, 2017). Therefore, the question of innovative financing's capacity to close the public infrastructure financing gap in Zimbabwe is out of bounds. Rather, the question is about the readiness and the existence of a supportive

framework for attractive innovative finance. This remains a challenge, but the government has provided the legal framework, which however is yet to be fully implemented.

## **8.7 Chapter Summary**

The chapter has presented and discussed results on the extent to which innovative financing is currently being used to finance public infrastructure in Zimbabwe. The results have shown that in sectors such as power/energy, transport and ICTs, no infrastructure project has been financed through innovative financing instruments such as PPPs. There are however instances whereby a variety of financing instruments and sources are used in an innovative manner, which amounts to innovative financing. Innovative financing entails the amalgamation of private resources, especially financial resources with public systems such as the provision of public infrastructure as well as the development of new ways of using and/or combining conventional financing mechanisms (Mostafavi, et al., 2014; O'Brien and Pike, 2015; Keohane and Madsbjerg, 2016; Chen and Bartle, 2017 and Bayliss and Van-Waeyenberge, 2018).

The water and sanitation sector, despite presenting opportunities that private sector financiers may be willing to invest in the sector, continues to face financing challenges. The possible reason for such is the bottlenecks created by the legislation in Zimbabwe. For instance, all water resources on the surface and underground are legally controlled by ZINWA (AfDB, 2011), therefore any financier for water infrastructure projects immediately ceases to have control over the dam that they contract once there is water in that dam.

To attract innovative finance, there is need for a supporting framework that includes regulations and policies that guarantee investments protection (UNDP, 2019). This represents one area where Zimbabwe is negatively perceived as being unable to guarantee investment protection, with the case of the land reform of the early 2000s always cited. The Government of Zimbabwe should ensure that investments by both local and international investors are protected through the enactment and implementation of investor-friendly laws and policies. Once there is security of investments and corruption is eliminated, then Zimbabwe is likely to attract private sector resource financing of public infrastructure.

Based on the results of such innovative financing as PPPs in other countries, especially in developed economies, Zimbabwe is not fully taking advantage of private sector resources to close the infrastructure financing gap. There is scope for improving participation by the private sector in the financing of public infrastructure. It must however be noted that innovative finance is not a panacea since the most developed countries continue facing challenges in financing their infrastructure requirements (Calitz & Fourie, 2010). Countries such as the USA continued to have their infrastructure being classified in the D+ grade, which shows that the infrastructure is deficient (ASCE, 2017). Therefore, resources will continue being scarce and the infrastructure financing gap cannot be closed completely but rather can be mitigated when public and private resources have been pooled together in a mutually beneficial way.

The following chapter presents and discusses results on the roles played by public sector accountants and public sector accounting professionals in the financing of public infrastructure. The purpose of the chapter is to establish if there are gaps that public sector accounting professionals should fill in order to attract enough and efficient financing for public infrastructure requirements.

## **CHAPTER NINE**

### **ROLE OF PUBLIC SECTOR ACCOUNTING IN PUBLIC INFRASTRUCTURE FINANCING IN ZIMBABWE**

#### **9.1 Introduction**

The previous chapter presented and discussed results on the possibility of using innovative finance to mitigate the public infrastructure financing gap in Zimbabwe. However, it has been observed that innovative finance is not the panacea to the financing of public infrastructure in Zimbabwe but can only supplement the other sources of public infrastructure finance. This is so because infrastructure financing gaps are always increasing, including in developed countries that have been using innovative finance. Therefore, innovative financing can only mitigate the gap to levels where basic infrastructure services are available and are of an acceptable quality, improving productivity and the quality of life for citizens. In the discussion of results, it was observed that some innovative financing deployed in the development of public infrastructure have not been publicly reported. This is indicative of possible challenges existing in public sector accounting.

Given the challenges highlighted in the disclosure of public financing arrangements, it is imperative to assess the role played by public sector accounting in attracting appropriate and efficient mechanisms to finance public infrastructure in Zimbabwe. It was observed from the literature reviewed that public sector financial reporting roles are clearly outlined and guided by the International Public Sector Accounting Standards (IPSAS). The role of accountants spans from financial reporting/accounting to cost accounting, management accounting and financial management. The roles played by public sector accountants and public sector accounting practitioners beyond financial reporting are not clear. Yet, accountants are expected to be integral in the decision-making processes in organisations.

The current chapter presents and discusses the findings obtained from the interviews conducted and interpretations drawn from these results. Primarily, the role of public sector

accounting was assessed from the MoFED, which is at the epicentre of public sector accounting as they have accounting responsibility for the whole of the Government of Zimbabwe, as well as for other ministries. Moreover, these roles were assessed against the roles outlined on the job descriptions of accountants in the public sector as well as the provisions of the Public Finance Management Act (Chapter 22:19).

The chapter is outlined as follows, starting with the presentation and discussion of the roles currently being played by accountants in Zimbabwe's public sector in general, but with special emphasis on the MoFED which has national accounting responsibilities. Thereafter, the discussion gaps in the current practices are identified and discussed with a view of proffering solutions for possible improvement. Lastly, a summary of the chapter is given which re-emphasises the findings of the study. Interview results are presented first, then the results are discussed together, identifying gaps between current practices and the theoretically expected roles.

## **9.2 Roles played by public sector accountants in infrastructure financing discourse**

The study sought to establish the role played by public sector accounting practitioners before the commencement, during the execution and after the completion of infrastructure development projects in Zimbabwe. The accountant, or any other title that they may be called by, of any organisation has the primary responsibility for accounting (financially) to the external stakeholders about the affairs of the organisation. The accountant however also has internal roles that as a manager, the accountant is responsible for giving advice on the financial matters of the organisation. Therefore, the ability of the government to attract financial resources for financing public infrastructure requires the active participation of public sector accounting professionals who have accountability roles.

To establish the roles played by public sector accounting practitioners, key informant interviewees were asked questions that followed through the life cycle of the infrastructure development project. Firstly, the study sought to establish the role played by accounting staff before an infrastructure project is undertaken in relation to the evaluation of the financing decisions. Accounting staff are in three levels, starting with those in parastatal enterprises,

then accountants in the line ministries and lastly accountants in the MoFED, in the Accountant General's department. They all play different roles in the execution of public infrastructure projects. The qualifications and the duties of the Accountant General are clearly stipulated in section 9 of the Public Finance Management Act (Chapter 22:19), whilst duties of accounting officers are enlisted in section 10 of the same statute. Box 9.1 below summarises the key roles of an accountant in the MoFED of the Government of Zimbabwe.

**Box 9.1: Duties of an accountant (extract from job description)**

- Accounting and cash flow control of the Consolidated Revenue Fund including the production of monthly and yearly statement of accounts for management, audit, IMF and World Bank.
- Recording all central government public debt and contingent liabilities and ensuring timeous servicing of debt, including the creation of Sinking Funds and accounting thereof.
- To undertake financial appraisals and analysis of Parastatals and State-Owned Enterprises' performance.
- Preparation and presentation of appropriation accounts, asset returns and expenditure returns.
- Monitoring the suspense accounts and administration of short-term loans to designated statutory bodies including parastatals.
- Management and control of aid accounting, including monitoring and reporting to aid agencies on use of aid in Zimbabwe.
- Preparation of monthly, quarterly, bi-annual and yearly Consolidated Financial Statements.
- Preparation of management accounting reporting responsibilities, that is, preparation of annual and supplementary budgets, preparation of monthly, quarterly and annual budget outturns and the Fiscal monitor table, forecasting and planning, performing variance analysis, reviewing and monitoring costs.
- Coordinating management reporting, reviewing and re-engineering financial reporting including responding to questions and comments made by the IMF and World Bank.
- Monitoring financial performance, liquidity management, project implementation and making investments decisions including appraisals of financial performance of public enterprises.
- Performing all authorized SAP budget transactions, financial reports generation, financial, accounting transactions, and funds management and monitoring budget changes at regular intervals.

**Source:** Ministry of Finance and Economic Development (2020)

As shown in Box 9.1, the accountant in the MoFED has responsibilities/duties that are akin to the duties of an accountant in the private sector. The duties include, “Monitoring financial performance, liquidity management, project implementation and making investments decisions including appraisals of financial performance of public enterprises.” This duty means that the public sector accountant is expected to be actively involved in the evaluations of public infrastructure investment decisions.

Duties for line ministries and government departments are streamlined according to the operations and functions of the ministry or department. Ultimate duties are included for the MoFED accountant that encompass the responsibilities of other ministries and government departments. However, the adoption of cash-based budgeting by the Government of Zimbabwe appears to have resulted in the accounting officials in line ministries becoming bookkeepers. Thus, their responsibilities are now more bookkeeping related, whereby they request finance from treasury, which only releases money to line ministries and government departments when they have the resources in the consolidated fund and are ready to fund the paymaster general account.

When finances are released, ministries and government departments do not get extra resources for them to manage. Therefore, there is no financial management responsibility placed on the line ministry accountants as there are no excess resources that the accountants must manage and account for. This fact was confirmed by a key informant from the DDF who said, “DDF used to get its budget allocations once, at the beginning of the financial year. For example, if we budgeted for \$100 million, treasury would disburse that amount once and the financial director manages the money, but nowadays it takes time to get the money...” This observation means that accountants at the DDF are only expected to account for the disbursements made to the department. Hence financial management is only done by the accountant in the MoFED.

Despite the existence of clear job descriptions outlining the roles of accountants in both MoFED and other line ministries and government departments, the researcher observed that the accountants do not have such responsibilities as there are other departments that deal with the responsibilities usually undertaken by the accountants. The MoFED is made up of four

principal directorates, namely accountant general, non-accounting permanent secretary, fiscal policy, and advisory services, as well as chief director national budgets (MoFED, 2020). The four directorates are divided into nine departments, namely accountant general, budgets, revenue and tax policy, debt management and international co-operation departments (MoFED, 2020). The accountant general's department is responsible for the financial reporting for the Government of Zimbabwe. Therefore, accounting staff are concentrated in this department and their contribution in relation to such issues as budget formulations is limited as it is beyond the scope of their duties and there is a separate department dealing with that (MoFED, 2020). Key informant F2 said, "Even budgets are prepared by economists and accountants are considered only when it comes to monitoring of funds and preparing financial statements."

Thus, participation of accounting staff in other accounting responsibilities such as budgeting and advisory services at government level is limited. This is due to the separation of accounting duties at the MoFED into several departments. The set-up is not akin to the set-up of the finance department of the MoFED, which is responsible for the preparation of budgets for the ministry. The usual functions of accountants are decimated into several units since the MoFED has the responsibility for stewardship over national resources, resource mobilisation, accounting and allocation. Therefore, the MoFED has accountability responsibilities for other government ministries and these departments are meant to facilitate the roles for a bigger entity that must consolidate the outputs of the activities of several ministries.

Key informant F2 had the following to say when asked about the role played by accountants in the Ministry of Finance when infrastructure financing decisions are made:

*"There is sort of a balance here considering that in the PSIP most of them are economists and in the accountant general department there are only accountants. When it comes to the monitoring and evaluation department, it comprises of both accountants and economists because mostly we are looking at financial statements, monitoring of the flow of project funds. For debt, there are few accountants, and the majority are economists. There is a sort of balance though most of the decisions to ministers or secretaries are taken from economists as compared to accountants. Even*



*the top posts in the ministry are mostly occupied by economists which also brings in a sort of imbalance.”*

As shown in the quote above, public sector accounting professionals in the MoFED are overshadowed by other professionals, especially economists. This has led to public accountants failing to proffer advisory services during the evaluation of public infrastructure projects. They are also excluded from the evaluation of the financing decisions wherein public accounting professionals are expected to be technocrats who bring in technical skills about the methods that are useful when evaluating financing options/choices. The accounting/finance staff should be leading in the assessment of the financial viability and the financing methods that minimise the costs and maximise value for public money. In response to the same question about the role played by accounting staff in the evaluation of public infrastructure financing, key informant. F3, had the following to say (see Box 9.2):

#### **Box 9.2: Role of accountants in public infrastructure financing decisions**

**Question:** Which personnel is the key involved in the evaluation of project finance between finance and economic development staff?

**Response:** The setup is that you find the department is more concentrated with economics personnel. They are all economists, no accountant. It's a disadvantage because we need a mix of different technocrats evaluating infrastructure projects. That's why I was telling you about payback period because all that stuff happens but when it comes to selecting the sources of financing you look back 5 years back, how did it happen, they opted for an expensive loan like this. I think it also goes back to the issue of technocrats involved.

**Interviewer probe:** Here I want to establish the role that accountants are playing in the public sector in the evaluation of sources of financing for public infrastructure.

**Response:** I would like to believe so because like I said there is more concentration of economists than finance people. So, some of the aspects of evaluating a project it's not their area of expertise. They might know here and there but not of great significance what finance person might do. I like to believe it is also one of the symptoms to poor selection of sources of finance.

The responses from key informant F3 point out the overshadowing of accounting staff by economic staff having the possible effect of making inappropriate financing decisions for

public infrastructure projects. Therefore, key informants F2 and F3, concurred that staffing in the MoFED is skewed in favour of economic development staff (economists) rather than finance staff (accountants). This implies a notion of trying to re-name the ministry the 'Ministry of Economic Development and Finance', as the finance personnel are playing a supporting subsidiary role to the roles played by economists. Only the internal audit and accountant general's departments are headed by accountants, whilst the rest of the departments are led by economists and the permanent secretary of the MoFED is also an economist.

The results from the study point to the accounting personnel playing a supporting role in relation to the financing of public infrastructure. Thus, public sector accounting practitioners are not playing active roles in the financing decision-making processes for public infrastructure. This supporting role contradicts the expectations of certain financing arrangements for public infrastructure. For instance, if public infrastructure is financed through PPPs, there are expectations that accounting staff will be actively involved. One of the critical success factors for PPPs is the selection of partners for infrastructure development partnerships which must be anchored on the concept of value for money (OECD, 2012). Accountants, being the financial custodians, must be actively involved in the selection of financing partners that ensure that value for public money is achieved. Therefore, public sector accountants in Zimbabwe are lagging in supporting the selection of financing partners that enhance value for public money.

Moreover, the successful financing of public infrastructure requires that the budgeting processes be transparent for purposes of minimising risks such as fiscal risks and procurement related risks like corruption (OECD, 2012). This can be achieved if the budgeting process incorporates the views from several technocrats that add value to the parties in the budgeting process. For example, the budgeting process should include econometricians with forecasting skills, whilst the accountants are actively involved in the national budget formulation as custodians of national resources. Moreover, if accounting staff are involved their professional ethics are expected to enhance the credibility of the procurement processes. As a result, public

accountants are not relegated to performing clerical responsibilities and therefore participate in strategic decision-making for the public sector entities (Juras, 2014).

In pursuit of the public sector reforms by the Government of Zimbabwe, the current focus of the public accountants is on the preparation of financial reports guided by the International Public Sector Accounting Standards (IPSAS) (Business Weekly, 2020). The adoption of IPSAS by public entities in Zimbabwe was motivated by the revision of the legal frameworks after the realisation that there were inconsistencies in accounting practices by public entities. This led to the enactment of the Public Finance Management Act (Chapter 22:19), which amongst other changes required a change from the cash accounting basis to an accrual basis of accounting, which is supported by the IPSAS (Santis, et al., 2018). However, since the enactment of the new Public Finance Management Act, adoption of IPSAS was optional but the Government of Zimbabwe has decided to adopt the IPSAS holistically. The transition process witnessed in Zimbabwe was also observed in Thailand in a study of public universities (Upping & Oliver, 2012). This change should lead to an improvement in the quality of financial information for planning and control purposes by the management of public sector entities as observed by (Upping & Oliver, 2012).

The transition to IPSAS accounting enhances the quality of accountability and is expected to help in attracting investors, including private sector investors (Upping & Oliver, 2012). This is important for creating an environment of transparency and accountability (Jomo, et al., 2016 and IFAC, 2020). Transparency and accountability represent key issues highlighted by the UNDP (2019) as a challenge, which if absent, may render the public sector unable to attract private sector capital using such innovative financing mechanism as PPPs. A study in South Africa found that PPPs can be used as instruments for enhancing accountability and transparency since the private sector entities involved would always require full accountability for the resources provided (Fombad, 2014).

It is most likely that the current financial reporting practices by public sector entities in Zimbabwe are failing to attract the required PPP investments into public infrastructure, a fact that was also observed by Fombad (2013) in South Africa. Therefore, more is expected for

the private sector to be confident in the transparency and integrity of the public sector accounting systems in Zimbabwe. The cases of alleged corruption that have been publicly reported in relation to the awarding of public infrastructure tenders, which include the Gwanda solar project (The Herald, 2019), point to the possibility of public sector accounting not taking leading roles but just supporting roles. The allegations of anomalies in procurement processes in relation to public infrastructure financing could be contributing to public sector failure to attract the confidence of the private sector in Zimbabwe.

Besides public sector accountants participating in the project selection and financing selection highlighted in the discussion above, they are expected to fully disclose all fiscal implications of the financing of public infrastructure, including any underlying contingent liabilities (Jomo, et al., 2016). This is not adequately disclosed in Zimbabwe, especially in relation to the financing of most public infrastructure using concessionary loans obtained from China Exim Bank. Published consolidated financial reports by treasury do not disclose enough detail on the fiscal implications of the financing arrangements for public infrastructure investments. This is likely to be a result of the austerity measures introduced by the Zimbabwean government in 2019, which Tan, et al. (2019) and Heald and Hodges (2015), submit enhances the likelihood of motivating governments to conceal risks and guarantees, making the comparability of financial reports difficult and meaningless. However, professional accountants should safeguard against such concealment and ensure that the financial statements prepared are informative to all stakeholders and users of the financial statements (IFAC, 2020). Financial reports should provide information such as the efficiency and effectiveness of service delivery resources at the disposal of public sector entities for future expenditure (IFAC, 2020; Santis, et al., 2018). There are gaps that require filling in order to make public sector financial reporting in Zimbabwe meet the expectations of investors, including private sector investors. The following section presents and discusses such gaps.

### **9.3 Gaps identified in the roles played by public sector accountants**

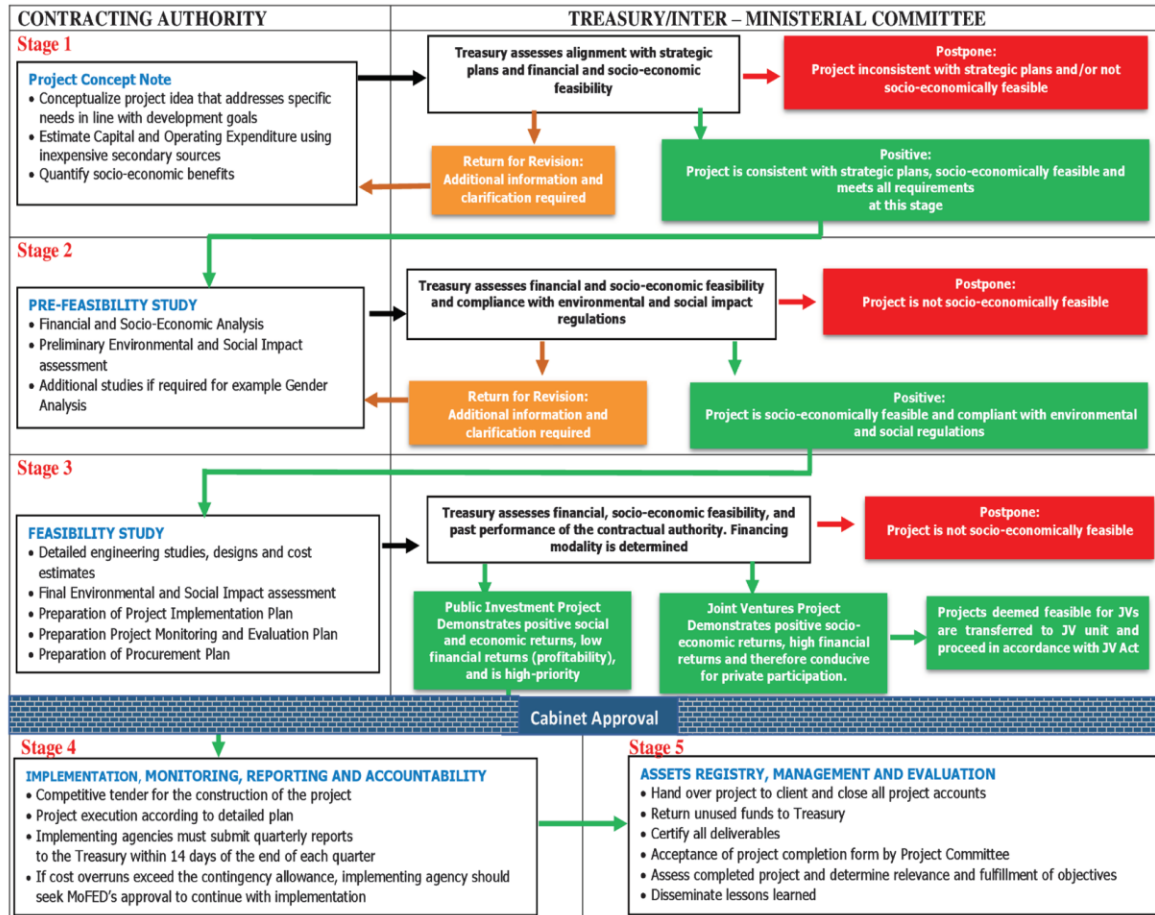
After establishing that public sector accountants were participating in public infrastructure financing decision-making processes to a limited extent, the researcher sought to establish some gaps likely to be leading to this limited participation. Accordingly, the researcher made

some inferences based on observations during the data collection process, where some accountants were initially eager to be interviewed but when they requested the interview questions in advance of the interview, started being evasive. It is the researcher's interpretation and submission that some of the accounting staff may not be adequately skilled to deal with the technical expertise expected of them during the evaluations of public infrastructure financing options. To corroborate this interpretation, the researcher browsed through and examined current and past academic and professional curricular focusing on the areas of emphasis in the training of accountants and established that it was more tailored to private sector accounting. For instance, accountants studying both professional and academic qualifications do not study modules focusing on public sector financial management, where accountants are expected to obtain skills for investment appraisals and financing decisions in the public sector. This is despite the importance of both management accounting and financial management in decision-making by management in both private and public sector entities (Paulsson, 2012; Juras, 2014). Therefore, there appears to be a knowledge/skills gap in public sector accountants that is limiting their participation in infrastructure financing decision-making processes.

In addition to accountability, public sector accounting is expected to champion sustainability through championing and participating in environmental and sustainability reporting (Schaltegger & Zvezdov, 2015). There is therefore a gap in that public sector accountants in Zimbabwe are not active in relation with sustainability accounting and reporting. The only public entity that publishes sustainability reports is TelOne (Pvt) Ltd, a parastatal entity in the ministry of ICTs and courier services. Financial reports for the Government of Zimbabwe presented and prepared by the MoFED do not report on sustainability issues, yet sustainability is important in relation to infrastructure projects. For instance, when the Government of Zimbabwe engages China Exim Bank to finance the development of thermal power stations, sustainability in terms of the environment and society must be considered. This has been motivated by the need for ensuring that the construction industry is responsive to the need for sustainability in their operations (Siew, Balatbat, & Carmichael, 2016). Therefore, the technology used in the construction of the power station as well as the power generation technologies should be sensitive to the environmental sustainability requirements.

Public sector accountants in Zimbabwe are therefore not actively advocating for sustainability reporting and their reports must fully disclose the sustainability of various infrastructure projects financed by treasury or any other financiers engaged by the Government of Zimbabwe. As a result, tools for assessing and reporting sustainability for infrastructure assets must be developed for the purposes of measuring progress towards the attainment of sustainability goals. The sustainability reporting requirements differ for infrastructure based on the sources of financing, with some financiers and investors more interested in sustainability than others. For example, green bond investors would be more interested in the public sector providing sustainability reports for their infrastructure projects (Siew, Balatbat, & Carmichael, 2016). A study by Schaltegger and Zvezdov (2015), however, established that accountants are not usually involved in sustainability accounting practices but rather act more as gatekeepers instead, a view supporting practices by public sector accountants in Zimbabwe.

Once the infrastructure financing decisions have been made, the expected roles of accounting personnel are outlined in the Public sector investment guidelines in what is called the public sector investment cycle. The guidelines have five stages and public sector accountants are expected to participate throughout the stages but as has been observed in the results presented above, their participation is very limited. The roles played by the accountants are separated between the line ministry accountants and the treasury accountants. The line ministry/department accountants are expected to provide financial advisory services to the project teams set up for the infrastructure projects. This fact was confirmed by key informants in the study. For example, key informant ICT1 said, “Our finance guys take that supporting role if funding is done in certain ways, this is their language. They are mainly on the advising side as they are involved.” A schematic presentation of the stages of the public investment management cycle extracted from the public sector investment guidelines are shown in Figure 9.1:



**Figure 9.1: Public Investment Management Cycle (Source: MoFED, 2017)**

At every stage of the public investment management cycle, there are roles that must be undertaken by accountants. For example, at stage 2, the treasury assessment of financial feasibility is a role that accountants are expected to undertake, but since the deliberations are between the user ministry and the PSIP, a function in the budgets department, accountants are not involved, except if they are in the PSIP department. There is a gap as identified by key informants of a staffing imbalance in the MoFED that results in public sector accountants being excluded from active participation by reason of departmentalisation and certain departments being charged with certain responsibilities.

The purpose of the Public Investment Management Guidelines is to enhance efficiency and effectiveness in the management of public investments in order to achieve value for public money (MoFED, 2017). Value for money is better achieved where there is accountability in

various forms which helps stakeholders in making informed decisions about whether to invest or not, for both private sector investors and governments. For public sector accounting, this role is emphasised by Schaltegger and Zvezdov (2015), who reinforce that informed decisions by managers rely heavily on the judicious preparation and interpretation of information, a proficiency expected to be provided by accountants and practitioners in the accounting profession. Similarly, Ball (2011) submits that financial reports and the accompanying disclosures complement each other in eliminating information asymmetry between entity management and other entities who contract with their entity, such as shareholders, providers of finance, customers, employees, and suppliers. Therefore, public sector entities in Zimbabwe should endeavour to have guidelines that enhance the decision-making processes of managers. The public investment guidelines are a useful tool to achieve that, and all public sector entities should be encouraged to adopt these guidelines.

Some infrastructure projects undertaken by line ministries, government departments and parastatal enterprises are implemented through project teams set up for that purpose. Accountants are usually not considered part of the core project team but are only consulted when it comes to the financial aspects of the projects. Moreover, there is no standardised procedure regarding the implementation of projects through project teams. The use of project teams was highlighted by key informants from the Ministry of Energy and Power Development, where key informant EN said, “The implementation does not include staff from the ministry. What happens is that the ministry is only involved in the initial stages where we will be looking at the relevance of the project. So, the actual implementation of the project is done by our implementing partner.” Whilst the same procedures can be gleaned from the response by key informant F1, who said, “... During implementation, there is an implementation department at the MoFED and there is a monitoring and implementation department from the Office of the President and Cabinet... At the implementation stage, we are the main player in terms of disbursement and going out as part of monitoring and evaluation but the main player in terms of the implementation is the implementing entity.” These responses show a possible gap in that the project teams set up in parastatal entities may not have support from the government if the ministries are acting as independent observers



who only monitor progress and are not actively involved in infrastructure projects implementation.

The lack of standardised procedures for undertaking public infrastructure investment projects is a serious challenge. Despite the existence of the public sector investment guidelines highlighted above, it is paramount to have a standard set of guidelines applied in the evaluation of public infrastructure projects, including evaluating financing alternatives. Such guidelines may amount to a framework, which is the aim of this study. All interview key informants did not refer to the investment guidelines and as a result, the guidelines appear to be used by the MoFED only, yet they are supposed to be uniformly applied in all government ministries and departments, as well as parastatal enterprises. Only key informant ICT2 could refer to the public sector investment guidelines. This supports the lack of uniformity in procedures for making public investments. Responses given by the different key informants were inconsistent and therefore were the basis for the identification of the gap in the participation of public sector accountants in the financing decision-making process for infrastructure projects. Box 9.3 below highlights some of the responses from the key informants.

**Box 9.3: Key informant responses on the existence of a framework for financing**

Response from key informant EN, from energy and power development ministry:

“As a ministry, we do not have a framework as such but what happened recently is that through the aid from World Bank, we developed what we call a project implementation manual and that, manual if finalised, will be the standard tool to use.”

Whilst key informant ICT2 said:

“yes, different frameworks are used by different operators or stakeholders”

Key informant F3, from MoFED also said:

“Yes, there is a framework that was formulated with the help of World Bank, I don’t remember the name but will look for it. It has everything and it’s like a booklet in terms of evaluation of the processes of infrastructure investments.”

The variations in the responses by study participants are indicative of gaps in the procedures for evaluating public infrastructure financing decision-making processes and are hence a

likely reason for the limited participation by public accountants in the process. The existence of a framework for public infrastructure financing would ensure that there are clearly laid down evaluative procedures that accountants would be expected to undertake during the infrastructure financing process.

As part of the public sector accounting and accountability reforms, there is need for establishing a robust whistleblowing mechanism in order to deal with corruption in the public sector. There are guidelines about whistleblowing, but their implementation is weak. This is supported by some cases of corruption in the awarding of public infrastructure projects which have not been prosecuted despite the existence of glaring evidence in the non-performance of the work contracted out. The challenges of weak whistleblowing mechanisms in Zimbabwe are consistent with observations by Okafor, et al. (2020). Accountability challenges in relation to corruption and fraud can be addressed by deploying whistleblowing mechanisms (Okafor, Adebisi, Opara, & Okafor, 2020). Whistleblowing, however, has challenges in developing countries as a mechanism for enforcing accountability as there is danger of physical harm to the whistle-blower. Highlighted above are some of the gaps in the practices that have motivated the need to develop a framework for public infrastructure financing in Zimbabwe. The following section therefore discusses the results of the study in view of the expectations from literature.

#### **9.4 Chapter Summary**

Given the results presented and discussed above, it appears that public sector accounting practitioners in Zimbabwe have not been actively playing major roles towards supporting the financing of public infrastructure. This has led to the public sector failing to inspire private sector confidence in financing public infrastructure projects. As a result, financing challenges have been perpetuated and therefore more reforms in public sector accountability are necessary in order to ensure that private capital is attracted to the public sector in Zimbabwe.

At the apex of public sector accounting, that is, at treasury, there is need for ensuring a balance in staffing so that public infrastructure investments are evaluated and reviewed from the perspectives of varied technocrats. Departments that deal with public investments appraisals,

as well as those that evaluate financing suitability, must be appropriately constituted with staff having economic and financial expertise. This enhances the value for public money as infrastructure projects are financed efficiently and effectively.

The following chapter presents results on the development of the framework for public infrastructure financing. The need for the framework was motivated by the lack of common practices in the evaluation of infrastructure financing mechanisms, as observed in the findings obtained in the preceding chapters but also emphasised in this chapter. The framework is developed based on literature reviewed in Chapter 5. The purpose of the framework is to aid the public investment guidelines that have been developed by the Government of Zimbabwe and approved in 2017 (MoFED, 2017).

## CHAPTER TEN

### FRAMEWORK FOR PUBLIC INFRASTRUCTURE FINANCING IN ZIMBABWE

#### 10.1 Introduction

The previous chapter presented and discussed results on the role played by public sector accountants in relation to the financing of public infrastructure in Zimbabwe. It has been established that accountants in the public sector are not actively involved in the decision-making processes for public infrastructure financing. Findings also revealed that public sector accounting practitioners are mostly involved in the bookkeeping and financial reporting responsibilities rather than in roles supporting decision-making in their advisory capacity. It was also established that public sector accountants are less active in relation to management accounting and financial management for the Government of Zimbabwe. Moreover, disclosure of public financial information is limited, which has resulted in the public sector failing to attract meaningful private sector investments into infrastructure.

It was also established in the previous chapter that there are public investment management guidelines that highlights the stages and processes pertaining to the management of public investments. The guidelines on the management of public investments do not highlight how financing decisions are arrived at for the public infrastructure investments. Given the impact of financing decisions on the outcome of public investments, it becomes apparent that a framework articulating the necessary stages and processes before deciding on the appropriate financing instruments and mechanism to be selected is important. Such a framework should utilise the best available skills and techniques in arriving at this decision.

This chapter therefore sets out to propose a framework for making financing decisions for public infrastructure. The proposed framework is developed guided by literature that combines studies on financing decisions with studies that consider aspects such as public investments appraisals and risk management. The proposed framework incorporates econometric regression modelling to test the significance of risk in infrastructure financing decision-making. The econometric model is used in part to estimate the amount of finance

required to meet certain future levels of infrastructure investments. The scope of the study is not to estimate the financing requirements, but to develop a framework for making financing decisions that enhance efficiency. Therefore, the process of estimating the financing amounts required is not done, but it does develop and test the model to estimate the future infrastructure stock requirements. Details of the development of the model are highlighted in the following sections.

The concepts presented and discussed in this chapter are guided by the public infrastructure financing framework proposed. The stages and components of the framework are highlighted first, followed by the presentation and discussion of model results. The following sections of this chapter present the framework developed, which must be adopted when making financing decisions for public infrastructure in Zimbabwe. The development of the framework is based on the literature reviewed, which is followed by testing of the framework based on data collected in the study.

## **10.2 Framework for public infrastructure financing**

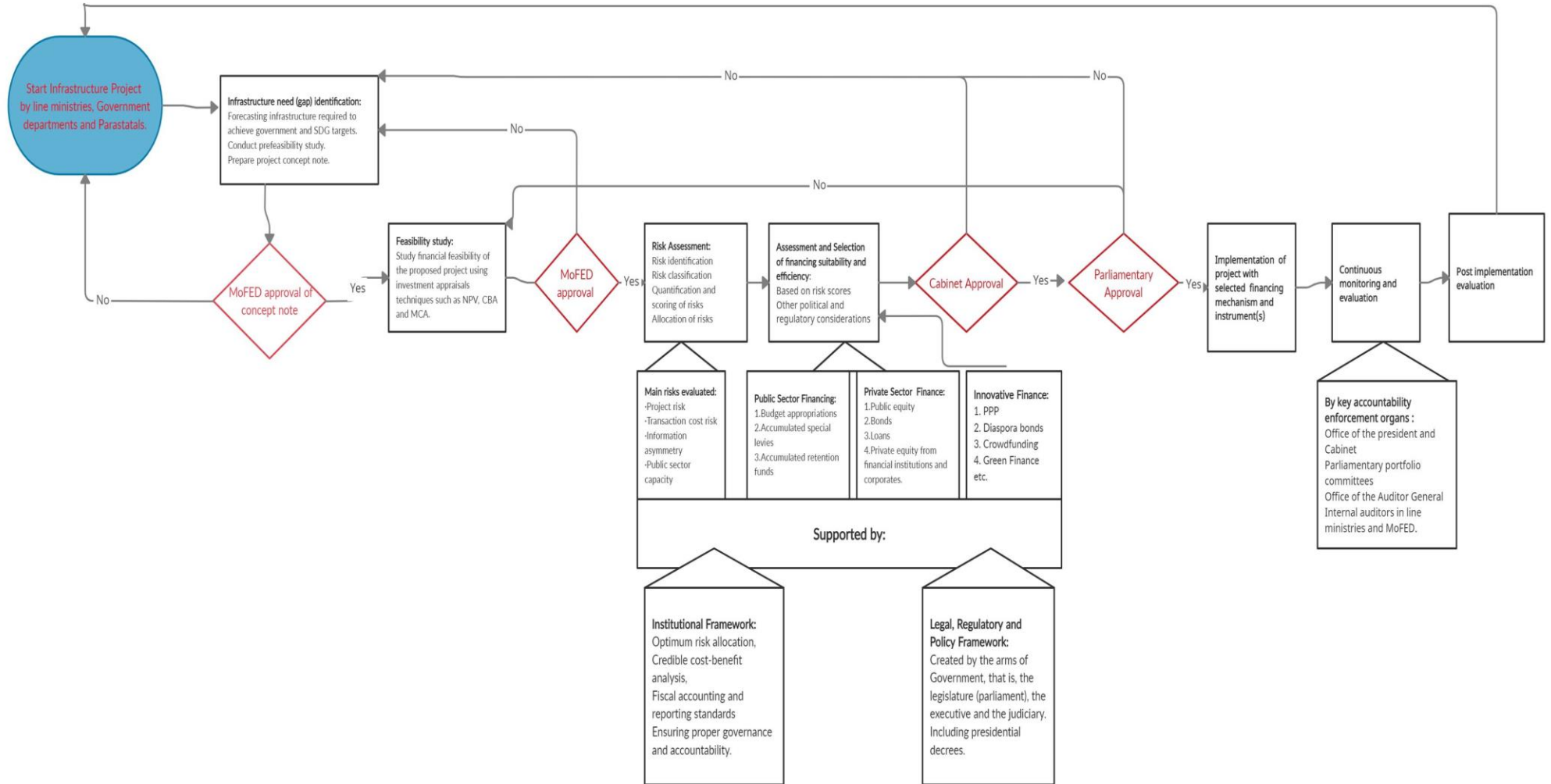
Based on the literature reviewed, the study proposes a new framework for financing public infrastructure detailing steps to be followed when making financing decisions for public infrastructure assets. The subsequent decisions and processes necessary to ensure efficiency in financing instruments and mechanism are also highlighted in the proposed framework. Thus, the focus of the framework is on the financing decision only. The following are the steps involved in the proposed framework:

- a) **Infrastructure need (gap) identification:** this stage entails the forecasting of future infrastructure needs using econometric modelling. The future infrastructure needs are informed by national economic growth and economic status targets. As part of the infrastructure gap identification, the utility or line ministry should conduct a preliminary feasibility study that assesses the basic socio-economic, environmental, and financial feasibility of the proposed infrastructure project. Identification of the infrastructure gap must result in the preparation of a concept note about the proposed infrastructure. Moreover, the infrastructure must also be appropriately classified in the concept note.

- b) **Feasibility study**- after project concept notes have been approved, the next step should be proceeding to conducting detailed technical, environmental, financial, social and economic feasibility studies. The financial feasibility study must also entail an appraisal of the projects using techniques such as multi-criteria appraisal, cost benefit analysis and value for money assessments.
- c) **Risk assessment**- this process entails the identification of all the risks associated with the proposed projects that have passed the feasibility study. This is an extension of the financial feasibility, but the focus is to guide on the selection of the financing instrument to be used in the project. The financing instruments are classified as either internal or external. The risk assessment leads to the risk scoring of projects and ultimately a ranking of the projects based on risk.
- d) **Assessment and selection of financing suitability and efficiency**- this assessment is based on the risk assessment outcomes and project ranking. The assessment also considers the political and regulatory considerations for financing choices available.
- e) **Implementation of infrastructure project using selected financing mechanism**- the recommendation is based on the preliminary stages highlighted above and ultimately, the suitability and efficiency assessment highlighted above.
- f) **Continuous monitoring and evaluation**- once the infrastructure project financing option has been selected and recommended, it is important to continually monitor how the infrastructure projects perform in terms of their adherence to set guidelines such as time and budgets.
- g) **Post-implementation evaluation**- after the completion of each infrastructure project, it is important to evaluate and assess the outcome of the infrastructure project from the financing perspective. This is important for the purposes of informing future projects so that there is continuous improvement in infrastructure financing decisions.

A schematic representation of the proposed model showing the various steps is presented in Figure 10.1

**Figure 10.1: Proposed infrastructure financing framework**



Source: Proposed by author guided by literature reviewed (2020)

Figure 10.1 presents a proposed framework for infrastructure financing which was developed based on literature and some studies that guided the development of the framework, including Camane (2013); Henn (2015); Henn, et al. (2016) and MoFED (2017). These authors have developed and published their proposed frameworks which were incorporated into the development of the framework. The development of the framework was motivated by the varied responses in the interviews conducted where a variety of responses were given regarding the process of making financing decisions for investments into the development of public infrastructure assets. The proposed stages of the framework are explained and discussed in greater detail in the following sections.

### **10.2.1 Infrastructure need (gap) identification**

It has been noted that financing decisions in relation to public infrastructure projects have traditionally been neglected and been hidden in a ‘black box’, to be unveiled after the project planning has been completed (Henn, 2015). It is however important that the financing decision is incorporated into the infrastructure project from the initial stages. This step of the proposed model is important, and the identification of the gap should be conducted using secondary data and should be least costly. Literature records that infrastructure gaps can be estimated using either the ‘top-down’ approach or the ‘bottom-up’ approach (Fay, 2000; Bhattacharyay, 2012; ADB, 2017 and Branchoux, et al. (2018). This study therefore proposes the use of the ‘top-down’ approach, which uses secondary data and has been proven useful by institutions such as the World Bank and the Asian Development Bank.

Results of using the ‘top-down’ approach in Zimbabwe are presented in the following sections. Firstly, descriptive summaries of the models are presented, followed by diagnostic tests of the models developed and finally, the results are discussed in the broader context of literature in relation to the estimation of infrastructure financing requirements. The model results only estimate the physical infrastructure stock requirements and has the capacity to estimate the monetary amounts by applying the average costs of construction and maintenance of infrastructure, as outlined by Branchoux, et al. (2018), in the following steps:



- i) Physical infrastructure requirements for the various infrastructure types are forecast using a dynamic data panel model to address population growth, the rise in urbanisation and changes in economic growth rates.
- ii) Shortages in current infrastructure are estimated using current access levels per infrastructure type.

The steps highlighted above were applied in the development of the infrastructure demand forecasting model. The model was based on studies by (Fay, 2000; Fay and Yepes, 2003; Bhattacharyay, 2012; ADB, 2017 and Branchoux, et al., 2018) which were presented in section 6.4.2.2 as Equation 6.1, and is given hereunder:

$$I_t^j = \alpha_0^j + \alpha_1^j I_{t-1}^j + \alpha_2^j y_t + \alpha_3^j A_t + \alpha_4^j M_t + \alpha_5^j U_t + \alpha_6^j P_t + \alpha_7^j t + \varepsilon \quad \text{Equation 6.1}$$

Where  $I_t^j$  represents the infrastructure stock of type j needed in the country at time t, With  $y_t$ ,  $A_t$ , and  $M_t$  representing the GDP per capita and shares of agriculture and manufacturing value added in GDP for the country, respectively,  $U_t$  and  $P_t$  representing the urbanization rate and the population density, respectively, t is a time trend, used to capture time effect, and  $\varepsilon$  represents the error term of the model.

Results from the models based on data on Zimbabwe are presented below. A total of 11 models were developed based on Equation 6.1, where the independent variables were regressed against and tested for their influence on forecasting several aspects of public infrastructure, key amongst which was the stock of infrastructure. The detailed regression model results are presented in the appendices to the thesis (Appendix 1). The summary of the regression model results is presented in Table 10.1:

**Table 10.1: Regression results summary**

Infrastructure Indicators  Independent Variables	Paved Roads	Unpaved Roads	Rail Lines	Power Consumption	Access to Electricity	Mobile Phones	Fixed Telephones	Drinking water-Rural	Drinking water-Urban	Sanitation Facilities Rural	Sanitation Facilities Urban
Lagged variable	(-.2795) .233	(.3646) .084*	(.4742) .029**	(.6652) .005***	(.1018) .707	(.5379) .047**	(.3239) .129	(-.0924) .001***	(.01813) .000***	(1.3955) .000***	(.5031) .016**
GDP per capita	(-.0003) .111	(-7.7e-06) .971	(-5.37e-06) .617	(.26502) .018**	(-.00345) .667	(.02973) .277	(-.0002) .419	(-.00001) .146	(2.2e-07) .155	(-.000097) .653	(.00003) .865
Urbanization	(-.0196) .753	(.11984) .017**	(.0032999) .198	(58.130) .079*	(-.22635) .880	(-3.1186) .426	(.03158) .608	(.085323) .001***	(-.00157) .000***	(-1.25642) .000***	(.51538) .086*
Population density	(-.0393) .409	(.00205) .971	(-.002739) .432	(-33.486) .276	(-.48838) .820	(-9.6673) .048**	(-.29777) .023**	(.04844) .000***	(-.00086) .000***	(.14181) .008***	(-.02156) .791
Manufacturing	(-.0172) .330	(.02628) .040**	(.000012) .984	(-1.1899) .841	(-.19196) .688	(-1.0095) .297	(-.03542) .051*	(-.00005) .916	(2.4e-07) .979	(-.01917) .127	(.00292) .690
Agriculture	(-.0187) .045**	(.00348) .655	(-.000424) .285	(4.4687) .186	(-.22271) .532	(-.71733) .041**	(.00324) .749	(-.00051) .355	(9.7e-06) .319	(.17893) .176	(-.00801) .436
Time (period)	(-.0041) .776	(-.03878) .005***	(.000131) .866	(-7.2208) .274	(.46954) .378	(3.5867) .002***	(.11284) .019**	(-0.6916) .000***	(-.05998) .000***	(.49654) .387	(-.16608) .000***
Constant	(12.318) .631	(77.313) .004	(-.148541) .918	(13 609.4) .269	(-877.484) .377	(-6 763.04) .003	(-215.583) .018	(1 444.9) .000	(213.36) .000	(14.861) .001	(327.04) .000
Error term	.0929	.0949	.0048	35.539	3.0236	6.3754	.1271	.0021	3.7e-05	.0541	.0691
R squared	.7192	.9748	.8837	.9106	.3887	.9819	.9531	.8913	.9178	.9997	.9995

**Notes:** Coefficients,  $\alpha_0^j - \alpha_7^j$  are given in parentheses.

The levels of significance are as follows: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , and \*  $p < 0.1$ .

$R^2$  represents the estimated variance of the overall error accounted by the individual effect.

As shown in Table 10.1, the eleven regression models show the relationships between various components of public infrastructure and the independent variables. For illustration purposes of how the model works, when the department of roads intends to develop a new unpaved road, Equation 6.1 is applied to estimate the quantity of roads needed using the coefficients shown in Table 10.1. The estimation is guided by central government targets such as the Government of Zimbabwe's target of achieving an upper-middle income economy by the year 2030 or targets set out by the UN's SDGs. It is important to note the significance of the independent variables as indicated by the notes under Table 10.1, where it is shown that the current stock of unpaved roads significantly influences the unpaved road network per 1 000 000 people at the 10% significance. At the 5% level of significance, the urbanisation rate and the manufacturing value added to GDP (%) were found to be significantly influencing the future stock of unpaved roads; whilst at the 1% level of significance, time was found to be a significant factor influencing the stock of unpaved roads. Thus, the stock of unpaved roads has been increasing over time, even without any change in the other independent variables.

The application of the model can be in the facets of public infrastructure shown in Table 10.1. The outcome of these forecasting techniques can be further applied to estimate the financing requirements and establish the gaps so that financing decisions are rationally made for enhancing the efficient allocation of scarce resources, which is a major constraint in public finance. The processes highlighted above can be applied to any sector of public infrastructure and help in enhancing infrastructure prioritisation by the governments. The robustness of the model indicates a reliable model for estimating infrastructure requirements and will therefore enhance the financing decision.

After the estimation of the infrastructure requirements, it is important to then consider conducting a preliminary feasibility study for the proposed project. The scope and depth of the preliminary feasibility study is to give an overview of the feasibility of conducting the proposed project in terms of the envisaged costs and benefits. The preliminary feasibility study informs other stakeholders about the proposed project. The information is conveyed through the concept note for the project. This concept note must sell the proposed project to all stakeholders, including those with financing responsibilities and decision powers, such as the

MoFED in Zimbabwe. The processes and procedures highlighted are meant to improve the decision-making processes and the infrastructure project concept notes must be subjected to parliamentary scrutiny, as well as public scrutiny if necessary. Project concept notes that have passed this stage must be the only projects that progress to the feasibility stage, which is outlined in the following section.

### **10.2.2 Feasibility study focusing on financial and economic feasibility**

Public financial management requires the investment of public resources (finances) into projects that have been evaluated for their capacity to enhance value for public money (Gamsakhurdia, 2013). It is therefore important to evaluate the financial and economic feasibility of public infrastructure projects for their feasibility before deploying scarce resources into unworthy infrastructure assets (Wellman & Spiller, 2012), which highlights the importance of this step of the proposed model for public infrastructure financing in Zimbabwe.

Conventionally, investments into non-current assets have been evaluated for their financial feasibility using such methods as the accounting rate of return, payback period, internal rate of return and net present value, amongst many others (Lefley, 2006). These methods of investment have religiously been used in the private sector and proven successful (Lefley, 2006). However, the same methods have also been used in the public sector but have not been applied in their entirety because of the nature of the objectives for undertaking infrastructure investments by the public sector. Some infrastructure investments are meant to achieve social goals and are therefore called ‘social infrastructure’, whilst infrastructure investments meant to achieve positive returns or positive cashflows are classified as ‘economic infrastructure’.

Given the difference in circumstances, conducting a financial feasibility study for public infrastructure should be undertaken using comprehensive methods such as the multi-criteria analysis (MCA), which has been advocated by Henn (2015) and Henn, et al. (2016). The MCA incorporates elements of the cost benefit analysis and value for money analysis. The MCA incorporates several criteria for assessing the financial feasibility of proposed infrastructure and is therefore more informative in the decision-making process. The MCA is envisaged to be likely to result in a better-informed selection of public infrastructure projects in Zimbabwe.

The major challenge expected to hamper the use of CBA and MCA in the evaluation of public infrastructure projects in Zimbabwe is the limitation of centrally documented information and estimates about project costs and benefits, which include economic and social benefits. Similar challenges were observed by Al-Tony and Lashine (2000) in a project to electrify the Egyptian railways infrastructure. However, as observed by Al-Tony and Lashine (2000), the decision made was comparable to decisions made in European public infrastructure projects. Therefore, Zimbabwe should consider adopting these contemporary public infrastructure assets investments appraisal techniques, which have been observed as commonly used in developed countries, including most European countries (Barfod, Salling, & Leleur, 2011). Therefore, Zimbabwe can use these methods based on the available information and learn from countries that have used either CBA and/or MCA. The following section explains the risk assessment stage of the proposed model.

### **10.2.3 Risk assessment**

The risk assessment is an extension of the financial feasibility study, with emphasis on the risk assessment of public infrastructure investments. This step of the proposed model is heavily reliant on the work done by Camane (2013), who developed a framework for public infrastructure financing in South Africa was centred on risk assessment and its allocation and management. The section presents results of the Binary Logistic Regression model that assesses how public infrastructure investments have been made based on the risk assessment criteria set out. The binary logistic model learns from public infrastructure projects that have been undertaken during the decade between 2009 and 2018, a period in which there was currency stability as the functional currency was the US\$.

At this stage of the framework, it is important to identify and classify the risks in project implementation, information asymmetry between private sector and public sector players, transaction costs-related risks, as well as incapacity risks of the public sector to facilitate and/or manage the infrastructure project (Camane, 2013). The risks were classified differently by (Della Croce & Paula, 2016), who classified infrastructure financing risks into political and regulatory risk, macroeconomic and business risks, and technical risk. The framework however adopts the risk classification by (Camane, 2013).

After the identification and classification of risks, it is important to quantify and score them. The risks must be scored and quantified using an objective tool, resulting in an overall risk score for the project which gives a benchmark for the project's rate of return, which investors may be expecting from investments into such a project (Camane, 2013). This risk score becomes the basis of assessing the suitability of the financing mechanism. The risk scoring of infrastructure projects in this model is undertaken using a total of 30 infrastructure projects undertaken in Zimbabwe between 2009 and 2018. The results of the binary logistic model are presented in the following section. Reliability of the data collection questionnaire was assessed using Cronbach alpha and the results are shown in Table 10.2:

**Table 10.2: Reliability Statistics**

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.720	.750	15

As shown in Table 10.2, the instrument was reliable for the purposes of collecting data for assessing considerations of risks in making financing decisions by public sector entities in Zimbabwe. Cronbach alpha is  $> 0.7$  for the 15 questions (items) assessing the various measures of risk for the infrastructure projects. Table 10.3 presents the sectors from which the infrastructure projects used in the study were taken.

**Table 10.3: Infrastructure sector**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Transport	8	26.7	26.7	26.7
	Water and Sanitation	10	33.3	33.3	60.0
	Information Communication Technologies	6	20.0	20.0	80.0
	Energy (Power)	6	20.0	20.0	100.0
	Total	30	100.0	100.0	

Table 10.3 summarises the infrastructure projects used in the risk assessment of the projects undertaken. The projects selected were almost equally represented for purposes of ensuring

representativeness, thereby eliminating sector bias. The purpose of this step was to assess the importance of risk in the infrastructure financing decisions that have been made in the past. The projects presented in Table 10.3 were financed as shown in Table 10.4:

**Table 10.4: Source of Finance**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	External	14	46.7	46.7	46.7
	Internal	16	53.3	53.3	100.0
	Total	30	100.0	100.0	

As shown in Table 10.4, 53% of the infrastructure projects were financed from internal resources and the remaining 47% were externally financed. The classification of the financing mechanisms followed the classification highlighted in Table 5.3, where infrastructure financing sources are classified as either internal or external and the variety of instruments making up both financing categories are highlighted (Henn, Sloan, Charles, & Douglas, 2016). However, despite the number of infrastructure projects financed internally being more than those externally financed, the value of externally financed projects was more than the internally financed infrastructure projects.

The external financing used in the infrastructure projects included bilateral loans obtained from the Chinese government through the China Exim Bank, infrastructure development bonds issued through IDBZ, loans from multilateral financial institutions such as the Development Bank of Southern Africa (DBSA), as well as loans from the Afrexim Bank and Standard Bank. The internal sources of financing used included PSIP/treasury resources, as well as resources from funds such as the Road Fund (ZINARA), the Rural Electrification Fund and the Universal Services Fund (POTRAZ). These classifications are consistent with the classification by (Henn, Sloan, Charles, & Douglas, 2016). The effect of risk on the choice of financing for public infrastructure projects was assessed using a binary logistic regression model, with results presented in Table 10.5.

**Table 10.5: Logistic regression model results**

		B	S.E.	Wald	Df	Sig.	Exp(B)
Step 1 <sup>a</sup>	Project_Risk	-2.316	.986	5.514	1	.019	.099
	Transaction_Cost_Risk	2.490	.943	6.974	1	.008	12.065
	Information_Asymmetry_Risk	.853	.908	.882	1	.348	2.348
	Constant	-4.448	4.216	1.113	1	.291	.012

a. Variable(s) entered on step 1: Project\_Risk, Transaction\_Cost\_Risk, Information\_Asymmetry\_Risk.

The concatenated independent variables shown in Table 10.5 shows that project risk and transaction cost risk significantly influenced the selection of the source infrastructure financing in Zimbabwe at the 5% significance level as p-values < 0.05, that p = .019 for project risk and p = .008 for transaction costs. Thus, project risk and transaction cost risk significantly influenced the selection of internal sources of financing for the infrastructure projects undertaken. It is important to examine the impact of individual sub-risks on the financing decision (Yescombe, 2007; Inderst, 2010; Sawant, 2010 and Chan, et al., 2009), rather than combining the risks, as done by Camane (2013). Since the model is based on infrastructure projects undertaken in the past, it shows that risk has been considered in making the financing decisions for public infrastructure in Zimbabwe. The predictive capacity of the model is shown in Table 10.6.

**Table 10.6: Classification Table<sup>a</sup>**

		Predicted			
		Source of Finance		Percentage Correct	
Observed		External	Internal		
Step 1	Source of Finance	External	11	3	78.6
		Internal	3	13	81.3
	Overall Percentage				80.0

a. The cut value is .500

As shown in Table 10.6, the model was able to predict 78.6% of infrastructure projects financed from external sources of finance and 81.3% of projects financed from internal



sources of finance. Overall, the model was able to predict 80% of the correct sources of finance and therefore, the model is a reliable model which can be used to predict future sources of finance to be used to finance public infrastructure projects.

However, the model is contrasting findings obtained from the interviews where key informants were asked about the importance of risk when evaluating public infrastructure projects financing. Some of the responses are shown in Box 10.1:

**Box 10.1: Importance of risk in public infrastructure financing decisions in Zimbabwe**

Response from F2 from MoFED:

“Yes, risk management is very important, but I don’t think we have risk management framework within the Ministry. This other time we were trying to have risk management framework for each department, but it did not see the light day to be honest. We all know that risk management is very important but without a framework pertaining to that, then it will not be given that important and you find out that some governments have fully fledged risk management department, but we do not really have such in Zimbabwe. At times, the risk management falls as responsibility for audit department, but audit department remember audit happens after everything has taken place, so it is not helpful. Even the internal audit may come in handy and observe red flags, but they are not in use for such.”

Informant T1 from the Ministry of Transport and infrastructure development said:

“Yes, we do consider risks. I am not sure what types of risk you want me to state but obviously there are general risks that you cannot run away from. In Zimbabwe we already suffered from Cyclone Idai which destroyed bridges and roads in some parts of Manicaland especially Chipinge and Chimanimani to an extent that we used a lot of resources to rehabilitate the road infrastructure. There is also risk of inflation as the currency is changing almost on a daily basis and prices are going up. So those are some of the risks that we normally face.”

The responses presented in Box 10.1 shows that respondents could not provide detailed responses on the importance of risk and how it has been evaluated in infrastructure projects that have been implemented. The responses are therefore indicating a possibility that infrastructure financing has been kept a secret that is only unveiled at the point of implementing the project. This is despite the importance of risk for most financiers, especially those with a private sector orientation where every risk must be appropriately priced into the financing provided (Chan, Forwood, Roper, & Sayers, 2009). Financiers such as China Exim Bank and the Afrexim Bank had a way of assessing the risks and factoring them into the

interests charged. Therefore, risk management is important for the public sector to attract private capital (Chan, Forwood, Roper, & Sayers, 2009).

After the determination of the risk scores for proposed infrastructure projects, the framework encourages the evaluation of legislative and policy restrictions which may take precedence in the ultimate selection of the infrastructure financing mechanism used to finance public infrastructure (Camane, 2013). After the assessment of the risk scores, the outcomes are used in the following section where infrastructure financing instruments must be assessed for suitability and efficiency. In addition to considering the technical aspects highlighted in the above stated stages of the proposed framework, there is also need to consider the political and regulatory influences on the financing decision (Henn, Sloan, Charles, & Douglas, 2016).

#### **10.2.4 Assessment and selection of financing based on suitability and efficiency**

The financing decision for public projects is influenced by the policies of the government, which depend on the political ideology and laws/regulations of the government (Henn, Sloan, Charles, & Douglas, 2016). Public projects are expected to be approved by the legislature or parliament as the choice of financing instrument creates obligations for the government. Therefore, the political philosophy of the government affects the evaluation of options for financing public infrastructure (Abelson, 2008). At this stage in the decision-making process, the framework recommends the balancing of the political and regulatory considerations with the technical considerations highlighted in the stages of the process illustrated above in order to optimise the value for public money (Gamsakhurdia, 2013). Efficiency of financing mechanisms is achieved through minimising risk. Thus, guided by the risk scores for proposed infrastructure projects, least risk projects should be selected. Consequently, the financing instruments selected for public infrastructure projects must allocate risks to parties that have the best capacity to manage these risks (Yescombe, 2007; Chan, et al., 2009; Inderst, 2010 and Sawant, 2010).

#### **10.2.5 Implementation of infrastructure using financing mechanism and instrument**

The recommendation of the infrastructure financing mechanism and instrument is the outcome of the assessment of the suitability and efficiency of the available financing mechanisms and

instruments in terms of their ability to optimise the value for public money (Ball, 2009 and Wellman and Spiller, 2012). This decision is ultimately influenced by the financial situation of the government or public entity (Henn, Sloan, Charles, & Douglas, 2016). The Government of Zimbabwe was considered by many of the key informants as being in a precarious financial situation, leading to financing decisions being made from the financial situation rather than the merit of the financing mechanism/instruments. Despite the current financial situation of the Government of Zimbabwe, it is important to have a framework that can be useful when the financial situation improves and there are a variety of options available to choose from.

#### **10.2.6 Continuously monitoring and evaluating projects' financial performance**

After the recommendation of the financing mechanism and/or instruments and the infrastructure projects have commenced, it is important to continually monitor and evaluate how the selected financing instrument or mechanism is performing. This process is critical as it can be useful for taking remedial action where possible. Given the fact that the success or failure of the public infrastructure project hinges on the financing decision, it is important to always be up to date with the financial performance of the project (Chamaki, Jenkins, & Hashemi, 2019). This ensures adherence to the original plans for the project (Owolabi, et al., 2018). For some financing mechanisms, monitoring and evaluation is achieved by the market as it forms part of the financing conditions. For instance, if infrastructure is financed using capital market instruments, the capital market investors are interested in up-to-date updates on the performance of the projects financed (Chan, Forwood, Roper, & Sayers, 2009).

#### **10.2.7 Post-implementation Monitoring and Evaluation**

This is the last stage of the proposed framework, designed to provide feedback to the public infrastructure financing decision-making process. The value of the feedback mechanism can be enhanced if it is conducted with scrutiny provided by committees or sub-committees of parliament, as well as engaging the office of the auditor-general (Chan, Forwood, Roper, & Sayers, 2009). The post-implementation evaluation should be done by applying financial management as well as cost management principles (Juras, 2014). Detailed variance analyses should be done together with the preparation of project financial reports that are audited (OECD, 2015). The evaluation of the suitability of the financing mechanisms and instruments

is critical for continuously improving the financing decision. The incorporation of this stage into the proposed framework was guided by responses from key informant interviewees where no consistent responses about the post-implementation evaluation of financing decision were gleaned. Box 10.2 highlights some of the responses from a cross-section of the infrastructure sectors.

**Box 10.2: Post-implementation evaluation of financing decision interview responses**

Key informant T2 from the ministry of Transport and infrastructure development was blunt and said, “I doubt, we don’t do.”

Whilst key informant T1 outlined what is done technically and said:

“What we normally do when we are done with a project..., we go back and see whether the actual finances that we used on the project are either below or above what we intended to use. If it’s above, then we need reasons maybe there are things which we didn’t consider during planning and also if it’s below we also need reasons. However, because of the inflationary environment we often get amounts higher than the planned.”

Key informant F2, from the MoFED had this to say:

“For the project they even prepare financial statements submitted to the MoFED where we analyse them. We will be looking at the cost or expenditure for the project in line with the initial contract plan, the result and also what is on the ground.”

Responses provide evidence of the need for the incorporation of post-implementation evaluation of the financing decision into the proposed framework. This stage was therefore considered necessary and useful for the purpose of enhancing the efficiency in making financing decisions for public infrastructure. The quality of the decisions is therefore improved by incorporating a feedback mechanism that ensures that lessons learnt in past infrastructure projects help in refining future financing decisions. The following section presents a summary of the results of the development of a framework for public infrastructure financing in Zimbabwe, which was a key objective of the study.

**10.3 Chapter Summary**

The chapter has proposed and explained the components of the framework for public infrastructure financing in Zimbabwe. The proposed framework is made up of seven interrelated stages. The first stage culminates in the development of a concept note which is technically informed in the identification of the infrastructure gap. An econometric model to quantify the infrastructure gap in terms of infrastructure physical stock with the potential to estimate the monetary amount for the gap was developed and proposed for the four economic

infrastructure sectors. This stage entails the conducting of a preliminary feasibility study of proposed public infrastructure assets.

The second stage deals with the feasibility study, with emphasis on the economic/financial feasibility of the proposed project. This stage is followed by the risk assessment of the proposed infrastructure project, which results in the risk scoring of the proposed project in order to invest in projects that minimise risk and maximise value for public money. The risk assessment scores, combined with political and regulatory considerations, are used to assess the suitability and efficiency of public infrastructure sources of finance. This informs the source of finance suitable for the proposed infrastructure project. After the commencement of the project, there is need for continuously monitoring and evaluating the financial performance of public infrastructure projects. This allows for the correction of financing arrangements without compromising the delivery of the infrastructure investment. The last step of the framework is conducting a post-implementation evaluation meant to assess the suitability and efficiency of the financing mechanism/instrument used on the completed projects. The purpose is to continuously provide feedback about how the completed project was financed in order to enhance future financing decisions.

The following chapter is the last of this thesis and provides a summary of the thesis, sums up the conclusions drawn from the study and makes recommendations to the various stakeholders based on the findings from the study. Recommendations are made for further academic research, as well as for policymakers in order to enhance the financing decision-making process for public infrastructure assets investments.

## CHAPTER ELEVEN

### SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

#### 11.1 Introduction

The previous chapter has presented results on the framework for public infrastructure financing developed in this study. The primary aim of the framework is to enhance the infrastructure financing decision-making process in order to optimise efficiency in the use of public financial resources in the development of public infrastructure assets. This chapter summarises the entire study and presents the conclusions drawn from the study, whilst making recommendations to the various stakeholders of the study.

The aim of the study was to identify the major infrastructure financing mechanisms, assess their efficiency and recommend a conceptual framework useful when selecting options to finance public infrastructure requirements in Zimbabwe. It is however important to recapitulate the objectives of the study:

- a) To determine the main sources of public infrastructure financing in Zimbabwe.
- b) To establish innovative finance's capacity to close the public infrastructure financing gap in Zimbabwe.
- c) To assess the role played by public-sector accounting in attracting appropriate and efficient mechanisms to finance public infrastructure in Zimbabwe; and
- d) To develop and recommend a framework for selecting suitable and efficient mechanisms to finance public infrastructure in Zimbabwe.

Given the above stated objectives, this chapter starts by summarising the study in terms of the chapters making up the thesis, highlighting the focus of each chapter. This is followed by a section that synthesises the main findings of the study which have been presented in the preceding four chapters of the thesis. Thereafter, the researcher makes recommendations directed to a variety of stakeholders of the findings of the study. Lastly, a summary of the chapter is given at the end.

## 11.2 Summary and Overview of the study

The thesis report is made up of 11 chapters which are summarised in Figure 11.1:

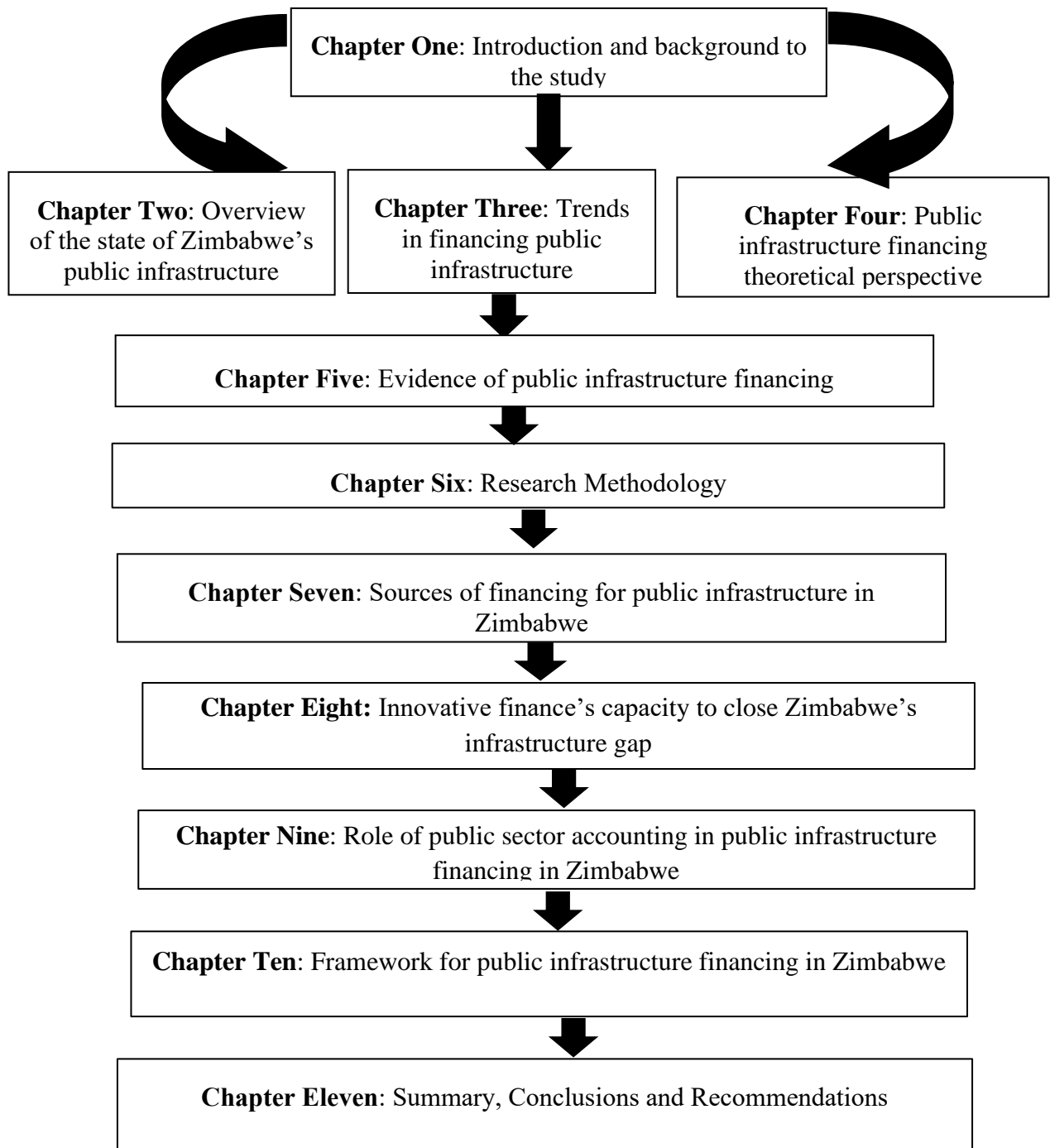


Figure 11.1: Overview of the study thesis

The overview of the thesis is given in Figure 11.1 and the highlights of each chapter are outlined hereunder.

**Chapter One:** the purpose of this chapter was to provide a background to the research problem under study. The chapter highlighted the challenges related to public infrastructure financing from the global perspective, in developing countries, in Africa and ultimately in Zimbabwe. The infrastructure financing requirements for Zimbabwe were showcased and ultimately, the problem under study was highlighted. In addition, the hypotheses for the study were given together with the significance or contribution of the study and finally, an outline of the thesis is given in the chapter.

**Chapter Two:** this chapter added to the background given in Chapter One by providing an overview of the state of public infrastructure in Zimbabwe. Firstly, infrastructure is defined and categorised, with the study focusing on economic infrastructure. This was meant to give credence to the study by highlighting the status quo in the economic infrastructure sectors, which revealed the existence of gaps in the infrastructure. The major gaps pertain to the state of the infrastructure against the demand. For example, the road infrastructure is well connected but some roads have become impassable over time due to poor maintenance, therefore requiring financing to ensure that the roads are rehabilitated. A similar examination of the four economic infrastructure sectors as well as the sub-sectors was made. A comparison was made of Zimbabwe's infrastructure being benchmarked against Sub-Saharan Africa's infrastructure. In some regards, Zimbabwe's infrastructure was found to be better than the SSA's infrastructure.

**Chapter Three:** the chapter showcased the trends in public infrastructure financing. Firstly, the key features of infrastructure financing and infrastructure financing needs were highlighted. The mechanisms for financing public infrastructure were highlighted, showcasing the extent to which they were able to narrow or close the infrastructure financing gaps in developed countries. This was followed by the showcasing of public infrastructure financing trends in emerging markets. Public infrastructure financing trends in Africa and sub-Saharan Africa were also given, besides showcasing how public infrastructure has been financed in Zimbabwe. The purpose of the chapter was to draw lessons from other countries



and regions in order to ascertain how Zimbabwe can narrow its infrastructure financing gap. It was established that Zimbabwe lags behind in terms of the use of innovative financing mechanisms, such as the use of PPPs in financing public infrastructure.

**Chapter Four:** the chapter presented theories that guide a variety of players in the public infrastructure financing spectrum. The concept of public infrastructure financing is given first where the financiers are broadly classified into public sector players, private sector players and innovative financiers. Public sectors players are guided by the public finance and public policy theory, as well as the view of public infrastructure as public goods. There are a few instruments through which the public sector can raise finance for public infrastructure, including taxes, bonds, and loans. There are also private sector financiers of public infrastructure who are guided by theories such as the Pecking Order theory, Capital Structure theory, the Agency theory, and the Risk-return theory. The private sector finances public infrastructure using instruments such as syndicated and bank loans, subscriptions to infrastructure corporate and project bonds amongst many others. There is also a combination of public and private players known as innovative financing where the main instruments are PPPs, innovative taxes, state infrastructure banks, as well as diaspora bonds and diaspora remittances, amongst others.

**Chapter Five:** the fifth presented empirical studies that showcased literature related to the objectives of the study. The emphasis of the chapter was on evidence based on empirical studies conducted in other countries and regions. The sources of public infrastructure financing that have commonly been used are highlighted in the chapter, followed by literature that showcased the major innovative financing instruments that have been used to finance public infrastructure and the extent of their success in closing infrastructure gaps in the countries they were used. The role that public sector accounting and accountability has in attracting efficient financing mechanisms for public infrastructure was elucidated. The literature reviewed showed the roles played by public sector accountants in the financing of public infrastructure. There is limited literature on public infrastructure financing frameworks. As part of the literature review, methods of infrastructure project appraisals were considered,

as well as literature related to the risks affecting the development of public infrastructure. Approaches to estimating public infrastructure gaps were also reviewed.

**Chapter Six:** the research methodology used in the study was presented in the chapter. The study adopted an interpretivism philosophy and was designed as a multiple case study research. The study used both qualitative and quantitative research methods, with the qualitative methods addressing Objectives number one to three, whilst the quantitative research methods were used in addressing parts of Objective number four. Data was collected from interviews, a survey questionnaire as well as secondary data from online databases and repositories such as the World Bank's world development indicators database. Where secondary data was missing, it was interpolated and extrapolated. Interviews were initially expected to be conducted face-to-face but due to challenges presented by the COVID-19, telephonic interviews were conducted instead. The data analysis and presentation procedures are also highlighted in the chapter. The quantitative models are highlighted in the chapter, as well as the qualitative analysis framework.

**Chapter Seven:** this was the first chapter that presented and discussed the results on the first objective of the study, which sought to determine the main sources of finance for public infrastructure in Zimbabwe. The major financier of power/energy infrastructure was found to be China Exim Bank which provided concessionary loans. For transport infrastructure, the major financier is the Government of Zimbabwe through its public sector investment programme funds availed by the MoFED. For water and sanitation infrastructure structures, the Government of Zimbabwe was the major financier of public infrastructure. Furthermore, in the ICT infrastructure, China Exim Bank was a major financier. Across all infrastructure sectors under study, there were limited private sector financiers, except for the ICT sector where the market leaders are private sector entities. There were other financiers such as development assistance in water and sanitation, especially in rural areas, and commercial loans as well as private investment into public infrastructure through their corporate social responsibility activities.

**Chapter Eight:** the chapter presented and discussed results on the potential of using innovative financing mechanisms to close the public infrastructure financing gap existing in Zimbabwe. Findings in the study revealed that there is limited use of innovative financing instruments in the financing of public infrastructure in Zimbabwe. The limited innovations were using conventional financing mechanisms in innovative ways where for example, a loan advanced to Zimbabwe for the part-financing the Kariba South power station expansion project was secured through a power purchase agreement deal entered between the Zimbabwe Power Company and Nampower, the Namibian power utility company. Moreover, the loan was re-financed by the Development Bank of Southern Africa (DBSA). This represents an innovative and complex loan financing arrangement.

**Chapter Nine:** the chapter presented and discussed results on the role currently being played by the public sector accounting practitioners in the financing of public infrastructure finance. Findings revealed that public sector accountants in Zimbabwe are mainly involved in financial reporting and are to a lesser extent actively involved in management accounting related duties. Public sector accountants are therefore found to be not contributing significantly to the attraction of efficient financing for public infrastructure in Zimbabwe. There were some gaps identified in the contribution of public sector accountants in the financing discourse for public infrastructure, key amongst which is the knowledge gap. Public sector accountants are also not positioned in roles that play the advisory role in the financing of public infrastructure in the Zimbabwean government.

**Chapter Ten:** this is the penultimate chapter that presented results on the fourth and last objective of the study and proposed a framework for public infrastructure financing. The purpose of the framework is to ensure efficient use of public finances, as well as ensuring that public infrastructure assets are financed using effective mechanisms by minimising risk and maximising value for public money. The proposed framework has eight interrelated stages which are meant to enhance the scrutiny and robustness in decision-making for public infrastructure financing decisions. The framework combines qualitative and quantitative methods in the processes of making financing decisions. The framework entails a feedback mechanism that ensures continuous improvement in the decision-making process.

**Chapter Eleven:** this is the ultimate chapter of the thesis that is meant to conclude the study. Firstly, it highlights an overview of the entire thesis. Thereafter, conclusions drawn from the study are summarised and synthesised into one section. The last major section of the chapter presents recommendations based on the findings obtained from the study and the conclusions presented in the chapter. The purpose of the chapter is to give a clear and concise outline of the study from the beginning to the end in terms of all the chapters and it highlights the conclusions drawn from the study and the pertinent recommendations that should guide future practice and policies on the financing of public infrastructure in Zimbabwe, as well as for other countries that find the study important. The following section presents the summary of findings obtained from the study as guided by the objectives of the study.

### 11.3 The main findings of the study

The previous section has given an overview of the study from the perspective of the outline of the thesis. This section spells out the key findings from the study based on each objective of the study.

#### 11.3.1 Sources of finance for public infrastructure financing in Zimbabwe

Study findings revealed that the mega economic infrastructure projects undertaken between 2009 and 2018 were financed from the sources shown in Table 11.1:

**Table 11.1 : Main sources of infrastructure finance estimated summary**

<b>Financier</b>	<b>Estimated total Infrastructure financing between 2009 and 2018</b>	<b>Economic infrastructure sector financed</b>
China Exim bank	US\$2.1 billion	Electricity, airports, water and sanitation
Treasury (MoFED)	US\$1 billion	Dams, roads, airports
Other loans/bonds (DBSA, Afrexim bank, Standard bank, IDBZ)	US\$400 million	Roads, electricity
Development partners	US\$200 million	Electricity, water and sanitation.

**Source:** Author's compilation (2020)

As shown in Table 11.1, China Exim Bank was the biggest financier of economic infrastructure in Zimbabwe during the period under study, followed by the Government of Zimbabwe's treasury department. However, some of the amounts included under the treasury financing may stretch beyond the ten-year period under study since some of the projects included had taken longer to complete and were only completed during the period under study. Moreover, the government focuses mainly on the provision of social infrastructure, whilst the reported amounts are only for economic infrastructure. Otherwise, the rest of the financiers are as shown in Table 11.1.

### **11.3.2 Potential of innovative finance to mitigate the infrastructure financing gap**

Findings from the study revealed that there is limited to no evidence of the use of innovative financing of public infrastructure. The only innovations are the use of conventional financing mechanisms in innovative ways, such as the Standard Bank financing arrangement where a loan is secured through a power purchase agreement. As a result, the study notes that there is capacity for innovative finance to significantly contribute only if the fundamentals are put right. Firstly, there is a need to operationalise the Zimbabwe Investment and Development Agency Act (Chapter 14:37) which was enacted in 2020, by enacting provincial and municipal regulations that govern innovative financing such as PPPs. Lessons can be obtained from South Africa, which is one of the leading countries in the SSA region in terms of the ability to attract private sector investments.

### **11.3.3 Roles of public sector accountants in the financing of public infrastructure**

The current roles of public sector accountants in the public infrastructure financing discourse were found to be in the financial reporting roles mainly. Thus, public sector accountants were found not to be providing advisory services in relation to financial management and management accounting in Zimbabwe.

### **11.3.4 The framework for financing public infrastructure in Zimbabwe**

The study found that government ministries, government departments and parastatal enterprises do not have a uniform framework for financing public infrastructure in Zimbabwe.

This has therefore led to the development of an eight-staged framework, which has been presented in Chapter 10 with the details of each stage provided in the same chapter.

## **11.4 Conclusions of the study**

This section presents the major conclusions drawn from the findings of the study. The conclusions drawn are categorised in terms of the objectives and hypotheses presented in Chapter One.

### **11.4.1 Main sources of financing for public infrastructure in Zimbabwe**

The study focused on four economic infrastructure sectors and the conclusions drawn are given for each infrastructure sector hereunder:

- a) The main source of **power/energy infrastructure** financing in Zimbabwe is bilateral loans, with China being the main financier. China was the leading financier for the expansion of the Kariba South power station as well as the expansion of the Hwange power station. China Exim Bank was the largest financier of economic infrastructure by value.
- b) The main source of finance for **transport infrastructure** is a combination, with China Exim Bank leading in the financing of airport infrastructure after it financed the expansion of the Victoria Falls international airport and the R.G Mugabe International Airport. The Government of Zimbabwe is the leading financier of road and bridge infrastructure, although there was a loan that financed the refurbishment of the Plumtree-Harare-Mutare road.
- c) The main source of financing for **water and sanitation** is the Government of Zimbabwe, especially for the construction of dams and water and sanitation projects in rural areas.
- d) The main source of finance for **public ICT infrastructure** is the China Exim Bank, as it financed mobile network expansion by NetOne cellular (Pvt) Ltd, as well as financing the installation of the fibre optic backbone by TelOne (Pvt) Ltd. However, at sectoral level, the market leaders are private sector entities and therefore are the leading financiers using either equity or loans secured from the commercial lending market.

Therefore, in terms of the hypothesis of the study, the study failed to reject the hypothesis that the government is the main source of finance for public infrastructure. The conclusion is however not applicable to all the infrastructure sectors. Thus, the conclusion is not conclusive as the hypothesis is not rejected in some sectors, but at the same time it is rejected in other sectors.

#### **11.4.2 Potential for innovative financing to close the infrastructure financing gap**

The study also sought to ascertain the role that innovative finance could play in closing or narrowing the public infrastructure financing gap in Zimbabwe. Findings in the study revealed a limited use of innovative financing in public infrastructure financing in Zimbabwe. Findings revealed that the Government of Zimbabwe is encouraging the private sector to contribute to the financing of public infrastructure in Zimbabwe, but there are limited to no takers. For instance, the Government of Zimbabwe has been driving an agenda of private sector-led economic growth, but the level of activity is limited. Therefore, the study concludes that there is scope for innovative finance in contributing to closing the infrastructure gap if the economic fundamentals are corrected. For instance, Zimbabwe is perceived as a high-risk investment destination due to the political dynamics of the country and therefore, is unattractive to foreign investors. In relation to the hypothesis, the study rejects the hypothesis that innovative finance has the potential to significantly contribute to closing the public infrastructure gap in Zimbabwe.

#### **11.4.3 Role of public sector accounting in public infrastructure financing in Zimbabwe**

Findings of the study indicated that public sector accounting practitioners are active in the financial accounting and reporting responsibilities, but the current reporting framework is failing to attract financiers for public infrastructure assets. Public sector accountants are therefore not making contributions in their advisory capacity in terms of the financing decisions for public infrastructure. Therefore, the study concludes that public sector accountants in Zimbabwe are not playing significant roles in the financing decisions for public infrastructure investments. The study therefore rejects the hypothesis that public sector accounting significantly contributes to attractive efficient public infrastructure financing

mechanisms, since the quality of financial reporting is failing to attract innovative financing mechanisms for public infrastructure financing.

#### **11.4.4 Framework for public infrastructure financing in Zimbabwe**

The study found and concludes that there is no commonly used framework for making financing decisions for public infrastructure in Zimbabwe. The MoFED developed guidelines for public investment management, which entails the public investment management cycle presented in Figure 9.1. The study therefore proposes a framework that may be applied in the financing decision-making process in order to enhance the use of appropriate and efficient financing mechanisms. The proposed framework borrows from literature and the public investment management cycle shown in Figure 9.1. The study therefore rejects the hypothesis that there is a framework for public infrastructure financing in Zimbabwe.

The sections above have presented the conclusions drawn from the study for each research objective. The following section presents the contributions made by this study to both theory and practice in relation to the financing of public infrastructure.

#### **11.5 Contributions of the study to theory and practice**

The study has contributed to theory and practice in relation to the financing of public infrastructure in Zimbabwe and the following are the key contributions:

- a) The study developed and proposed a multi-staged framework for making financing decisions for public infrastructure in Zimbabwe. This is addressing a gap identified by Henn, et al. (2016), who noted that there is no consistently applied framework for making infrastructure financing decisions. This framework is likely to affect practice since the importance of the financing decision in the delivery of public infrastructure has been highlighted and the framework provides a systematic and simplified approach to the financing decision-making process. It had also been noted in literature that the financing decision has not been incorporated into the planning stages of infrastructure projects and is therefore left to be made too late, yet the success of any investment depends on the financing decision (Henn, Sloan, Charles, & Douglas, 2016). Therefore, the framework contributes significantly to theory as there was a gap in the



theory that should guide practice in the public infrastructure financing decision-making process.

- b) The study has also theoretically evaluated the roles played by public sector accounting practitioners in public infrastructure financing discourse and therefore highlighted the need for improvement. The evaluation was in the context of the variations in the roles played by accounting personnel in the private sector compared to public sector accountants. Yet the public sector is migrating towards private sector inspired accounting practices such as accrual accounting based on IPSAS (Jārvinen, 2009). This is a significant contribution as the findings of the study highlighted the need for improving the practices in the decision-making process at central and local government levels by incorporating management accounting personnel into the infrastructure financing planning and decision-making processes. Although the evaluation was from a theoretical perspective, its findings and recommendations are likely to significantly influence practice.
- c) The study has contributed to extant knowledge available about how infrastructure is financed in Zimbabwe, from both academic and practical perspectives. Thus, the study enriches the literature available about Zimbabwe on public infrastructure financing, including the possible ways of improving access to innovative finance which has proven a major source of finance for public infrastructure in developed countries and in emerging markets.

The aforementioned are some of the key contributions of the study to both theory and practice about public infrastructure financing in Zimbabwe. The contributions are not only contextual to Zimbabwe but can be applied in other countries after adapting them to their localised situations. The following section highlights the key recommendations of the study.

### **11.6 Policy Recommendations**

Given the findings presented and discussed in the past four chapters and conclusions synthesised in the sections above and epitomised with the contributions of the study, it is appropriate to provide recommendations that help in the enhancement of efficiency in the financing of public infrastructure in Zimbabwe. This is expected to ultimately improve the

state of public infrastructure in the country and enhance the likelihood of the achievement of the Government of Zimbabwe's vision, that is, "Towards a Prosperous and Empowered Upper Middle-Income Society by 2030". The recommendations guide policymakers and players in the infrastructure sector on the way in which the Sustainable Development Goals (SDGs) related to infrastructure could be achieved. For example, SDG 6 seeks to ensure access to water and sanitation for all, whilst SDG 7 seeks to "ensure access to affordable, reliable, sustainable and modern energy for all" and SDG 9 seeks to "build resilient infrastructure, promote sustainable industrialization and foster innovation". The following sections outline the recommendations of the study based on the findings.

### **11.6.1 Enhance investments protection framework**

Policymakers in the various infrastructure sectors led by the Government of Zimbabwe and its various arms, which include, government ministries, regulatory parastatal enterprises, local authorities (councils), and parliament, are advised to enhance the investments protection framework as follows:

#### **a) Ensure policy consistency**

It was observed from the study that private capital in Zimbabwe is not safe due to policy inconsistencies. Such inconsistencies increase the fiscal/sovereign risk of the country as noted by Chan, et al. (2009) and Sawant (2010). The major inconsistency noted by key informants in the study pertains to monetary and currency policies, whereby currencies are too frequently changed. Domestic and foreign investors who invested in long-term financial assets during the dollarization period were prejudiced when there was a currency reform/change, since their US dollar- denominated investments were translated into local currency at an exchange rate of 1:1. Thus, the gains of dollarization, such as enhancing financial sector development, were reversed at the expense of investors (Pasara & Garidzirai, 2020). If such policy inconsistency is removed, it helps in improving investor confidence which is likely to increase private sector investments in public infrastructure in Zimbabwe.

#### **b) Liberalise economically viable infrastructure sectors**

Findings in the study revealed that the ICT infrastructure sector is highly privatised, whilst power/electricity generation is partially liberalised, and the rest of the infrastructure sectors

are monopolised by the government. The architecture of the infrastructure sectors is hinged on the public sector, hence choking the fiscus, especially in times of austerity (Tan, et al., 2019; Noman, 2017 and Hall and Jonas, 2014). The study therefore recommends that infrastructure sectors that are economically viable be liberalised and allow private sector participation in order to help mitigate the financing requirements on the fiscus, which has limited capacity. Success stories are apparent in the ICT sector in Zimbabwe where the leading players in the sector are private sector corporates and there is significant advancement in the sector. For instance, the mobile penetration rate was reported to be more than 83% and the internet penetration rate was reported at about 50% in 2020. The effect of the liberalisation of the infrastructure sectors is improving competition, which usually leads to discovering prices influenced by the market forces of demand and supply (Abelson, 2008). Therefore, liberalisation or even privatisation may be more beneficial than the status of excessive government control but saddled with inefficiencies.

**c) Develop a robust regulatory framework to manage private sector investments**

The ability of the Government of Zimbabwe to attract private sector investments requires a sound and robust framework that minimises risks for private sector investments. Such a policy should ensure that the government is liable for any losses suffered by private sector investors as a result of government actions. Such a framework is noted in literature as a catalyst for attracting private sector investors into PPPs (UNDP, 2019). Given the success realised in developed countries and some developing countries, Zimbabwe should ensure that there is a conducive environment to attract private sector partners (Carbonara & Pellegrino, 2014). This has the potential to significantly reduce the infrastructure financing gap for the country, if critical success factors for PPPs are in place (Garcia-Kilroy and Rudolph, 2017 and Olusola, et al., 2012).

**11.6.2 Ensure that more public infrastructure financing options are available**

The results of the study showed that there are limited options available for financing public infrastructure and as a result, the financing options taken are not selected based on merit but availability. To enhance efficiency in the financing decisions, the study recommends that the Government of Zimbabwe should deliberately undertake to clear debt arrears with

development financial institutions such as the World Bank, the European Investment Bank and the African Development, amongst others, as this negatively affects economic development (Checherita-Westphal & Rother, 2012). This should lead to more financing options availability and therefore is likely to result in Zimbabwe obtaining financing at more favourable terms than the current status. The arrears are an indicator of financing risk, which most financiers will incorporate into their financing costs when they avail financing (Chan, Forwood, Roper, & Sayers, 2009). Moreover, as highlighted in the interviews, developmental financial institutions will always incorporate an interest-free component when they advance loans, which is known as the grant element. Zimbabwe could therefore not be enjoying any such benefits due to the perceived high risk.

The increase in financing options after the clearance of arrears is also expected to result in an increase in official development assistance, which is a major source of infrastructure financing in developing countries (Tortajada, 2016). The ODA usually helps in mitigating infrastructure financing requirements if it is provided as budgetary support, as noted by (Kingombe, 2011). This is currently not happening because Zimbabwe is in arrears for loans obtained from the donor countries or from international developmental financial institutions.

### **11.6.3 Operationalise policies and legislation that encourage private sector investment into infrastructure**

In 2020, the Government of Zimbabwe enacted the Zimbabwe Investment and Development Agency Act (Chapter 14:37), which was meant to encourage private sector-led economic development through investments in the public sector, including into public infrastructure. The new legislation replaced several laws such as the Joint Ventures Act (Chapter 22:22) which had been enacted in 2016, which was replaced without having been implemented. Implementing the legislation meant to attract private sector investments in the public sector, Zimbabwe can learn a lot from the case of South Africa which has become the regional benchmark because of the number of PPPs that have been successfully implemented (Fourie, 2015).

The key requirements for operationalising the legislation on private sector investments in the public sector pertain to governance structures. The Joint Ventures Act failed, amongst other reasons, because its implementation was centralised at the MoFED, where a PPP unit was instituted but was never functional. In the South African case, the implementation of such laws and regulations is multi-pronged, where there is a centralised unit for coordinative purposes whilst the actual implementation is done at provincial and municipal level (Fourie, 2015). In addition to the Public Finance Management Act (Chapter 22:19), there may be need for an Act that specifically deals with local governments, such as municipalities and rural district councils. In addition to such as Act, there is need to gazette regulations by these local governments that deal with private sector investments within their jurisdictions. Similarly, governance frameworks are also recommended in literature (OECD, 1995; UNDP, 2011; OECD, 2012; UNDP, 2019; Chen and Bartle, 2017).

### **11.7 Suggestion for future research**

The study has given an overview of the situation in the public infrastructure sector in Zimbabwe, but studies about public infrastructure are done wide apart. This study therefore encourages continual research in order to consistently share the knowledge with key stakeholders, which should give direction to policymakers. Thus, it is important to continually conduct research on public infrastructure financing and make it an embedded religious practice to document infrastructure financing practices in Zimbabwe. Moreover, this study focused on economic infrastructure. Therefore, it is important to conduct a similar study that focuses on social infrastructure and the study and its findings should guide the government in making sound financing decisions.

### **11.8 Chapter Summary**

The chapter has provided an overview of the thesis highlighting each chapter and the respective contents. This was followed by the presentation and discussion of conclusions drawn from the study. Recommendations to the key stakeholders to the findings of the study have also been proposed, as well as the contributions of the study to practice and to theories. This therefore is the last and final chapter of the thesis.

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## APPENDICES

### Appendix 1: Regression models results

#### Appendix 1A: Rail Lines Model

```
. reg T_RL L1.T_RL Year GDP_PercapitaUSD Agric Manuf Urbanpop PopDens
```

Source	SS	df	MS	Number of obs	=	28
Model	.004837191	7	.000691027	F(7, 20)	=	30.30
Residual	.000456107	20	.000022805	Prob > F	=	0.0000
				R-squared	=	0.9138
				Adj R-squared	=	0.8837
Total	.005293297	27	.000196048	Root MSE	=	.00478

T_RL	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
T_RL					
L1.	.4742169	.2011431	2.36	0.029	.0546396 .8937941
Year	.0001319	.0007704	0.17	0.866	-.001475 .0017389
GDP_PercapitaUSD	-5.37e-06	.0000106	-0.51	0.617	-.0000274 .0000167
Agric	-.0004247	.0003868	-1.10	0.285	-.0012316 .0003822
Manuf	.0000117	.000584	0.02	0.984	-.0012065 .0012299
Urbanpop	.0032999	.0024797	1.33	0.198	-.0018727 .0084725
PopDens	-.0027387	.0034182	-0.80	0.432	-.009869 .0043916
_cons	-.1485411	1.428455	-0.10	0.918	-3.128247 2.831164

```
. ovtest
```

```
Ramsey RESET test using powers of the fitted values of T_RL
Ho: model has no omitted variables
F(3, 17) = 0.91
Prob > F = 0.4555
```

```
. hettest
```

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of T_RL

chi2(1) = 0.15
Prob > chi2 = 0.7030
```

```
.
```

## Appendix 1B: Paved Roads Model

```
. ovtest

Ramsey RESET test using powers of the fitted values of TPR
Ho: model has no omitted variables
      F(3, 17) =      1.71
      Prob > F =      0.2018

. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of TPR

      chi2(1)      =      8.06
      Prob > chi2  =      0.0045

. reg TPR L1.TPR Year GDP_PercapitaUSD Agric Manuf Urbanpop PopDens, robust

Linear regression                               Number of obs   =           28
                                                F(7, 20)        =           18.90
                                                Prob > F         =           0.0000
                                                R-squared       =           0.7192
                                                Root MSE       =           .09285
```

TPR	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
TPR						
L1.	-.2795166	.2272614	-1.23	0.233	-.7535756	.1945424
Year	-.0040824	.0141812	-0.29	0.776	-.0336638	.025499
GDP_PercapitaUSD	-.0003062	.0001833	-1.67	0.111	-.0006886	.0000763
Agric	-.0186541	.0087422	-2.13	0.045	-.0368901	-.0004181
Manuf	-.0171871	.0172025	-1.00	0.330	-.0530709	.0186967
Urbanpop	-.0195769	.0612937	-0.32	0.753	-.1474332	.1082794
PopDens	-.0392842	.0465693	-0.84	0.409	-.136426	.0578577
_cons	12.31776	25.28248	0.49	0.631	-40.42058	65.05609

## Appendix 1C: Unpaved Roads Model

```
. reg T_UR L1.T_UR Year GDP_PercapitaUSD Agric Manuf Urbanpop PopDens
```

Source	SS	df	MS	Number of obs	=	28
Model	9.47403117	7	1.35343302	F(7, 20)	=	150.28
Residual	.180122681	20	.009006134	Prob > F	=	0.0000
				R-squared	=	0.9813
				Adj R-squared	=	0.9748
Total	9.65415385	27	.357561254	Root MSE	=	.0949

T_UR	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
T_UR						
L1.	.3645487	.2001776	1.82	0.084	-.0530144	.7821119
Year	-.0387811	.0122526	-3.17	0.005	-.0643395	-.0132226
GDP_PercapitaUSD	-7.66e-06	.0002101	-0.04	0.971	-.0004459	.0004306
Agric	.0034807	.0076616	0.45	0.655	-.0125012	.0194626
Manuf	.0262792	.0119878	2.19	0.040	.0012731	.0512853
Urbanpop	.1198379	.0459254	2.61	0.017	.0240391	.2156366
PopDens	.0020548	.0565593	0.04	0.971	-.1159258	.1200355
_cons	77.31273	23.48299	3.29	0.004	28.32807	126.2974

```
. ovtest
```

```
Ramsey RESET test using powers of the fitted values of T_UR
Ho: model has no omitted variables
F(3, 17) = 2.83
Prob > F = 0.0695
```

```
. hettest
```

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of T_UR
chi2(1) = 0.33
Prob > chi2 = 0.5645
```

## Appendix 1D: Power Consumption Model

```
. reg E_PCKwK L1.E_PCKwK Year GDP_PercapitaUSD Agric Manuf Urbanpop PopDens
```

Source	SS	df	MS	Number of obs	=	24
Model	304602.37	7	43514.6243	F(7, 16)	=	34.45
Residual	20208.546	16	1263.03412	Prob > F	=	0.0000
				R-squared	=	0.9378
				Adj R-squared	=	0.9106
Total	324810.916	23	14122.2137	Root MSE	=	35.539

E_PCKwK	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
E_PCKwK L1.	.6652012	.205097	3.24	0.005	.230415	1.099987
Year	-7.220815	6.375792	-1.13	0.274	-20.73689	6.29526
GDP_PercapitaUSD	.2650247	.1004776	2.64	0.018	.0520218	.4780277
Agric	4.468658	3.233091	1.38	0.186	-2.385188	11.32251
Manuf	-1.189907	5.827273	-0.20	0.841	-13.54317	11.16336
Urbanpop	58.1295	30.95428	1.88	0.079	-7.490636	123.7496
PopDens	-33.4855	29.69909	-1.13	0.276	-96.44476	29.47376
_cons	13609.4	11886.61	1.14	0.269	-11589.08	38807.88

```
. ovtest
```

```
Ramsey RESET test using powers of the fitted values of E_PCKwK
Ho: model has no omitted variables
F(3, 13) = 3.41
Prob > F = 0.0501
```

```
. hettest
```

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of E_PCKwK
chi2(1) = 0.32
Prob > chi2 = 0.5725
```

## Appendix 1E: Access to Electricity Model

```
. reg E_AEPop L1.E_AEPop Year GDP_PercapitaUSD Agric Manuf Urbanpop PopDens
```

Source	SS	df	MS	Number of obs	=	26
Model	209.348341	7	29.9069059	F(7, 18)	=	3.27
Residual	164.561824	18	9.14232353	Prob > F	=	0.0201
				R-squared	=	0.5599
				Adj R-squared	=	0.3887
Total	373.910165	25	14.9564066	Root MSE	=	3.0236

E_AEPop	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
E_AEPop					
L1.	.1017563	.2663646	0.38	0.707	-.457855 .6613676
Year	.4695381	.5190267	0.90	0.378	-.6208965 1.559973
GDP_PercapitaUSD	-.0034526	.0078857	-0.44	0.667	-.0200198 .0131146
Agric	-.2227097	.3497751	-0.64	0.532	-.9575598 .5121405
Manuf	-.1919583	.4708668	-0.41	0.688	-1.181213 .7972963
Urbanpop	-.2263502	1.473858	-0.15	0.880	-3.322812 2.870112
PopDens	-.48838	2.116065	-0.23	0.820	-4.934067 3.957307
_cons	-877.4839	968.1604	-0.91	0.377	-2911.513 1156.546

```
. ovtest
```

```
Ramsey RESET test using powers of the fitted values of E_AEPop
Ho: model has no omitted variables
F(3, 15) = 0.54
Prob > F = 0.6646
```

```
. hettest
```

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of E_AEPop
chi2(1) = 2.65
Prob > chi2 = 0.1036
```

## Appendix 1F: Fixed Phone Technologies Model

```
. reg ICT_FTS L1.ICT_FTS Year GDP_PercapitaUSD Agric Manuf Urbanpop PopDens
```

Source	SS	df	MS	Number of obs	=	28
Model	8.98336636	7	1.28333805	F(7, 20)	=	79.42
Residual	.323177385	20	.016158869	Prob > F	=	0.0000
				R-squared	=	0.9653
				Adj R-squared	=	0.9531
Total	9.30654375	27	.344686805	Root MSE	=	.12712

ICT_FTS	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
ICT_FTS L1.	.3239257	.2044057	1.58	0.129	-.1024572 .7503087
Year	.1128395	.0440528	2.56	0.019	.0209469 .2047322
GDP_PercapitaUSD	-.0002379	.0002885	-0.82	0.419	-.0008396 .0003638
Agric	.003241	.009992	0.32	0.749	-.0176019 .0240838
Manuf	-.0354216	.0170677	-2.08	0.051	-.0710243 .000181
Urbanpop	.0315831	.060532	0.52	0.608	-.0946844 .1578506
PopDens	-.2977682	.1205452	-2.47	0.023	-.5492211 -.0463154
_cons	-215.5834	83.87296	-2.57	0.018	-390.5393 -40.62743

```
. ovtest
```

```
Ramsey RESET test using powers of the fitted values of ICT_FTS
Ho: model has no omitted variables
F(3, 17) = 1.39
Prob > F = 0.2811
```

```
. hettest
```

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of ICT_FTS
chi2(1) = 0.12
Prob > chi2 = 0.7255
```



## Appendix 1H: People Using Safely Managed Sewage and Sanitation (Urban) Model

```
. ovtest

Ramsey RESET test using powers of the fitted values of WSS_PUSMSUSUrban
Ho: model has no omitted variables
      F(3, 6) =      0.54
      Prob > F =      0.6738

. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of WSS_PUSMSUSUrban

      chi2(1)      =      8.29
      Prob > chi2  =      0.0040

. reg WSS_PUSMSUSUrban L1.WSS_PUSMSUSUrban Year GDP_PercapitaUSD Agric Manuf Urbanpop PopDens, robus
> t

Linear regression                               Number of obs   =           17
                                                F(7, 9)         =      19202.70
                                                Prob > F         =           0.0000
                                                R-squared       =           0.9995
                                                Root MSE      =           .06906
```

WSS_PUSMSUSUrban	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
WSS_PUSMSUSUrban L1.	.5031242	.1700925	2.96	0.016	.1183483	.8879001
Year	-.1660799	.0230258	-7.21	0.000	-.218168	-.1139919
GDP_PercapitaUSD	.0000252	.0001437	0.18	0.865	-.0002999	.0003504
Agric	-.0080128	.0098303	-0.82	0.436	-.0302504	.0142247
Manuf	.0029221	.007095	0.41	0.690	-.0131279	.018972
Urbanpop	.515381	.2669919	1.93	0.086	-.0885966	1.119359
PopDens	-.0215642	.078821	-0.27	0.791	-.1998697	.1567413
_cons	327.0424	49.05787	6.67	0.000	216.0658	438.019



## Appendix 1I: Basic Drinking Water Urban Model

```
. reg WWS_PUBWSSUrban L1.WWS_PUBWSSUrban Year GDP_PercapitaUSD Agric Manuf Urbanpop PopDens
```

Source	SS	df	MS	Number of obs	=	17
Model	1.52536965	7	.21790995	F(7, 9)	>	99999.00
Residual	1.2140e-08	9	1.3489e-09	Prob > F	=	0.0000
				R-squared	=	1.0000
				Adj R-squared	=	1.0000
Total	1.52536966	16	.095335604	Root MSE	=	3.7e-05

WWS_PUBWSSUrban	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
WWS_PUBWSSUrban L1.	.0181298	.0030785	5.89	0.000	.0111657	.0250939
Year	-.0599821	.0001328	-451.58	0.000	-.0602826	-.0596817
GDP_PercapitaUSD	2.24e-07	1.44e-07	1.55	0.155	-1.03e-07	5.51e-07
Agric	9.66e-06	9.15e-06	1.06	0.319	-.000011	.0000304
Manuf	2.37e-07	8.85e-06	0.03	0.979	-.0000198	.0000202
Urbanpop	-.0015657	.0002749	-5.69	0.000	-.0021876	-.0009438
PopDens	-.0008554	.0000477	-17.94	0.000	-.0009633	-.0007476
_cons	213.3579	.5497691	388.09	0.000	212.1143	214.6016

```
. ovtest
powers of fitted values collinear with explanatory variables
(typically because all explanatory variables are indicator variables)
test not possible
r(499);
```

```
. hetttest
```

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
```

```
Ho: Constant variance
```

```
Variables: fitted values of WWS_PUBWSSUrban
```

```
chi2(1) = 3.40
```

```
Prob > chi2 = 0.0650
```

## Appendix 1J: Basic Drinking Rural Model

```
. reg WSS_PUBDSSRural L1.WSS_PUBDSSRural Year GDP_PercapitaUSD Agric Manuf Urbanpop PopDens
```

Source	SS	df	MS	Number of obs	=	17
Model	161.733445	7	23.1047779	F(7, 9)	>	99999.00
Residual	.000038441	9	4.2713e-06	Prob > F	=	0.0000
				R-squared	=	1.0000
				Adj R-squared	=	1.0000
Total	161.733484	16	10.1083427	Root MSE	=	.00207

WSS_PUBDSSRural	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
WSS_PUBDSSRural L1.	-.0924204	.0180541	-5.12	0.001	-.1332617	-.0515791
Year	-.6916105	.0083608	-82.72	0.000	-.710524	-.6726969
GDP_PercapitaUSD	-.0000129	8.08e-06	-1.59	0.146	-.0000311	5.42e-06
Agric	-.0005064	.0005191	-0.98	0.355	-.0016808	.000668
Manuf	-.0000539	.0004975	-0.11	0.916	-.0011792	.0010715
Urbanpop	.085323	.017116	4.98	0.001	.0466039	.1240421
PopDens	.0484358	.0019994	24.23	0.000	.043913	.0529587
_cons	1444.932	17.28848	83.58	0.000	1405.823	1484.041

```
. ovtest
```

```
Ramsey RESET test using powers of the fitted values of WSS_PUBDSSRural
Ho: model has no omitted variables
F(3, 6) = 79022.94
Prob > F = 0.0000
```

```
. hetttest
```

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of WSS_PUBDSSRural

chi2(1) = 2.48
Prob > chi2 = 0.1155
```

```
.
```

## Appendix 1K: People Using Basic Sanitation Services Rural Model

. reg WSS\_PUBDSSRural L1.WSS\_PUBDSSRural GDP\_PercapitaUSD Agric Manuf Urbanpop PopDens

Source	SS	df	MS	Number of obs	=	17
Model	161.704218	6	26.9507031	F(6, 10)	=	9209.13
Residual	.029265207	10	.002926521	Prob > F	=	0.0000
				R-squared	=	0.9998
				Adj R-squared	=	0.9997
Total	161.733484	16	10.1083427	Root MSE	=	.0541

WSS_PUBDSSRural	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
WSS_PUBDSSRural L1.	1.395511	.0405616	34.40	0.000	1.305134	1.485888
GDP_PercapitaUSD	-.0000973	.0002098	-0.46	0.653	-.0005648	.0003702
Agric	.0178925	.0122785	1.46	0.176	-.0094658	.0452507
Manuf	-.0191736	.0115309	-1.66	0.127	-.044866	.0065188
Urbanpop	-1.256424	.1430332	-8.78	0.000	-1.575122	-.937726
PopDens	.1418138	.0431951	3.28	0.008	.045569	.2380586
_cons	14.86091	3.196673	4.65	0.001	7.738274	21.98354

## Appendix 2: Ethical Clearance Approvals

### Appendix 2A: Institutional Approval

**NELSON MANDELA**  
UNIVERSITY

PO Box 77000, Nelson Mandela University, Port Elizabeth, 6031, South Africa mandela.ac.za

Chairperson: Research Ethics Committee (Human)  
Tel: +27 (0)41 504 2347  
[sharlene.govender@mandela.ac.za](mailto:sharlene.govender@mandela.ac.za)

NHREC registration nr: REC-042508-025

Ref: [H20-BES-ACC-004] / Approval]

26 May 2020

Prof H Fourie  
Faculty: BES

Dear Prof Fourie

#### A FRAMEWORK FOR PUBLIC INFRASTRUCTURE FINANCING IN ZIMBABWE

PRP: Prof H Fourie  
PI: Mr T Kapesa

Your above-entitled application served at the Research Ethics Committee (Human) (meeting of 25 March 2020) for approval. The study is classified as a high risk study. The ethics clearance reference number is **H20-BES-ACC-004** and approval is subject to the following conditions:

1. The immediate completion and return of the attached acknowledgement to [Imtiaz.Khan@mandela.ac.za](mailto:Imtiaz.Khan@mandela.ac.za), the date of receipt of such returned acknowledgement determining the final date of approval for the study where after data collection may commence.
2. Approval for data collection is for 1 calendar year from date of receipt of above mentioned acknowledgement.
3. The submission of an annual progress report by the PRP on the data collection activities of the study (form RECH-004 available on Research Ethics Committee (Human) portal) by 15 November this year for studies approved/extended in the period October of the previous year up to and including September of this year, or 15 November next year for studies approved/extended after September this year.
4. In the event of a requirement to extend the period of data collection (i.e. for a period in excess of 1 calendar year from date of approval), completion of an extension request is required (form RECH-005 available on Research Ethics Committee (Human) portal)
5. In the event of any changes made to the study (excluding extension of the study), completion of an amendments form is required (form RECH-006 available on Research Ethics Committee (Human) portal).
6. Immediate submission (and possible discontinuation of the study in the case of serious events) of the relevant report to RECH (form RECH-007 available on Research Ethics Committee (Human) portal) in the event of any unanticipated problems, serious incidents or adverse events observed during the course of the study.
7. Immediate submission of a Study Termination Report to RECH (form RECH-008 available on Research Ethics Committee (Human) portal) upon expected or unexpected closure/termination of study.
8. Immediate submission of a Study Exception Report of RECH (form RECH-009 available on Research Ethics Committee (Human) portal) in the event of any study deviations, violations and/or exceptions.
9. Acknowledgement that the study could be subjected to passive and/or active monitoring without prior notice at the discretion of Research Ethics Committee (Human).

Please quote the ethics clearance reference number in all correspondence and enquiries related to the study. For speedy processing of email queries (to be directed to [Imtiaz.Khan@mandela.ac.za](mailto:Imtiaz.Khan@mandela.ac.za)), it is recommended that the ethics clearance reference number together with an indication of the query appear in the subject line of the email.

We wish you well with the study.

Yours sincerely



**Dr S Govender**  
**Chairperson: Research Ethics Committee (Human)**

Cc: Department of Research Development  
Faculty Administrator: BES

[Appendix 1](#)

## Appendix 2B: Faculty Ethics Approval letter

# NELSON MANDELA UNIVERSITY

PO Box 77000, Nelson Mandela University, Port Elizabeth, 6031, South Africa mandela.ac.za

Chairperson: Faculty Research Ethics Committee (Human)  
Tel: +27 (0)41 504 2906

Ref: [H20-BES-ACC-004] / Approval]

28 January 2020

Prof H Fourie  
Department: School of Accounting

Dear Prof Fourie,

### **TITLE OF STUDY: A FRAMEWORK FOR PUBLIC INFRASTRUCTURE FINANCING IN ZIMBABWE (PHD)**

PRP: Prof H Fourie  
PI: T Kapesa

Your above-entitled application served at the *Faculty Ethics Committee of the Faculty of Business and Economic Science, (07 November 2019)* for approval. The study is classified as a negligible/low risk study. The ethics clearance reference number is **H20-BES-ACC-004** and approval is subject to the following conditions:

1. The immediate completion and return of the attached acknowledgement to [Lindie@mandela.ac.za](mailto:Lindie@mandela.ac.za), the date of receipt of such returned acknowledgement determining the final date of approval for the study where after data collection may commence.
2. Approval for data collection is for 1 calendar year from date of receipt of above mentioned acknowledgement.
3. The submission of an annual progress report by the PRP on the data collection activities of the study (form RECH-004 to be made available shortly on Research Ethics Committee (Human) portal) by 15 December this year for studies approved/extended in the period October of the previous year up to and including September of this year, or 15 December next year for studies approved/extended after September this year.
4. In the event of a requirement to extend the period of data collection (i.e. for a period in excess of 1 calendar year from date of approval), completion of an extension request is required (form RECH-005 to be made available shortly on Research Ethics Committee (Human) portal)
5. In the event of any changes made to the study (excluding extension of the study), completion of an amendments form is required (form RECH-006 to be made available shortly on Research Ethics Committee (Human) portal).
6. Immediate submission (and possible discontinuation of the study in the case of serious events) of the relevant report to RECH (form RECH-007 to be made available shortly on Research Ethics Committee (Human) portal) in the event of any unanticipated problems, serious incidents or adverse events observed during the course of the study.
7. Immediate submission of a Study Termination Report to RECH (form RECH-008 to be made available shortly on Research Ethics Committee (Human) portal) upon unexpected closure/termination of study.
8. Immediate submission of a Study Exception Report of RECH (form RECH-009 to be made available shortly on Research Ethics Committee (Human) portal) in the event of any study deviations, violations and/or exceptions.
9. Acknowledgement that the study could be subjected to passive and/or active monitoring without prior notice at the discretion of Research Ethics Committee (Human).

Please quote the ethics clearance reference number in all correspondence and enquiries related to the study. For speedy processing of email queries (to be directed to [Lindie@mandela.ac.za](mailto:Lindie@mandela.ac.za)), it is recommended that the ethics clearance reference number together with an indication of the query appear in the subject line of the email.

We wish you well with the study.

Yours sincerely



Prof S Mago

Cc: Department of Research Capacity Development  
Faculty Research Co-ordinator: Lindie van Rensburg

**Appendix 3: Approvals of study by some gatekeepers**

**Appendix 3A: Approval Letter from the Public Service Commission**

Correspondence should not be addressed to individuals



PUBLIC SERVICE COMMISSION  
SOCIAL SECURITY CENTRE  
P.O. BOX CY 440  
Causeway  
HARARE

Telephone: 700881-3/720234/793936/706066  
Fax: 708771/705190

REF: A/65 1782

13 March 2020

Mr. Tonderai Kapesa ✓  
729 Jacana Drive  
Helensvale  
Harare

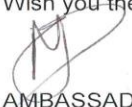
**RE: REQUEST TO CONDUCT STUDY IN GOVERNMENT OF ZIMBABWE  
MINISTRIES: TONDERAI KAPESA**

Reference is made to your letter dated 02 March 2020, on the above subject matter.

It is noted that you are a student at Nelson Mandela University in South Africa and intend to carry out a PhD research in the Civil Service. Your proposed research topic is titled "A framework for public infrastructure financing in Zimbabwe". In this regard, you are seeking the Commission's clearance in order for you to carry out the research in Government Ministries and Departments.

Please be advised that the Commission has no objection to your request. You will however only be able to access declassified information. The concerned Ministries and Government Departments shall determine which information you can access.

Wish you the best in your research.

  
AMBASSADOR J. WUTAWUNASHE  
SECRETARY

**PUBLIC SERVICE COMMISSION**

CC: Chairman, Public Service Commission  
Head, Human Capital Development and Management  
General Manager, Training, Development and Management  
Manager, Research Planning and Skills Upgrading  
Tonderai Kapesa (0772 614 943)  
Section Float





**Appendix 3B: Authorisation from TelOne Pvt Ltd ( A parastatal Enterprise) excerpts**



---

**CONFIDENTIALITY**

**AND**

**NON-DISCLOSURE AGREEMENT**

**BETWEEN**

**KAPESA TONDERAI**

**AND**

**TEL-ONE (PVT) LTD**

*Handwritten initials and text:*  
RP  
H2  
Mcm  
E-T  
SR

CONFIDENTIALITY AND NON-DISCLOSURE AGREEMENT

---

**1 PARTIES**

The parties to this agreement are:

Tonderai Kapesa, a student studying towards a PHD in Accounting at Nelson Mandela University.

**WHEREAS**

- 2.1.1 Tonderai Kapesa would like to carry out a research for his Dissertation focusing on "A Framework for public infrastructure finance in Zimbabwe.
- 2.1.2 This will involve TelOne sharing information around their strategy and Organisational Performance;
- 2.1.3 Tonderai kapesa as part of the research will use academic theories and frameworks to analyse the TelOne Organisational Performance;
- 2.1.4 The information gathered will be for the purpose of broadening academic knowledge in the areas of leadership strategies and organizational performance which in turn can be useful to TelOne to sharpen their strategies;
- 2.1.5 The parties wish to record the terms and conditions upon which they are willing and prepared to enter this agreement.

**3. INTERPRETATION**

3.1 In this agreement, unless inconsistent with or otherwise indicated by the context:

- 3.1.1 "the/this agreement" means the agreement as set out herein;
- 3.1.2 "Commencement date" means the latest date of signature to this agreement not taking into consideration the dates applicable to amendments, annexures or appendices.
- 3.1.3 "Confidential information" means without limiting the generality of the term, any:
  - 3.1.3.1 technical, scientific, commercial, business, financial or market information, or trade industry secrets;
  - 3.1.3.2 data concerning business relationships, samples, devices, demonstrations, processes or machinery;
  - 3.1.3.3 designs, data models, software code, proposals, literature, brochures, drawings and technical specifications,
  - 3.1.3.4 any document with a footer marked "Private and Confidential" and all other

CONFIDENTIALITY AND NON-DISCLOSURE AGREEMENT

enforcing, at any time and without notice, strict and punctual compliance with each and every provision or term hereof.

16. BINDING ON SUCCESSORS AND RELATED PARTIES

This agreement shall be binding upon the heirs, assigns, executors or sequestrates successors-in-title and parent, subsidiaries and affiliates of the parties hereto.

Signed at Harare, on this 06 day of March 2020

FOR AND ON BEHALF OF TELONE

NAME: HOPEWELL ZINYAU

DESIGNATION: CORPORATE SERVICES DIRECTOR

SIGNATURE: 



AS WITNESSES

1. 

2. 

Signed at Harare, on this 12 day of March 2020

BY:

NAME: TONDERAI KAPESA

SIGNATURE: 

AS WITNESSES

1. 

2. 

## Appendix 3C: Approval Letter City of Harare



CITY OF HARARE

HUMAN CAPITAL DEPARTMENT  
TOWN HOUSE, HARARE, ZIMBABWE  
POST OFFICE BOX 990  
TELEPHONE 752979 / 753000

EMAIL: [hrd@hararecity.co.zw](mailto:hrd@hararecity.co.zw)  
ADDRESS ALL CORRESPONDENCE TO THE HUMAN CAPITAL DIRECTOR

24 February 2020

Nelson Mandela University  
P O Box 77000  
South Africa

Dear Kapesa Tonderai

**RE: AUTHORITY TO UNDERTAKE RESEARCH: KAPESA TONDERAI**

This letter serves as authority for Kapesa Tonderai to undertake a research survey on topic:  
**"A FRAMEWORK FOR PUBLIC INFRASTRUCTURE FINANCING IN ZIMBABWE"**.

The City of Harare has no financial obligation and neither shall it render any further assistance in the conduct of the research. The researcher is however requested to avail a soft and hard copy of the research to the undersigned so that residents of Harare can benefit out of it. The research should not be used for any other purpose other than the study purpose specified.

Yours faithfully

 MAJOR M. MARARA

## Appendix 3D: Approval Letter from ZETDC



### ZIMBABWE ELECTRICITY TRANSMISSION & DISTRIBUTION COMPANY

HEAD OFFICE  
ELECTRICITY CENTRE,  
25 SAMORA MACHEL AVENUE,  
HARARE  
P.O. BOX 377, HARARE  
TELEPHONE: 2774491/9, 2774508/35  
FAX: 2774542/3, 2758356

OUR REF:.....115/1/TC/vlg.....

YOUR REF .....

WHEN CALLING WITH REFERENCE  
TO THIS LETTER PLEASE ASK FOR

.....T. Chendume.....

5 March 2020

Mr. T. Kapesa  
729 Jacana Drive  
Helensvale  
**HARARE**

Dear Sir

**RE: APPLICATION FOR PERMISSION TO CARRY OUT A DISSERTATION IN ZETDC**

Your correspondence on the above subject is acknowledged. Authority is hereby granted for you to carry out the dissertation utilising the data obtained from ZETDC. The information collected shall remain confidential. We shall also be glad to get the findings of your project.

I wish you the best as you pursue your studies.

Yours faithfully

**R. KATSANDE**  
**MANAGING DIRECTOR (A) – ZETDC**

## Appendix 3E: Approval letter from POTRAZ

### Postal & Telecommunications Regulatory Authority of Zimbabwe



1008 Performance Close  
Mt. Pleasant Business Park  
P.O. Box MP 843  
Mt. Pleasant  
Harare  
ZIMBABWE  
Tel number: +263 242 333032  
Fax number: +263 242 333041  
Email: [the.regulator@potraz.gov.zw](mailto:the.regulator@potraz.gov.zw)  
Website: [www.potraz.gov.zw](http://www.potraz.gov.zw)

Our Ref:GKM/rc/em/322/20

28 February 2020

Faculty of Business and Economic Sciences  
Nelson Mandela University  
P.O. Box 77000 Nelson Mandela University  
Port Elizabeth 6031  
South Africa

**Attention: Dr Gift Mugano**

#### **RE : REQUEST TO CONDUCT RESEARCH FOR KAPESA TONDERAI**

Reference is made to your correspondence under even subject matter, dated 5 February 2020, in which you requested the above mentioned student to undertake research on POTRAZ as part of your PhD studies.

We are pleased to advise you that, the Authority is amenable to your request and as such, the student may proceed with the research as requested.

Yours faithfully

  
Dr G. K. Machengete  
**DIRECTOR GENERAL**



**CC : Tonderai Kapesa, PhD Accounting Student, Nelson Mandela University**

# Appendix 3F: Letter of referral from Ministry of Energy and Power Development

All correspondence should be addressed to "The Secretary"  
Telephone: 791760/9,  
Website: [www.energy.gov.zw](http://www.energy.gov.zw)  
Email: [energy@energy.gov.zw](mailto:energy@energy.gov.zw)

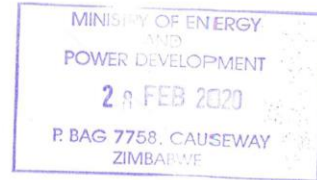


Ministry of Energy & Power Development  
John Boyne House  
2<sup>nd</sup> Floor  
Cnr. Inez Terrace and Speke Ave  
Private Bag 7758, Causeway  
HARARE, Zimbabwe

Reference: AD/1/18/701

28 February 2020

729 Jacana Drive  
Helensvale  
Harare



**REQUEST FOR ORGANISATIONAL CONSENT TO CONDUCT STUDY: MR KAPESA TONDERAI: STUDENT: NELSON MANDELA UNIVERSITY: REPUBLIC OF SOUTH AFRICA**

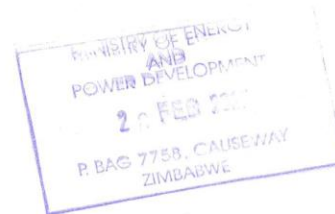
Reference is made to your application letter to this Ministry dated 10 February 2020

The Ministry acknowledges receipt of your application letter for permission to collect relevant academic data for your research. It is noted that you are studying towards a PhD in Accounting at Nelson Mandela University, Republic of South Africa and that you are carrying out a research on "A framework for public infrastructure financing in Zimbabwe".

In view of the above, you are kindly being advised to direct your application to the Secretary for Public Service Commission (PSC). In your application state whether you are a resident of Zimbabwe and also attach your approval letter from the college to carry out the research.

The Secretary for PSC can be reached on the following address:

The Secretary  
Public Service Commission  
6<sup>th</sup> Floor, Social Security Centre  
Cnr 2<sup>nd</sup> / Julius Nyerere  
Harare  
**Zimbabwe**



V. Kamtepa  
for: **SECRETARY FOR ENERGY AND POWER DEVELOPMENT**  
//cn

*Towards Energy Reliability*

## Appendix 4: Data Collection instruments

### Appendix 4A: Survey questionnaire (Completed per infrastructure project)

Respondent number: 

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My topic of research is: **A Framework for Public Infrastructure Financing in Zimbabwe.**  
The purpose of this survey is to establish the processes involved in the financing decision for public infrastructure investments for purposes of developing and recommending a framework for the selection of suitable and efficient mechanisms to finance these investments. Responses will be treated with utmost confidentiality. Kindly tick (√) the box you think appropriately represents your views or provide details in the spaces provided. Please complete this questionnaire for each infrastructure project undertaken.

#### Section I: Personal details

1. Gender: 

1	2
Female	Male

2. What position do you hold in your organization?

1	2	3	4
Non-managerial	Middle management	Senior Manager	Executive

3. How long have you been employed in the organization?

1	2	3	4
Less than 5 years	6 to 10 years	11 to 15 years	More than 15 years

#### Section II: Infrastructure project details

4. In which Infrastructure sector is your organisation?

1	2	3	4
Transport	Water and sanitation	Information Communication Technology	Power (energy)

5. Please specify the project undertaken: \_\_\_\_\_  
\_\_\_\_\_

6. How much financing up-front was required for the project? US\$ \_\_\_\_\_



7. How was the project financed?

0		1	
<b>Externally</b>		<b>Internally</b>	
Debt (loans)		Equity (retained funds)	
Development finance		Budget appropriations (taxes)	
Public Private Partnership		Retention funds	
Infrastructure finance institutions			
Infrastructure bonds			

**Section III: Infrastructure Financing risk assessment**

For each case study project, a risk factor which is determined with reference to; Project Risk, Transaction Cost and Information Asymmetry is sub-divided into sub-criteria. Each sub-criterion is evaluated qualitatively as assigned a Likert Scale rating of 1 (very low risk) or 2 (low risk) or 3 (average risk) or 4 (high risk) or 5 (very high risk). A simple average rating is then calculated for each Risk Factor, assuming all the sub-criteria carry the same weight. A risk score is then calculated by dividing the average rating by the maximum possible score (5). i.e., Risk Score= average rating/5.

**8. Project risk**

How do you assess the following risks for each infrastructure project undertaken? (Please tick one box to show your assessment of the risks).

	Score	1	2	3	4	5
	Rating	Very low	Low risk	Average	High	Very high
Construction risk						
Operations risk						
Demand risk						
Political and regulatory risk						
Environmental risk						
Social risk						
Currency exchange risk						
Interest rate risk						

**9. Transaction cost risk**

	Score	1	2	3	4	5
Time taken to contract (negotiation period)	Rating	Very short	Short	Average	Long	Very long
Contracting process	Rating	Very fast	Fast	Average	Slow	Very slow
Administrative costs	Rating	Very low	Low	Average	High	Very high
Project delays	Rating	Very short	Short	Average	Long	Very long

**10. Information asymmetry**

	Score	1	2	3	4	5
Common understanding of project objectives	Rating	Very high	High	Average	Low	Very low
Role clarification for public/private sector	Rating	Very low	Low	Average	High	Very high
Transparency in procurement process	Rating	Very high	High	Average	Low	Very low

11. Besides the above risks which other risks do you consider critical in arriving at the financing decisions for public infrastructure projects?

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12. How did you mitigate the financing risks of each infrastructure project?

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**Thank you for your time and effort**

## Appendix 4B: Interview Guide for Ministry of Finance and Economic Development Staff

<b>INTERVIEWER:</b>	Tonderai Kapesa		
<b>PARTICIPANT:</b>			
<b>DATE:</b>		<b>VENUE:</b>	
<b>Do you Consent to Participating in the Interview?</b>	YES	NO	
<b>Permission to record interview</b>	Granted	Not granted	
<b>Would you like to receive a copy of the results?</b>	YES	NO	
<b>PURPOSE:</b>			
The purpose of the interview is to gather primary data on the topic: <b>A framework for Public infrastructure financing in Zimbabwe.</b>			
<b>INTERVIEW STRUCTURE:</b>			
The interview will be guided by questions that allow open-ended responses. The data obtained from these questions will be recorded and analysed using the R software for qualitative data analysis (RQDA).			
<b>INTRODUCTION:</b>			
The topic of the research is: <b>A Framework for Public Infrastructure Financing in Zimbabwe</b>			
The aim of the interviews is to gather data regarding: <ul style="list-style-type: none"> <li>• The main sources of public infrastructure financing in Zimbabwe.</li> <li>• The innovative finance's preference for financing the public infrastructure gap in Zimbabwe.</li> <li>• The role played by public-sector accounting/accountants in determining appropriate and efficient mechanisms to finance public infrastructure in Zimbabwe.</li> <li>• Existence of a framework for selecting suitable and efficient mechanisms to finance public infrastructure in Zimbabwe.</li> </ul>			
<b>Sources of infrastructure finance</b>			
Question 1 - What major public infrastructure projects has the Government of Zimbabwe embarked on in the last decade (2009-2019)?			

Question 2 – Who financed the infrastructure projects? (Itemise for each project)
Question 3 - How was the decision to finance each project arrived at? And what considerations are regarded critical in determining infrastructure project financiers?
Question 4 – What mechanism or evaluation criteria are available to assess suitability of financing for each project?
<b>Innovative finance use (focus on specific projects identified above)</b>
Question 5 – How important is the source of finance for infrastructure in the decision-making process on each project?
Question 6 – To what extent (how much) has the government (treasury) financed infrastructure projects during the period (2009-2019)?
Question 7 - Has there been any private sector involvement in the financing of each project? (to what extent (How much)?)
Question 8 – What has been the implication of the financing decision on infrastructure delivery? (in terms of infrastructure delivery timelines, adherence to initial budget, quality of workmanship, etc)

Question 9 - Is there infrastructure project-finance post implementation evaluation at the end of each project?
Question 10- Was the financing appropriate for each project?
Personnel involved in infrastructure project financing evaluation
Question 11- Are infrastructure project-appraisals done, before each project? And Which methods are used for the appraisals?
Question 12- What aspects are appraised before the implementation of each project?
Question 13- Are financing decisions part of the appraisal/evaluation?
Question 14- Who is responsible for project appraisal and financing evaluation?(What is the role of accountants?)

Question 15- What role do personnel in your Ministry/ RBZ take during the appraisal and evaluation of infrastructure projects?

Question 16- At what stage are personnel from your Ministry/RBZ involved in infrastructure projects?

Question 17- Do you make any contributions on the financing decisions of infrastructure projects?

Question 18- How consultative or technical is the pre-financing evaluation process?

**Framework used to evaluate infrastructure finance**

Question 19- What factors are considered before deciding on the finance for infrastructure projects?

Question 20- How is risk considered in the financing decisions for infrastructure projects?

Question 21- Is there any framework used in your ministry to evaluate the suitability and efficiency of the financing mechanisms for each project?

#### Appendix 4C: Interview Guide for Government Ministries and Parastatals Staff

<b>INTERVIEWER:</b>	Tonderai Kapesa		
<b>PARTICIPANT:</b>			
<b>DATE:</b>		<b>VENUE:</b>	
<b>Do you Consent to Participating in the Interview?</b>	YES	NO	
<b>Permission to record interview</b>	Granted	Not granted	
<b>Would you like to receive a copy of the results?</b>	YES	NO	
<b>PURPOSE:</b>			
The purpose of the interview is to gather primary data on the topic: A framework for Public infrastructure financing in Zimbabwe.			
<b>INTERVIEW STRUCTURE:</b>			
A semi-structured interview will be used to gather the required primary data from participants. The interview will be guided by questions that allow open-ended responses. The data obtained from these questions will be recorded and analysed using the Atlas Ti software package.			
<b>INTRODUCTION:</b>			
The topic of the research is: <b>A Framework for Public Infrastructure Financing in Zimbabwe</b>			
The aim of the interviews is to gather data regarding: <ul style="list-style-type: none"> <li>• The main sources of public infrastructure financing in Zimbabwe.</li> <li>• The innovative finance’s preference for financing the public infrastructure gap in Zimbabwe.</li> <li>• The role played by public-sector accounting/accountants in determining appropriate and efficient mechanisms to finance public infrastructure in Zimbabwe.</li> <li>• Existence of a framework for selecting suitable and efficient mechanisms to finance public infrastructure in Zimbabwe.</li> </ul>			
<b>Sources of infrastructure finance</b>			
Question 1 - What major public infrastructure projects has the ministry/parastatal embarked on in the last decade (2009-2019)?			

<p>Question 2 – To what extent is the Ministry/Parastatal involved in the project’s evaluation including the evaluation of the financing decision?</p>
<p>Question 3 - Who financed the infrastructure projects?</p>
<p>Question 4 - How was the decision to finance each project arrived at? And what considerations are regarded critical in determining infrastructure project financiers?</p>
<p>Question 5 – What mechanism or evaluation criteria are available to assess suitability of financing for each project?</p>
<p><b>Innovative finance use (focus on specific projects identified above)</b></p>
<p>Question 6 – How important is the source of finance for infrastructure in the decision-making process on each project?</p>
<p>Question 7 – To what extent (how much) has the government (treasury) financed infrastructure projects?</p>
<p>Question 8 - Has there been any private sector involvement in the financing of each project? (to what extent?)</p>



<p>Question 9 – What has been the implication of the financing decision on infrastructure delivery? (in terms of infrastructure delivery timelines, adherence to initial budget, quality of workmanship, etc)</p>
<p>Question 10 - Is there infrastructure project-finance post implementation evaluation at the end of each project?</p>
<p>Question 11- Was the financing appropriate for the project?</p>
<p>Personnel involved in project financing evaluation</p>
<p>Question 12- Are infrastructure project-appraisals done, before each project? And Which methods are used for the appraisals?</p>
<p>Question 13- What aspects are appraised before the implementation of each project?</p>
<p>Question 14- Are financing decisions part of the appraisal/evaluation?</p>
<p>Question 15- Who is responsible for project appraisal and financing evaluation?</p>

Question 16- What roles are played by which personnel during infrastructure projects evaluation?

Question 17- How consultative or technical is the pre-financing evaluation process?

**Framework used to evaluate infrastructure finance**

Question 18- What factors are considered before deciding on the finance for infrastructure projects?

Question 19- How is risk considered in the financing decisions for infrastructure projects?

Question 20- Is there any framework used in your ministry to evaluate the suitability and efficiency of the financing mechanisms for each project?

#### Appendix 4D: Interview Guide for Financial Institutions

<b>INTERVIEWER:</b>	Tonderai Kapesa		
<b>PARTICIPANT:</b>			
<b>DATE:</b>		<b>VENUE:</b>	
<b>Do you Consent to Participating in the Interview?</b>	YES	NO	
<b>Permission to record interview</b>	Granted	Not granted	
<b>Would you like to receive a copy of the results?</b>	YES	NO	
<b>PURPOSE:</b>			
The purpose of the interview is to gather primary data on the topic: A framework for Public infrastructure financing in Zimbabwe.			
<b>INTERVIEW STRUCTURE:</b>			
A semi-structured interview will be used to gather the required primary data from participants. The interview will be guided by questions that allow open-ended responses. The data obtained from these questions will be recorded and analysed using the RQDA package.			
<b>INTRODUCTION:</b>			
The topic of the research is: <b>A Framework for Public Infrastructure Financing in Zimbabwe</b>			
The aim of the interviews is to gather data regarding:			
<ul style="list-style-type: none"> <li>• The main sources of public infrastructure financing in Zimbabwe.</li> <li>• The innovative finance's preference for financing the public infrastructure gap in Zimbabwe.</li> <li>• The role played by public-sector accounting/accountants in determining appropriate and efficient mechanisms to finance public infrastructure in Zimbabwe.</li> <li>• Existence of a framework for selecting suitable and efficient mechanisms to finance public infrastructure in Zimbabwe.</li> </ul>			

**Access to finance for public infrastructure projects from financial institutions.**

Question 1 - What services does your institution offer in financing of infrastructure projects?

Question 2 – For each of the services you have stated, what are your requirements from clients before granting finance?

Question 3 - What are the key considerations before financing public infrastructure projects?

Question 4 - Does your institution apply any framework to evaluate the suitability and efficiency of a financing public infrastructure?

Question 5 – What are the major risks affecting public infrastructure financing in Zimbabwe?

Question 6 – How do you mitigate the risks of financing public infrastructure?

Question 7 – How many public infrastructure projects has your institution financed in Zimbabwe? (probe for the value of projects in ICT, Water and sanitation, transport and energy and the amounts involved)

Question 8 - What is the value of public infrastructure financed in Zimbabwe? (Probe for further details which are project specific).

Question 9 – How did the public infrastructure projects financed perform?

Question 10 - What lessons have you learnt about financing public infrastructure in Zimbabwe?

Question 11- Do you think financial institutions in Zimbabwe have sufficient capacity to finance public infrastructure requirements?

Question 12- Do you have alternative financiers for public infrastructure in Zimbabwe given your experience in this regard?

## Appendix 5: Participant Information Sheet and Consent Form

Date.....

Title of research: **A FRAMEWORK FOR PUBLIC INFRASTRUCTURE FINANCING IN ZIMBABWE**

Dear Prospective Participant

My name is Tonderai Kapesa undertaking research together with Dr G. Mugano and Professor H. Fourie, towards the award of a PhD degree at the Nelson Mandela University in South Africa. We are inviting you to participate in a study entitled “*A FRAMEWORK FOR PUBLIC INFRASTRUCTURE FINANCING IN ZIMBABWE*”.

### **WHAT IS THE AIM/PURPOSE OF THE STUDY?**

The aim of this study is to develop and recommend a framework for evaluating the financing decisions for public infrastructure projects in Zimbabwe.

### **WHY AM I BEING INVITED TO PARTICIPATE?**

I am specifically interested in the perspectives of the following key groups of players in the determination of financing decisions for public infrastructure projects:

1. Practising accountants in government ministries and parastatal enterprises directly responsible for infrastructure including, transport, energy/power, ICT and water and sanitation in Zimbabwe.
2. Economists from government ministries and parastatal enterprises directly responsible for infrastructure including, transport, energy/power, ICT and water and sanitation in Zimbabwe.
3. Government of Zimbabwe’s development partner representatives with direct interest in commercial infrastructure (transport, ICT, power/energy and water and sanitation).
4. Representatives of financial institutions which have financed public infrastructure in Zimbabwe.

You are being invited to participate as a <accountant/economist/representative of development partner/financial institution representative>.

**WHAT IS THE NATURE OF MY PARTICIPATION IN THIS STUDY /WHAT DOES THE RESEARCH INVOLVE?**

Your input to the study will be through a semi-structured interview conducted by the researcher at the most convenient time and place to you.

It is anticipated that the interviews will take about **1 hour**.

**CAN I WITHDRAW FROM THIS STUDY?**

Your participation in this study is voluntary and you are under no obligation to consent to participation.

You are free to withdraw at any time and without giving a reason.

**WHAT PERSONAL DATA SHALL BE REQUIRED FROM STUDY PARTICIPANTS**

Participants' names and other personal identification details shall not be required in the study except for the following: gender, age and experience in the organisation. These personal data will be used collectively in the analysis of findings without identifying them to their organisations. For the analysis participant numbers will be used.

**WHAT ARE THE POTENTIAL BENEFITS OF TAKING PART IN THIS STUDY?**

There will be no direct benefit to you for your participation in this study. However, the researchers hope that the information obtained from this study will contribute to the body of knowledge on financing of public infrastructure in Zimbabwe

**WHAT IS THE ANTICIPATED INCONVENIENCE OF TAKING PART IN THIS STUDY?**

We do not anticipate any inconvenience associated with your participation in this study beyond the loss of time due to participation.

**WILL WHAT I SAY BE KEPT CONFIDENTIAL?**

Every effort will be made by the researcher to preserve your confidentiality. You will be assigned a participant code number and you will be referred to in this way in the data, any publications, or other research reporting. Notes, interview transcriptions, recordings and any other material containing identifying participant information may be reviewed by people responsible for making sure that research was done properly. These may include a transcriber, external coder, and members of the Research Ethics Committee. In all such cases, a formal confidentiality agreement will be signed before access to any material will be granted. Participants may request a copy of the interview transcription.

**HOW WILL INFORMATION BE STORED?**

Notes, hard copies of interview transcriptions, recordings and any other identifying participant material will be kept in a locked filing cabinet in the personal possession of the researcher for a period of five years. Electronic materials containing identifying participant information will be stored in a password-protected folder on the hard drive of the personal computer of the researcher for a period of five years. Computer files will not be saved on any server. Future use of the stored data will be subject to further research ethics review and approval if applicable.

**HAS THE STUDY RECEIVED ETHICAL APPROVAL?**

This study has received approval from the Research Ethics Committee of the Faculty of Business and Economic Sciences of the Nelson Mandela University.

**HOW WILL I BE INFORMED OF THE FINDINGS/RESULTS?**

If you would like to be informed of the final research findings, please indicate this to the researcher at any stage during the research process.

**HOW CAN I GET FURTHER INFORMATION?**

Should you require any further information or want to contact the researcher about any aspect of this study, please contact Tonderai Kapesa on +263 772614943 or at [kapesatonde@yahoo.com](mailto:kapesatonde@yahoo.com).

Should you have concerns about the way in which the research has been conducted, you may contact Dr Gift Mugano on +263 712164049 /+27 12 433 4651 or at [gmugano@gmail.com](mailto:gmugano@gmail.com) or Prof Houdini Fourie on +27 832618748 or email: [HFourie@mandela.ac.za](mailto:HFourie@mandela.ac.za).

Thank you for taking time to read this information sheet and for participating in this study.

Kind regards

TONDERAI KAPESA (219359911)



---

**CONSENT FORM**

---

Title of Research: **A FRAMEWORK FOR PUBLIC INFRASTRUCTURE FINANCING IN ZIMBABWE**

Name of Researcher: **Mr Tonderai Kapesa**

Please initial all boxes

1. I confirm that I have read and understood the information sheet above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.
  
2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason.
  
3. I understand that my personal data collected during the study, such as gender, age and experience in the organisation, may be looked at by individuals from **Nelson Mandela University**, where it is relevant to my taking part in this research. I give permission for these individuals to have access to my records.
  
4. I agree to take part in the above study.
  
5. I am aware that the findings of this study will be anonymously processed into a research report, journal publications and/or conference proceedings.
  
6. I agree to the recording of the interview.

\_\_\_\_\_  
Name of Participant

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Name of Person  
taking consent (researcher).

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature

**Appendix 6: English Language Editing Confirmation Letter**

**EDITING LETTER**

696 Clare Road

Clare Estate

Durban

4091

6 January 2021

To: Whom it may concern

**Editing of PhD: Mr T Kapesa**

**A FRAMEWORK FOR PUBLIC INFRASTRUCTURE FINANCING IN ZIMBABWE**

This letter serves as confirmation that the aforementioned PhD has been language edited.

Any queries may be directed to the author of this letter.

Regards




MP MATHEWS

Lecturer and Language Editor

[mercillenem@dut.ac.za](mailto:mercillenem@dut.ac.za)

## Appendix 7: Turnitin Similarity Report Overview



Originality Report

Processed on: 07-Jan-2021 16:00 SAST  
 ID: 1186594386  
 Word Count: 114344  
 Submitted: 7

### Final Thesis for examination T. Kapesa By Tonderai Kapesa

Similarity by Source	
Internet Sources:	10%
Publications:	5%
Student Papers:	4%

Document Viewer

[include quoted](#)   [include bibliography](#)   [excluding matches < 9 words](#)
mode: show highest matches together   [Change mode](#)    

A FRAMEWORK FOR PUBLIC INFRASTRUCTURE FINANCING IN ZIMBABWE BY  
 TONDERAI KAPESA

**STUDENT NUMBER:** 219359911 **SUBMITTED IN FULFILMENT OF** 5  
**THE REQUIREMENTS FOR THE DOCTOR OF PHILOSOPHY DEGREE**  
 (PhD) **IN ACCOUNTING IN THE FACULTY OF BUSINESS AND ECONOMIC**  
**SCIENCES AT THE NELSON MANDELA UNIVERSITY** **PROMOTER: PROF**  
**GIFT MUGANO CO- PROMOTER: PROF**

HOUDINI FOURIE DECEMBER 2020 DECLARATION BY CANDIDATE NAME: KAPESA  
 TONDERAI

**STUDENT NUMBER:** 219359911 **QUALIFICATION: DOCTOR OF** 173

- 1

1% match ( )  
<http://hdl.handle.net>
- 2

< 1% match (Internet from 24-Jan-2019)  
<https://epubs.scu.edu.au/cgi/viewcontent.cgi?article=1463&context=theses>
- 3

< 1% match (Internet from 19-Aug-2019)  
<https://www.mdpi.com/2227-7099/6/3/43/htm>
- 4

< 1% match (publications)  
["Global Encyclopedia of Public Administration, Public Policy, and Governance", Springer Science and Business Media LLC, 2018](#)