FULL COLOUR THINKING

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WATER INFRASTRUCTURE FINANCE IN NAMIBIA:
Analysing the participation of State and non-State actors

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Simon Tangi Nghipangwa

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Supervised by: Dr. Steven Rogers

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ABSTRACT

The adverse effects of climate change have had significant impacts on water resources, mostly in dry and semi-arid countries. Therefore, there is a need to provide more water infrastructure. Lack of adequate water infrastructures, most prevalent in the developing countries, negatively affects sufficient supply of clean drinking water and provision of basic sanitation. Infrastructure forms the basic medium for water generation, processing, transportation, and storage. Efforts to improve this in many developing countries have predominantly been the responsibility of the State. However, in recent years, Non-State Actors (NSA) have been increasingly involved in governance and financing of infrastructure projects in developing countries. To explore this further, the research investigated the roles and relationships between State and NSAs in the governance and financing of water infrastructure projects in Namibia.

A mixed explorative qualitative and quantitative approach was adopted. It relied on a survey and a case study of State actors and NSAs involved in water infrastructure in Namibia. Data from both the structured infrastructure questionnaires and secondary data from document review (i.e. water-capital project reports) were extracted, classified, and evaluated using statistical analysis tools. Data pertinent to the research were extrapolated to support the analysis of water infrastructure funding and financing structures. This research examined the State of water-infrastructure development finance in Namibia, by analysing the participation of State and non-State actors in water infrastructure development and finance.

There is a well-acclaimed global trend towards diminution of State control and management of public infrastructures. Non-State actors now play a more significant role. Importantly, by contrast, this study found a continued dominance of State in water infrastructure development in Namibia; the presence of NSAs in the water infrastructure space is very limited. A Public Private Partnerships Act would allow non-State actors to participate freely in public infrastructure development. The lack of such enabling legislation in Namibia has prevented financial and technical partnerships between the State and NSAs. This absence has kept potential NSAs almost out of the water-infrastructure development business to complement the State. This phenomenon further exacerbates the continued burden on State finance resources to cater for infrastructure development.

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LIST OF ACCRONYMS AND ABBREVIATIONS

ACPC	African Climate Policy Centre
AGRIBANK	Agricultural Bank of Namibia
CoW	City of Windhoek
DBN	Development Bank of Namibia
DBSA	Development Bank of Southern Africa
DFIs	Development Finance Institutions
DRWS	Directorate of Rural Water Supply
GDP	Gross Domestic Product
GIPF	Government Institutions Pension Fund
GNP	Gross National Product
GRN	Government of the Republic of Namibia
HLP	High-Level Panel on financing infrastructure
IGOs	Intergovernmental Organization
IMF	International Monetary Fund
INGOs	International Non-Governmental Organizations
MAI	Multilateral Agreement on Investment
MAWF	Ministry of Agriculture, Water, and Forestry
MDGs	Millennium Development Goals
NAMWATER	Namibia Water Corporation Limited
NDP4	National Development Plan 4
NSA	Namibia Statistics Agency
NSAs	Non-State Actors
PIF	Project in Progress
REITs	Real Estate Investment Trusts
SADC	Southern African Development Community
SBN	Standard Bank Namibia
SDGs	Sustainable Development Goals
STD BANK	Standard Bank of Namibia
TNCs	Transnational Corporations
UN	United Nations
UNECA	United Nation Economic Commission for Africa

GLOSSARY OF TERMS

Aquifer is a layer of rock or soil able to hold or transmit much water.

Climate change is a change measured in the statistical distribution of weather patterns that lasts for an extended period (i.e., from decades to millions of years). The term may refer to a change in average weather conditions, or a type of weather pattern recorded, such as more or fewer extreme weather events, over a longer-term. Climate change is caused by factors such as biotic processes, variations in solar radiation received by Earth, plate tectonics, and volcanic eruptions. Certain human activities have also been identified as significant causes of recent climate change, often referred to as global warming.

Commercial banks - are a type of financial institution that accepts deposits, makes business loans, and offers basic investment products. A commercial bank can also be a division of a large bank, which more specifically provides deposit and loan services to corporations or large/middle-sized business - as opposed to individual members of the public/small business - retail banking, or merchant banks.

Development Finance Institutions (DFIs) - are alternative financial institutions, which include microfinance institutions, community development financial institutions, and revolving loan funds. They play a crucial role in providing credit in the form of higher risk loans, equity positions, and risk guarantee instruments to private sector investments in developing countries. States with developed economies back DFIs.

Infrastructure development – entails rehabilitation, upgrade, and building of new infrastructures such as water infrastructures, road network infrastructures, railway infrastructures, airport infrastructures, seaport infrastructures, telecommunication infrastructures, and power-energy infrastructures.

Namibia Vision 2030 – Namibia adopted a broad, unifying Vision 2030 plan in 2004. Its intention is to guide Namibia towards making deliberate efforts to improve the quality of life of the people by means of five-year development plans, from NDP 2 through to NDP 7. At the same time, it should provide direction to government ministries, the private sector, NGOs, civil society, regional and local Government authorities.

NDP 4 - is the fourth of seven development plans to guide Namibia towards achieving Vision 2030. NDP 4 is a higher-level plan, characterized by fewer and more carefully selected and sequenced goals and associated target values. The NDP4 has adopted three overarching goals: high and sustained economic growth, increased income equality, and employment creation.

Non-State actors (NSAs) - are entities that participate in domestic activities and programmes complementing State. They are organizations/entities with sufficient powers to influence and cause a change even though they do not belong to any established institution of a State

.

Private/institutional investors – are entities that pool money to purchase securities, real property and other investment assets, or to originate loans. Institutional investors include banks, insurance companies, pensions, hedge funds, Real Estate Investment Trusts (REITs), investment advisors, endowments, and mutual funds.

Public-Private Partnerships (PPP) - involve a contract between a public-sector authority and a private party, in which the private party provides a project service and assumes substantial financial, technical and operational risk in the project.

Sustainable Developmental Goals (SDGs) – are 17 United Nations goals to transform the world. On September 25th 2015, member nations adopted a set of goals to end poverty, protect the planet, and ensure prosperity for all as part of a new sustainable development agenda. Each goal aims to achieve specific targets within the next 15 years.

*** Namibian Dollar (N$) is pegged to the South African Rand (R) and trades 1 to 1. The N$= R**

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1 INTRODUCTION

1.1 Research Area

Infrastructure is the medium for water generation, processing, distribution, and storage (Mathew, *et al.*, 2011). Therefore, a good water infrastructure represents a basic element for forming an efficient water supply system, needed for both optimum use of water resource and preserving purposes. A poor national water infrastructure system poses a serious threat to life. Infrastructure development coincides with rapidly evolving technology. Ever-newer technology needs financing. Therefore, the most critical challenge and limiting factor in water infrastructure development is the need for the finances (African Development Bank, 2015). Traditionally, State structures and agencies have funded and managed most public infrastructure development. However, with the pressing need for more infrastructures, combined with the already stretched national development budgets as a direct result of limited public resources, the participation of Non-State Actors (NSAs) in financing and managing public infrastructure became overly necessary. Finance is one of the most important aspects of water investment (Burki & Perry, 2008). Given this pluralistic nature of water governance, the research investigates the participation of State and non-State actors – who often have varying levels of urgency and agendas – in financing water infrastructure projects in Namibia.

1.1.1 Water as a vital commodity to the living

Water is the basic essence of life (Abu-Zeid, 1998). This postulation further augments the well-known assertion that, there can be no life without water. Therefore, water forms an essential commodity for the living and environment. However, increasingly, world water is a strategic resource under serious threat and pressure, thus requiring modern technology and infrastructure to be managed (Ruiters, 2011). This development poses a serious threat to governments, businesses, and nations worldwide. Fresh water resources have faced a major crisis worldwide in the recent decades, mainly through climate change (Frost & Suvillan, 2008). This crisis, worsening gradually each year, has caused major challenges in countries that are already semi-arid, especially in developing nations in southern Africa. These challenges include increasingly scarce fresh water for drinking and sanitation; deterioration of water quality; fragmentation of water management nationally and globally; and decline of financial resources allocation for

water development. These challenges therefore pose a threat to the intended goal of water sufficiency to ensure universal access to clean water and sanitation.

Gleick (1999) has further contended that access to a basic water requirement is a fundamental human right implicitly and explicitly supported by international law, declarations, and State practice. Therefore, governments, international aid agencies, non-governmental organizations, and local communities should work together to provide all humans with a basic water requirement and to guarantee that water as a human right. Szent-Gyorgyi *et al.* concluded that **water** is life's mater and matrix, mother and medium. Therefore, water resources need preservation to serve and sustain the entire environment and all living organisms in it. However, in order to achieve sustained water resources, there is critical need for further development of adequate and efficient water infrastructure systems to process, store, and distribute clean water. Therefore, an understanding of the importance of water resources is the foundation of this research. Its findings facilitate deeper insights into the critical need and importance for water infrastructure development and financing, regulation, and governance.

1.1.2 Climate change negative impacts on water resources

Climate change is having and will have a multitude of immediate and long-term impacts on water resources in African countries (Urama & Ozor, 2010). These impacts would include droughts, drying up of rivers and dams, poor water quality in surface and ground water systems, and precipitation and water vapour pattern distortions. Their combined effects pose devastating threats to the ecosystem and communities, ranging from economic and social impacts to health and food insecurity. Development of medium- and long-term preparedness strategy that is cost effective, and factors in future uncertainty, is essential. Finding solutions requires a high level of scientific interrogation, and then briefing to policy makers, to ensure a better understanding of such impacts (United Nation Economic Commission for Africa, 2011). By 2025, water resources in most African countries, mainly in eastern and southern Africa, could be less than 1,000 m3 per person per annum. Another estimate sees the proportion of African population at risk of water stress and scarcity increasing from 47% in year 2000 to about 65% by year 2025 (Bates, et al., 2008). Taylor (2011) foresees water as the primary medium through which people in Africa will experience the wrath of climate change impacts. Further estimates are that by year 2020 up to 250 million Africans will experience increased water stress. Such forecasts must alert African States to invest more in water infrastructure development to minimize the negative impacts of climate change.

1.1.3 Infrastructure development as a catalyst for water sufficiency

Fedderke & Garlicky (2008) have confirmed the direct correlation between infrastructure development and economic growth. The Accelerated and Shared Growth Initiative - South Africa (ASGI-SA) has identified inadequate infrastructure as one of the six most important constraints to growth in South Africa. This revelation therefore augments the theory that infrastructure development is a key catalyst for economic growth and development worldwide. Tachiwou (2010) confirms that a nation's infrastructure development plays a significant role in its economic growth, hence a fast-growing economy warrants an even faster developing infrastructure. Its development entails rehabilitation, upgrade, and building of new infrastructures such as water infrastructures, road network infrastructures, railway infrastructures, airport infrastructures, seaport infrastructures, telecommunication infrastructures, and power- energy infrastructures.

Tortajada (2014) states that water infrastructure is an essential element for human development. However, such infrastructure will not contribute to improving the quality of life of millions of people unless it is part of an overall framework for development, economic growth, social equity, and environmental protection. The Nobel laureate Amartya Sen said, *"The absence of infrastructure has a pervasive influence on poverty, but at the same time is not a free –standing factor in lifting people from it."* Therefore, the focus should not be only on physical infrastructures per se but on infrastructure as a driver for growth and sustainable development.

The 17 United Nations Sustainable Development Goals (SDGs) greatly feature infrastructure development to achieve those goals (United Nations, 2015). They officially replaced the former United Nation Millennium Development Goals (MDGs) adopted in 2000. The UN has compelled all member States worldwide to adopt the new 17 SDGs unconditionally. Therefore, Namibia, being a bona fide member of the United Nations, ought to comply with them. It is important to note that the SDGs underscored water infrastructure development as a key priority area (United Nations, 2015).

Figure 1: **The United Nation Sustainable Development Goals 2015** (*Source: UN SDGs report 2015)*

Goal number six of the 17 SDGs particularly focused on ensuring access to Clean Water and Sanitation worldwide by year 2030. This goal is only achievable with an increased investment into water infrastructures. Therefore, governments of water-scarce countries should invest significantly in water infrastructures, or otherwise create an enabling environment for private sector investors to invest in them.

1.1.4 The role of State and other non-State actors in water governance

Water governance refers to "the range of political, social, economic and administrative systems that are in place to develop and manage water resources, and the delivery of water services, at different levels of society" (Global Water Partnership, 2003). The literature States that governance rests on two core values:

- **Inclusiveness** - ensuring that all members of the group receive equal treatment
- **Accountability** - ensuring that those in authority answer to the group they serve if things go wrong, and receive credit when things go well

However, there have been failures in water governance worldwide. Kirchhof & Dilling (2016) revealed that worldwide water governance failures undermine effective water management under uncertainty and change. Expanding economies, growing populations, and a rapidly changing and uncertain environment challenge the ability of water managers and policy makers

to govern water effectively. Overcoming these challenges requires stronger water management approaches. Water governance - the "range of political, social, economic, and administrative systems that are in place" to manage water resources at different levels of society - encompasses a wide variety of activities such as planning and allocation, data gathering, modelling, legislative and judicial processes, and local citizen involvement (Rogers & Hall, 2003, p.7).

The State specifically plays a significant role in providing water infrastructure. Traditionally, State institutions have been the main custodians and key players in water infrastructure finance, providing funding from State resources raised through tax collection tools. However, this phenomenon is slowly fading out with the emergence of actively participating non-State actors. The State also plays a major role in governance and regulation of water resources. All States ought to have an established water governance and regulatory body. However, water governance particularly must recognise some of the following (Global Water Partnership, 2003):

- Investments in water infrastructure provide a mix of public and private benefits. A dam, for example, provides public benefits such as flood protection, and it stores water for individual households or businesses to use
- Water has an emotional and often spiritual dimension for many users
- Rivers, lakes, coastlines, aquifers, and infrastructure are often common-pool resources
- It is possible for members of a group to stop others getting access to water
- There is significant uncertainty about the amount and quality of water available from year to year, in terms of both stocks and flows
- Water management often requires large investments of public funds that are difficult for the public to evaluate at the planning stage, and that are vulnerable to capture by special interests
- Water resources usually must be managed across different periods and at different scales (local, regional, national, international).

Despite all these challenges, States continue to play their part in ensuring water remains a regulated commodity.

Non-State Actors (NSAs) have little or limited authority in water governance and regulation because it remains predominantly linked to the State and its institutions. However, NSAs may cause to play the role of supporting and complementing the State in fulfilling its governance

and regulatory role. Wagner (2009) defines NSAs as international organizations, corporations, non-governmental organizations, and local private institutions that participate in domestic activities and programs to complement the efforts of State to deliver development. They are organizations/entities with sufficient powers to influence and cause a change even though they do not belong to any established institution of a State. NSAs play a key role in water infrastructure finance. They aim to bridge the funding and technical gaps in the infrastructure development space. They support the State by providing financial resources, technical support, and capacity in developing new and maintaining existing water infrastructures. There are many NSAs operating globally and in different countries. Their role in infrastructure development is far-reaching, and it requires a conducive enabling participatory environment to maximally explore and harness it. Table 8 presents the key NSAs in infrastructure development space operating in Namibia.

1.1.5 The State of water resource and infrastructure in Namibia

Water is a strategic resource (Allan, 1998). Water and Sanitation are fundamental enablers for sustainable development (World Health Organisation, 2014). However, many nations and regions of the world have experienced water shortage since the 1970s, especially the dry and semi-arid countries and continents, such as Namibia in the African continent. Reduced water resources are direct results of climate change, increasing population, and very limited spending on the water infrastructure development (Ministry of Agriculture Water and Forestry report, 2015).

Currently, over 97% of all Namibians in urban areas and 87% in rural areas have access to safe water (Ministry of Agriculture Water and Forestry report, 2015). However, in contrast to other States in Eastern and Southern Africa, Namibia has one of the lowest levels of sanitation coverage. Estimates are that about 46% of the Namibian population does not have access to improved sanitation; in rural areas, about 46.5% of the population practices open defecation. There are regional, rural, and urban disparities in access to water and sanitation, ranging from a low of about 12% to a moderate access of about 52%. Poor access to water and sanitation contributes to a negative socio-economic impact on the health of the population and increases child morbidity and mortality. It has led to the death of 1.5 million children under-five age worldwide (World Health Organisation, 2014). Diarrhoea, worms, and respiratory diseases like pneumonia cause around half of the sickness and death of children under five years old. Poor

access to sanitation and hygiene also contributes to undernourishment and stunting; estimates are that 24% of children in that age group are stunted. Implementing Water, Sanitation and Hygiene (WASH) is still a challenge in schools; 20% of schools in Namibia do not have access to sanitation facilities. Furthermore, poor sanitation technologies and inadequate maintenance of existing facilities negatively affect the environment, such as in the pollution of water sources.

There are three major categories of supply and distribution of water resource in Namibia:

- Bulk water supply, by Namwater
- Rural water supply by the Ministry of Agriculture, Water and Forestry – DRWSS
- Private water supplies by private entities such as mines, commercial farms and lodges (Ministry of Agriculture Water and Forestry report, 2015).

The demand for water has increased faster than the growth in population in many places. Estimates are that water demand for economic activities and urban consumption will increase from 416.1 million cubic meters per year in 2015 to about 572.5 in 2025; rural domestic use is likely to increase from 10.6 million cubic meters per year in 2015 to 10.9 in 2025 (Ministry of Agriculture Water and Forestry report, 2015). Agriculture (irrigation) is the largest consumer of water and it will remain the largest consumer up to year 2030. Hence, there is a dire need for more water infrastructure development to cater for the rising need for more water.

Namibia is a semi-arid country, with limited rains. However, rainfall remains the only natural source of fresh water that the entire environment depends on. Change in rainfall patterns and other forms of precipitation are amongst the most critical factors determining the overall impact of climate change. The phenomenon of climate change is recognised when a change in the statistical distribution of weather patterns lasts for an extended period. The following events can cause it:

- Biotic processes
- Variation in solar radiation received by earth
- Plate tectonics
- Volcanic eruptions

Ministry of Agriculture Water and Forestry report (2015) revealed that over the past three to five years, most countries in southern Africa including Namibia, South Africa and Botswana, received poor rainfall, resulting in severe droughts affecting both humans and animals. The poor rainfall has negatively affected the agricultural sector that naturally depends on rainwater,

resulting in poor production of foods to feed both humans and animals. A great number of livestock was lost to drought over the past five years in Namibia. Scientific studies predict that low rainfall caused by climate change may continue and get even worse in the future. All affected countries including Namibia should devise and develop other mechanisms as alternative sources of water, such as accessing underground waters, desalinating seawater, and channelling water from bordering rivers such as the Kavango and Zambezi. Lack of adequate water processing, transportation and storage infrastructures has not ameliorated the bad effects of the current drought situation in Namibia. Since all sectors of production depend on water, economic growth of the country requires water infrastructures as part of the overall development infrastructures to drive it. Infrastructure development is capital intense and requires massive finances. Therefore, the participation of both State and non-State actors in water infrastructure financing remains critical.

Ministry of Agriculture Water and Forestry report (2010) revealed that, of the total rainfall received in Namibia, 83% evaporates; vegetation uses 14%, and 1% recharges underground water. O**nly 2%** becomes runoff water for harvesting and channelling into surface storage facilities such as dams, lakes, and water plants. MAWF/Namwater's investigation revealed the dire shortage of water in the entire country, with the central region being the most severely affected (Ministry of Agriculture Water and Forestry report, 2016). The assessment proposed the following recommendations to government for its **urgent** investment in the following as medium and alternative sources of water:

- To develop new water infrastructures to tap into the underground water i.e. boreholes. Namibia has been recorded as rich in underground water i.e. aquifers.
- To develop water infrastructures to source water from ocean /sea i.e. build mega water-desalination plants. Namibia has 1,570km of coastline bordering the Atlantic Ocean.
- To purchase the AREVA desalination plant in Erongo region, offered for N$ 3 billion (US$231 million).
- To extend and connect water distribution pipeline networks across the country.
- To develop water pipelines and processing plants to source water from Orange and Kavango rivers.
- To rehabilitate the dilapidated water pump stations and distribution canals across the country.

Traditionally, the role of infrastructure development and provision of basic services has rested with the State through government functionaries and agencies. Services include access to clean water and sanitation. However, the State's limited resources may not be sufficient to provide water services for the entire country and its citizens, considering its many other social responsibilities. Therefore, the government should create an enabling environment for the non-State actors, i.e. the DFIs and other private sector players such as commercial banks and private investors, to participate in infrastructure development and provisioning of essential public services. Non-State actors can then complement State efforts by bridging the gaps left in public service provisioning.

1.2 Problem Statement

Given the infrastructure shortages of developing countries, there is fundamental need for partnerships among different actors (government, private sector, development agencies), (Buso, *et al.,* 2016). However, there are palpable tensions between State and non-State actors (Thomas, *et al.,* 2006).The continued tensions are propelled by varying interests of State and non-State actors in infrastructure development. The varying interests of State and non-State actors' lies in the fact that State has limited resources to develop and deliver the required public infrastructures, while NSAs may have access to resources complement State in infrastructure development but their focus is more focused on financial return on investment. In the past three decades, the role of government in governance of public goods has diminished as private actors play a more significant role; business, for example, is more involved in setting up rules and norms in global governance (Berg, *et al.,* 2006). This creates tensions among the different agencies. The aim of this research is to investigate the complex relationships and tensions between different agents involved in water infrastructure development/financing in Namibia.

In Namibia, State agencies such as Directorate of Rural Water Supply and Sanitation (DRWSS) and others have traditionally funded all Namibian water-infrastructure development projects in the pre-and post-1990 independence era. These projects only benefited a few minority groups, and not the entire population. Little has been done to explore alternative models and funding opportunities for water infrastructures. Alternative funding methods/models lie in the hands of the NSAs. Therefore, with the growing demand for access to clean water, existing infrastructures are under immense pressure to cater for the growing population. However, with the limited resources allocated to the DRWSS, mass water-infrastructure development becomes

a serious challenge. Therefore, State needs to find alternative funding models for water infrastructures for Namibia. Good benchmarks are similar emerging economies in Brazil, Mexico, Australia, and India (Mayle et al., 2001: Matta & Ashkenas, 2003)

Water is a strategic natural resource; hence, a reliable and affordable water supply underpins all economic and social development. Therefore, the supply of water is a critical input into the economy and the creation of opportunities for a broad-based empowerment to locals. The Directorate of Rural Water Supply (DRWS) needs to review and empower its Strategic Plan accordingly for the financial and technical resourcing of mass water-infrastructure projects. Financing and effective governance of public goods must increase to meet developmental needs.

1.3 Research Objective

Water infrastructures are the medium of water supply, carriage, storage, and distribution. This study explored the participation of State and Non-State actors (NSAs) in water-infrastructure development finance in Namibia. It tested the commonly argued assertion in academic literature that non-State actors (NSAs), such as private sector players, DFIs, commercial banks and institutional investors, play a significant role in development infrastructure financing. The study also examined the existing State of water infrastructures in the country, and explored alternative funding methods/models for infrastructure development.

Ministry of Agriculture Water and Forestry report (2015) revealed that water infrastructure in Namibia requires a significant boost to enable it to sufficiently pump, store and distribute water to the entire nation for consumption, agricultural activities and industrial production. Therefore, the research project sets specific and proper objectives as follows:

- *To analyse the current participation of the State and Non-State actors into water-infrastructure development finance in Namibia*
- *To explore the relationship and possible tensions between the State actors and NSAs in provision of infrastructure development*
- *To explore alternative funding methods/models for water infrastructure development*

Research questions in the next section formalise the objectives.

1.4 Research Questions and Scope

The purpose of the research is to explore whether current assertions in the literature, regarding the State of water infrastructure development and finance, hold true for Namibia. Then the study examines whether its results hold true for other developing countries in southern Africa and all around the globe. It answers the following questions:

1. *How do we characterise the role of State and non-State actors in water infrastructure development and finance in Namibia?*
2. *What is the relationship between the State and NSAs in water infrastructure development in Namibia?*
3. *What are the potential funding alternative methods/models suited to water infrastructure development?*

1.5 Appropriate Hypothesis

Based on the research objective and questions above, a test hypothesis was formulated. It was based on the concluding Statement in many of literatures that:

> *The role of State in controlling and managing some public infrastructures has diminished worldwide, as non-State actors now play a more significant role.*

This conclusion can only be achieved with the active participation of NSAs (i.e. development agencies, DFIs, commercial banks, institutional investors, etc.) into infrastructure development. The State resources are so limited to meet the water infrastructure development needs for developing countries such as Namibia.

The subject of development infrastructure financing in developing countries is both broad and complex. There has been little published on the focus of this study, namely, infrastructure development financing to Namibia. Analysis will be performed on the selected indicators of financing options available.

The formalised hypothesis to be tested is:

Hypothesis

- ***H0:*** *Despite limited resources, State continues to dominate the water infrastructure development space in Namibia*
- ***H1:*** *There is an active participation of non-State actors (DFIs, commercial banks, private & institutional investors etc.) into water infrastructure development in Namibia.*

1.6 The Importance and Significance of the Study

This research study is a vital missing link in the existing literature. It attempts to describe, understand, analyse, and review existing information on water-infrastructure project financing. The findings will produce a diagnosis of the challenges faced in the water sector, and recommendations on the best alternative funding methods for water infrastructure development. They will add value/weight to the existing body of knowledge in field of infrastructure development and finance. Furthermore, they will help to provide the State with an understanding of the existing national water infrastructure, and available funding alternatives for new infrastructure development. The findings will explain:

- Funding and financing options for new water infrastructure development and systems
- Improved water sector culture, professionalism and practices
- National water infrastructure situation and functional assessment
- Sustainable water infrastructure and asset management tools

This research study investigates the significant roles of State and non-State actors in water-infrastructure development finance in Namibia. It tests whether the commonly argued assertion in academic literature, that NSAs' (*DFIs, commercial banks, private & institutional investors etc*.) participation in public goods and services provisioning is vital for accelerated infrastructure development, holds true for Namibia. In addition, the study examines the unique responses of Namibia to this premise, and discusses various factors that could underlie the results. The study also explores underlying tensions/conflicts between the State and Non-State actors in delivering infrastructure development.

This exploration is also significant for several other reasons. Firstly, the primary objective is to add weight to the current body of research on water infrastructure finance. While this is a

significant contribution in its own right, its further import is due to the influential nature of two variables under study, namely, water infrastructure and finance. It is essential to study the nature of influential factors in development to understand whether and how to harness or moderate their influence.

A thorough self-search, and a review of critical issues in development in Namibia, preceded the selection of this specific research topic. Its intention is to add to the existing stock of knowledge around infrastructure development financing. Its thesis is that infrastructure development ought to be the role of State, complemented by NSAs such as DFIs, private sector players such as commercial banks and private investors.

The relevance and viability of this research topic is that there has been a paucity in the literature about adequate and exhaustive research studies on the roles and participation of State and NSAs in infrastructure development; moreover, on how much access to finance can contribute to the course of infrastructure development. The study's findings help to fill knowledge gaps on how State-budget resource allocation, DFI financing, and private-investor funding have helped nations and countries worldwide to accelerate development. Indeed, countries were able to industrialise through grants and soft loans from DFIs. The useful synthesis of views in this research project is that there is an urgent need to understand where Namibia stands in terms of water infrastructure development to plan better and accordingly. Planning has helped nations develop by measuring progress and gaps versus available resources. I therefore consider this topic of great value to Namibia in finding solutions to its water infrastructure development. There will be a water crisis in the country if it does not develop interventions immediately to address the situation. Accelerated infrastructure development is a highly ranked milestone in Namibia's Vision 2030 and UNSDGs.

2 LITERATURE REVIEW

2.1 Introduction

The purpose of the literature review is to summarise for the audience, readers and entire academia the sum of knowledge so far accumulated for this research topic, and discuss its strengths and weaknesses (Coldwell & Herbst, 2004; Lang, 2006). The predefined Research Objective and Problem Statement should guide the selection only of readings relevant to them. Selection therefore requires insightful evaluation, description and assessment of what is already in the existing body of knowledge about the research project under review (TerreBlance *et al.*, 2006; Open University, 2001). Literature review is a re-iterative process that selects appropriate literature to inform the research process, including the date collection and analysis. This literature search therefore concentrated on the few key concepts where empirical work was involved.

2.2 The view on water infrastructure development and financing in Africa

The World Bank Report on Africa's Infrastructure revealed that it lags significantly behind in comparison to other developing nations of other continents and worse in comparison to developed countries (World Bank, 2010). Sub-Saharan Africa has a combined infrastructure deficit of water and sanitation estimated close to $93 billion annually. An estimated two-thirds of the total gap relates to capital expenditure, and other one-third to operations and maintenance (Brineco-Garmendia *et al.*, 2008). The State continues to be the only or main funder for water infrastructure development in a significant number of developing States in the world and particularly in Africa, including Namibia.

The academic theory that there is a shift in terms of public sector dominance in infrastructure development does not hold for Africa. The public sector (State) remains the major source of finance for water infrastructure in Africa. Therefore, public sector funding remains dominant in public infrastructure development, with low participation by NSAs. Tax collection is the primary source of public finance, with funding executed via the central government budget. However, it is still widely believed that NSAs are the largest potential source of finance for infrastructure development but remained untapped. From the DFIs' perspective, the African Development Bank has long recognized that infrastructure investment has a central role in the development agenda and is critical for supporting economic growth, poverty reduction and the

achievement of the then millennium development goals (now SDGs), (African Development Bank, 2009). Infrastructure affects growth through two channels: directly through physical capital accumulation and indirectly through improvement in productivity. The relationship between investment and infrastructure is also bi-directional. Countries with high growth rates invest more in infrastructure, which subsequently feeds back into the growth process. It is noted that there is a strong link between infrastructure investment and some of the key indicators of social wellbeing, such as healthcare, water, sanitation, housing, and human capital accumulation (African Development Bank, 2009). Some glaring statistical facts about the situation of Africa's water infrastructures are that:

- 40 percent of the population still lacked access to safe water
- 60 percent of the population lacked basic sanitation

These problems stem from the continued dominance of State in infrastructure development. Clearly, the State has a significant number of social responsibilities to meet with the limited resources available at its disposal. Therefore, the role of NSAs becomes more overly crucial to support the efforts of State in infrastructure development.

2.3 State Actors in Water Governance

Traditionally in international relations, power and authority of governance rested with the States (Bieler, A. *et al*. 2004). However, in the light of globalisation and the emergence of the new role of non-State actors, there is a significant shift in the powers and authority of State (Bieler, A. *et al*. 2004). NSAs show increasingly salient capabilities to structure global politics and economics. Arts (2008) observed an increasing role of NSAs in the global arena. There is an increase of private and civil actor involvement in the global arena, thus facilitating a paradigm shift from 'government' to 'governance'.

Borze & Risse (2010) argue that governance includes hierarchal steering by State actors, and involvement of non-governmental actors (companies and civil society), in the provision of collective goods through non-hierarchical coordination. Non-hierarchical coordination can involve government actors if they refrain from using their coercive power. The essence of Statehood is the ability of the State to enforce collectively binding decisions, ultimately through coercive means, via its monopoly over the means of violence. The illustration below displays government hierarchy.

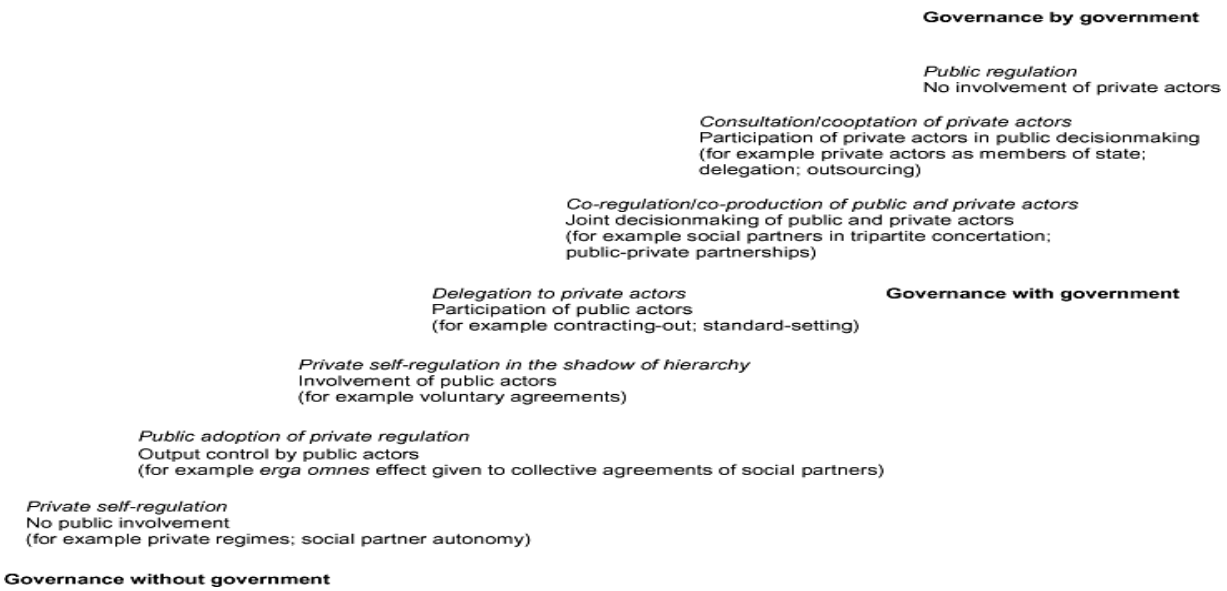


Figure 2: **Governance without government: the non-hierarchical involvement of nongovernmental actors (Source: Based on Börzel and Risse -2005)**

The hierarchy above demonstrates the sensitivity of government over governance. Up on the hierarchy is Governance by government, which runs by full public regulation with no involvement of the private actors (NSAs). Equally, down on the hierarchy is Governance without government, which runs by private self-regulation with no public involvement. These two levels are extreme and pose danger in governance of public goods. This leaves one optimal level, the mid-way, which runs on Governance with Government. This level runs on delegation to private actors and participation of public actors. On the other hand, State bears the overall powers and authority over the country, its government, and citizenry. Government is an agency of State. The State comprises four elements: the Population (people), Territory, Government, and Sovereignty. In return, the government serves a body that runs and manages the affairs of the State.

It requires commitment of financial recourses to run the affairs of the State. Therefore, government annually draws up a budget for allocation of financial resources to execute and fulfil governmental activities. The State funds its budget from taxes collected from its pool of taxpayers. The annual budget is usually made up of two components, Capital/ Development expenditure, and Operational expenditure. Capital-expenditure resources allocation is destined for infrastructures development. Operational expenditure resources are aimed at funding and servicing operational activities of government, such as public servants' wage bills, utility

services bills, State fleet, repairs and maintenance of government infrastructures, and provision of basic services, i.e. education and health services, etc. However, infrastructure development is by nature so capital intensive that it requires huge funding to build, maintain and sustain. Infrastructure development typically entails:

- Rehabilitation
- Upgrade and building of new development infrastructures such as:
- Water infrastructures, road network infrastructures, railway infrastructures, airport infrastructures, seaport infrastructures, telecommunication infrastructures, and power-energy infrastructures.

Literature search has revealed that infrastructure development can be funded and financed in various ways, ranging from:

- Funding through State budget allocation
- Debt finance from commercial banks, DFI and other financiers
- Long term borrowing from the international capital markets through issuance of bonds and other financial instruments
- Borrowing from the multinational institutions such as IMF and World Bank

Though all modes of infrastructures are equally important, some naturally supersede others. Water is life. Without water, there can be no life, nor industrial production, nor manufacturing nor any economic activity. Water infrastructures are an essential and basic element of living. Therefore, continued water infrastructure development and maintenance are essential for guaranteeing water security of any nation. Infrastructure development in general is a key driver of economic growth, as it creates an enabling environment and breeding ground for industrialisation. Given its declining traditional sources of water and increasing demand for water for consumption and production, Namibia must prioritise its water infrastructure. Esfahani *et al.* (2002) postulates that infrastructure development stimulates a country's potential and Gross Domestic Product (GDP) growth. It attracts investors to the country who create new jobs, and develop skills and capacity. African Development Bank (2014) indicates that inadequate infrastructure is affecting competitiveness and constraining industrialisation in Namibia. Though Namibia has slightly developed infrastructures as compared to other States in the continent, its thinly spread population makes provision for basic infrastructures such as roads, electricity networks and water supply less accessible to the citizenry. On water supply, specifically, "due to Namibia's dry climate and unpredictable low rainfall pattern, inadequate water resources are a challenge. Several dams and other reservoirs around the country are

running low, the reliability of water supply for both industrial use and human consumption is unsatisfactory, and many rural areas lack sanitation services." Alternative sources of water need identification and development to alleviate anticipated water shortages in the country. Per Namwater (2014), the only bulk water supplier in the country, estimated the total water consumption for municipal sector only at 130 million m3. Expansion of industrial and agricultural activities coupled with population growth in the urban areas continues to put pressure on water resources (Namwater, 2014). The bulk water supply in Namibia sources water from its five major dams: Hardap, Von Bach, Swakop, Goreangab and Naute. Other small dams include the Omatako, Friedenau, Otjivero and Oanob. These are supplemented by perennial rivers on the borderlands of Namibia's far north and south. However, these rivers are far away from the population centres; hence, water supply is critical in most parts of the country.

Furthermore, Namwater projected the water supply shortage at the coastal mines to increase from about 4 million m3 to more than 15 million m3 by 2018. The widening water deficit is mainly because of demand, especially from the mining sector. The situation is likely to remain critical for the next five years, and so the State and non-State actors in the infrastructure development fraternity must invest significantly in water infrastructures.

Gurira (2015) further confirmed that water infrastructures are essential for harnessing hydrological resources and exploiting local capacities to contribute to social and economic development. The High-Level Panel on financing infrastructure provides a specific focus on how water infrastructure can be financed. It has identified seven perspectives necessary for water to become fitter to finance:

- Water security is an essential requisite for national economic growth
- Multi-purpose water infrastructure is increasingly important
- Getting enabling environment right
- Make the best use of competition and innovation
- Overcoming inefficiency
- Balancing risks and rewards
- Accessing new and old finance

Tumbare (2015) emphasises water resources infrastructure as a critical component in provision of sustainable water resource management and services. Water resources infrastructure ranges from educational and research infrastructure, storage works (surface and underground),

hydrological and meteorological stations, and irrigation systems to water infrastructure for eco-tourism. These water resources infrastructures serve the mining, agricultural, urban and rural water needs, and the environment, amongst a host of other needs and demands. Demenge (2014) contends that roads play a major role in rainwater harvesting. Roads improve people's mobility and enhance access to markets, administrative centres, schools, and health posts. They facilitate important socio-economic changes. However, a less studied aspect is the impact of roads on hydrological resources. Roads interact with existing surface and groundwater flows, redistributing water-related hazards and resources across space with significant consequences on people and their livelihoods. The Ethiopian government has embarked on a massive road construction programme over the last decade, mainly to serve the needs of an essentially rural population and agrarian economy. In parallel, the government has also been investing significantly in water harvesting, conservation measures and irrigation to serve the needs of a population whose livelihoods depend heavily on rain-fed agriculture. It is arguable that the two distinctive objectives of improving road connectivity and water availability for irrigation are interlinked and can be served by the same infrastructure, which we call multifunctional roads.

Construction of roads is capital and skills intense. Briscoe (2010, p. 301-308) advances that financing of water-related infrastructure was a sleepy backwater; hydro-power plants, water supply and irrigation systems all depended heavily on government financing. However, in recent years the sweeping changes affecting most economies in the world-changing roles of government, increasing involvement of the private sector, and globalisation have had a profound effect on the provision and financing of infrastructure. While official development assistance declined slightly in real terms during the 1990s, private investment increased from about half to about five times the volume of official assistance. Some 15% of infrastructure investment in developing countries now comes from the private sector. Gleik (2009, p. 127-138) states that water-resources-management approaches around the world are changing dramatically. This "changing water paradigm" has many components, including a:

- Shift away from sole, or even primary, reliance on finding new sources of supply to address perceived new demands
- Growing emphasis on incorporating ecological values into water policy
- Re-emphasis on meeting basic human needs for water services
- Conscious breaking of the ties between economic growth and water use

At the same time, new methods that do not require requiring major new construction, or new large-scale water transfers from one region to another, are being developed to meet the demands of growing populations. More and more water suppliers and planning agencies are beginning to improve efficiency, implement options for managing demand, and reallocate water among users to reduce projected gaps and meet future needs. The connections between water and food are receiving increasing attention as the concerns of food experts begin to encompass the realities of water availability. Biswas (2009, p. 248-256) reports that the concept of integrated water resources management (IWRM) has been around for some 60 years. It was rediscovered by some in the 1990s.The possible future water crisis has long been envisaged in the dry countries in the world, hence the introduction of concepts such as integrated water resource management, looking at better ways of using, and saving and storing water.

Loucks (2009, p. 3 -10) contends that measuring of sustainability is a major challenge. Sustainability is a relative concept that must be applied in an environment undergoing multiple changes that are occurring over different temporal and spatial scales. Climate change has potentially led to poor rains in dry countries such as Namibia. Alcamo *et al.* (2010, p. 247-275) notes that a global water model is used to analyse the impacts of climate change and socio-economic driving forces on future global water stress. This work extends previous global-water research. In addition to the impact of climate change and population, it also analyses the effects of income, electricity production, water-use efficiency, and other driving forces on water stress. Depending on the scenario and climate model, water stress increases (between current conditions and the 2050s) over 62.0–75.8% of total river basin area and decreases over 19.7–29.0% of this area. The remaining areas have small changes.

The principal cause of *increasing* water stress (where it occurs) is the greater availability of water due to increased annual precipitation related to climate change. The principal cause of *increasing* water stress is growing water withdrawals; the most important reason for this increase is the growth of domestic-water use stimulated by income growth. Ward (2010, p. 321-349) reiterates that the world's irrigated regions face the problem of aging infrastructure and declining revenues to maintain and repair irrigation structures. Policy debates over climate change, population growth, food security, and impacts of irrigation on ecological assets exacerbate the urgency to invest in irrigation infrastructure; they delay implementation of investment to solve the problems. Meanwhile, a global call for full-cost recovery for water-infrastructure investments increases the need to identify the economic value of sustaining

irrigation infrastructure. Despite the growing debates, there has been little comprehensive research to determine factors affecting irrigation investments or policy options available for sustaining irrigation infrastructure. Briscoe (2010, p. 459-491) in Changing face of infrastructure financing in developing countries. He narrates infrastructures such as water-related sectors-hydropower, water supply and sanitation, irrigation, and overall water resources management (including the environment) can be financed. The overall level of investment in water-related infrastructure in developing countries is about $65 billion annually, with the respective shares about $15 billion for hydro, $25 billion for water and sanitation, and $25 billion for irrigation and drainage. About 90% of this investment comes from domestic sources primarily in the public sector. Water-related infrastructure accounts for a large chunk -- about 15% of all government spending. This heavy dependence on the public sector means that the global 'winds of change' in the respective roles of government and the private sector have major implications for the financing and structure of the water economy.

2.4 Non-State Actors (NSAs) in water governance

Non-State actors (NSAs) are all those actors that are not representatives of States yet operate at the international level, and are potentially relevant to international relations (Arts *et al.*, 2001; Furtak, 1997; Higgot *et al.*, 2000). Generally, NSAs fall into five groups: Intergovernmental Organizations (IGOs), International Non-Governmental Organizations (INGOs), Transnational Corporations (TNCs), epistemic communities, and a remaining general category.

There is a growing recognition that regulation is not the exhaustive domain of the State (Hutter, 2006). Thus, the regulatory capacities of non-governmental actors are increasingly recognised, and on occasions formally co-opted by the State. Throughout much of the nineteenth and twentieth century, regulation was inextricably related to the State's attempts to control economic activities. The moves to decentralization have been variously written about in terms of:

- Contracting out
- Multiple occupation of regulatory space (Hancher & Moran, 1989)
- A move from government to governance, where the State attempts to steer or regulate economic activities through co-opting non-governmental actors (Osborne & Gaebler, 1992).

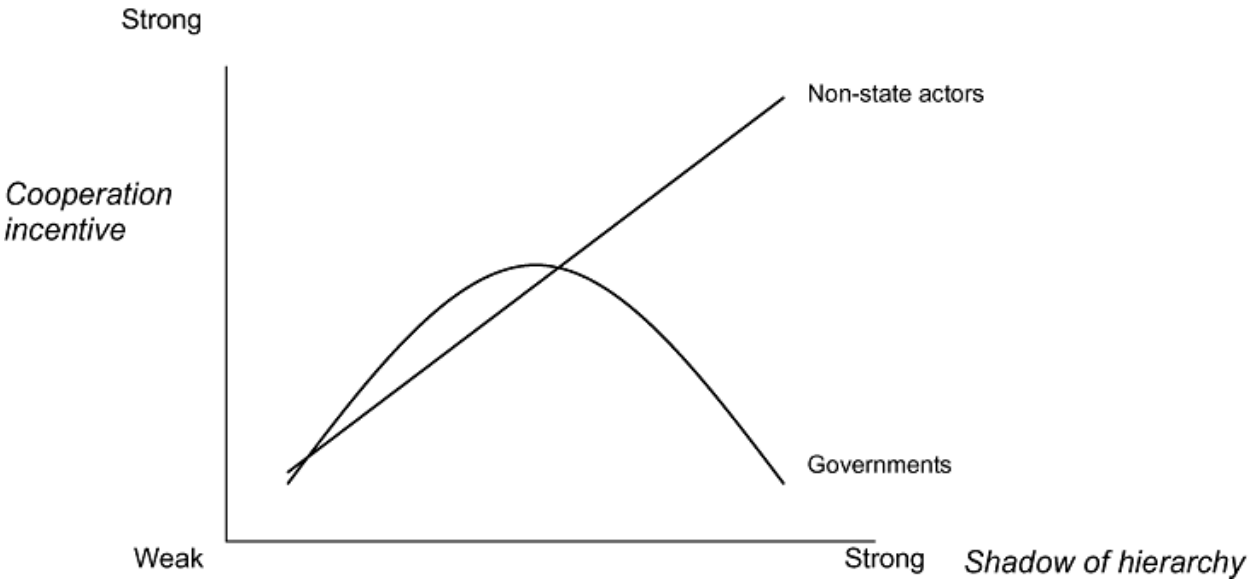


Figure 3: **The shadow of hierarchy and diverse incentives for cooperation for governments and non-State actors** ***(Source: Börzel and Risse -2005)***

The stronger the shadow of hierarchy, the more it provides non-State actors with incentives to cooperate in the provision of collective goods. The incentive structure for State to cooperate with NSAs is more curvilinear. To sum up, the shadow of hierarchy provides both governments and non-State actors with an important incentive structure for cooperation, albeit in different ways. On the one hand, weak States are unlikely to engage in governance with non-State actors because they might fear a loss of autonomy vis-à-vis society (agency capture). On the other hand, strong States are unlikely to share governance authority with non-State actors. The two curves meet in the middle; that is, a medium shadow of hierarchy is most likely to yield effective and problem-solving governance, once non-hierarchical modes of coordination and non-State actors are involved.

The non-State actors are partners of State in infrastructure development. They complement the State in fulfilling its mandate of providing necessary infrastructures to its citizens such as water, roads, railways, telecommunication, and ports. Non-State actors include non-governmental institutions and development partners, such as development finance institutions, commercial banks, institutional investors, donor agencies, and philanthropies. Development finance institutions specifically designed to provide funding or financing for infrastructure development are Development Bank of Namibia, African Development Bank, and multilateral institutions such as International Monetary Fund, World Bank, and International Finance Corporation. All

of them could serve as development partners complementing the government in providing essential infrastructures for rendering services to its citizenry.

However, due to the government's limited resources and technical abilities, it would enter cooperation agreements with non-State agencies to fund, build, manage, and operate certain infrastructures. The most common cooperation agreement used by government is the triple P agreement well known as Public-Private Partnership (PPP) arrangements. This model is very common in both developing and developed countries. It works well in sourcing funding for major capital projects in poor, developing States. Several publications share information on PPP projects that implemented massive infrastructure projects across the world over.

Amoa-Gyarteng (2015) compared Public-Private Partnership (PPP) arrangements between Ghana and the rest of the world, including Sub-Saharan Africa. The conclusion was that PPP is not being extensively utilised. There are several benefits in PPP arrangements to provide infrastructure. The non-recourse nature of project finance is well acclaimed. The use of PPP also frees up public funds for other equally important projects by the State. Governments all over the world push to satisfy a social contract with its citizens by providing infrastructure. There is always pressure on government treasury. The need to provide roads might have to be held in check by an equally pressing need for good healthcare facilities, and good schools, inter alia. Is the concept of Public-Private Partnership (PPP) working in Namibia, especially in the water projects?

Nafziger *et al.* (2015, p. 27-33) narrated that the United States was facing a crisis in which fewer financial resources were available to maintain the quality and meet increasing demand on the water infrastructure system. Gaps between available and necessary funds have been widening, and are expected to increase in the future. With government, unable to provide adequate funding, water utility owners were advised to consider alternative funding sources such as aping public- private partnerships investment.

Nafziger *et al.* (2015) presented various funding alternatives, and provided a framework for utilising alternative funding in water infrastructure planning and development simultaneously to:

- Help alleviate funding gaps
- Encourage future sustainability in public water infrastructure

Per a survey by a global-industry engineering firm, the top three issues of importance in the water and wastewater industry are:

1) Aging water and sewer infrastructure

2) Managing capital costs

3) Funding

Potential Funding Sources

The main funding components of a water utility or project throughout a life cycle of a water infrastructure system are:

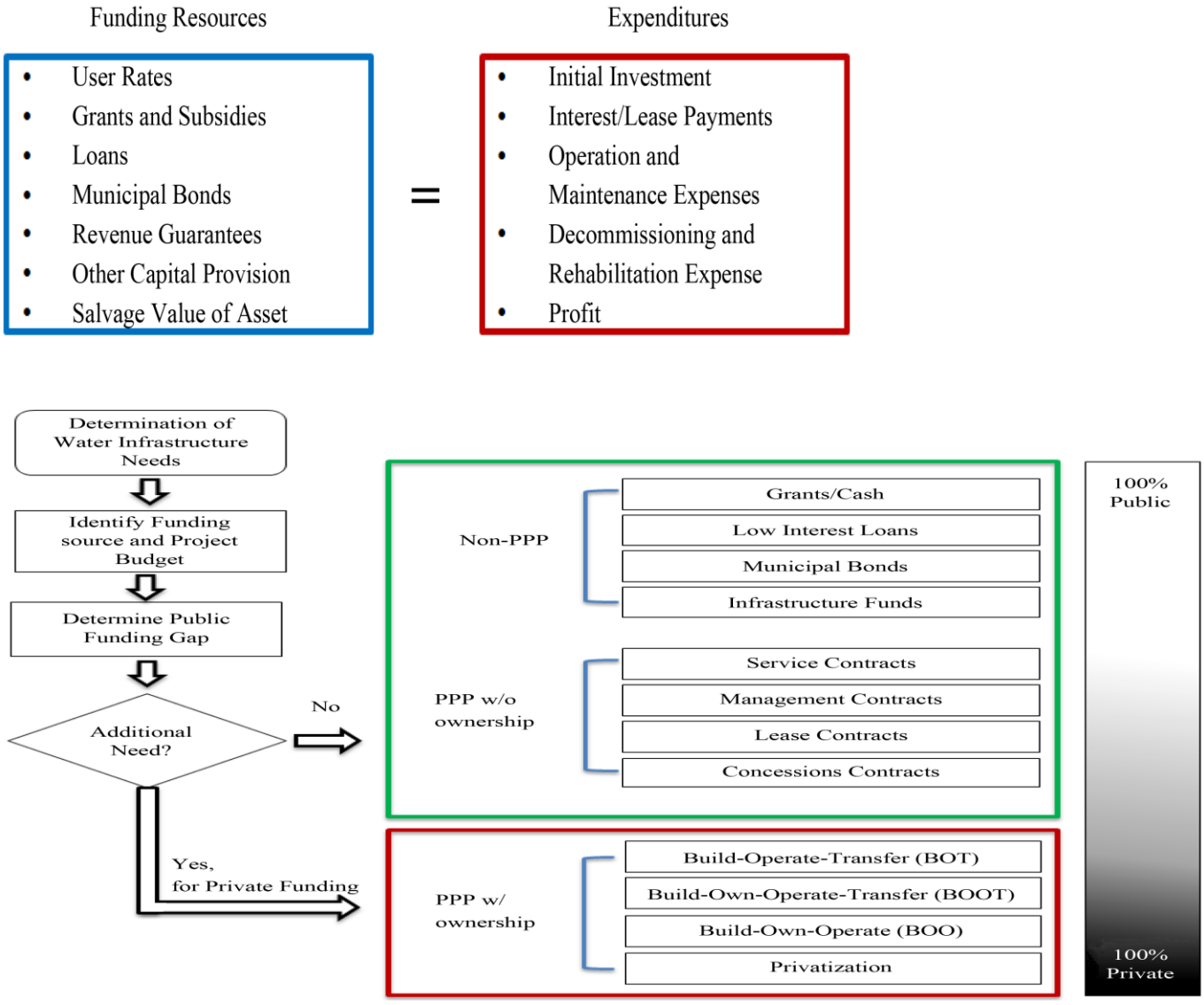


Figure 4: **Funding flow chart of Public-Private Partnership (PPP) arrangements (*Source:* Nafziger 2015)**

The lifecycle of the typical water infrastructure system has several phases including:

1) Planning
2) Financing
3) Design
4) Build
5) Operation and maintenance
6) Rehabilitation
7) Close-out

At the end of the partnership, the term 'Transfer' is included in many PPP models. Transfer can be a key difference between partnership contract types.

Is the concept of Public-Private Partnership (PPP) working/adopted in Namibia, especially in the water projects?

2.5 Partnerships between the State and Non-State actors

Public–private partnerships (PPPs) have long been advocated and analysed as organisational solutions to pressing societal problems that call for the comparative advantages of government, business, and civil society (Brinkerhoff. *et al.* (2011)). Public-private partnerships as governance tools have been around for quite a while in domestic affairs of highly industrialised States. Corporatist arrangement, for instance, constitutes one such form of PPP. However, it is only recently that they have become the objects of research beyond the nation-state. For decades, research on international institutions has concentrated on inter-State regimes solving collective action problems and providing common goods (Hasenclever, Mayer, & Rittberger. 1997).

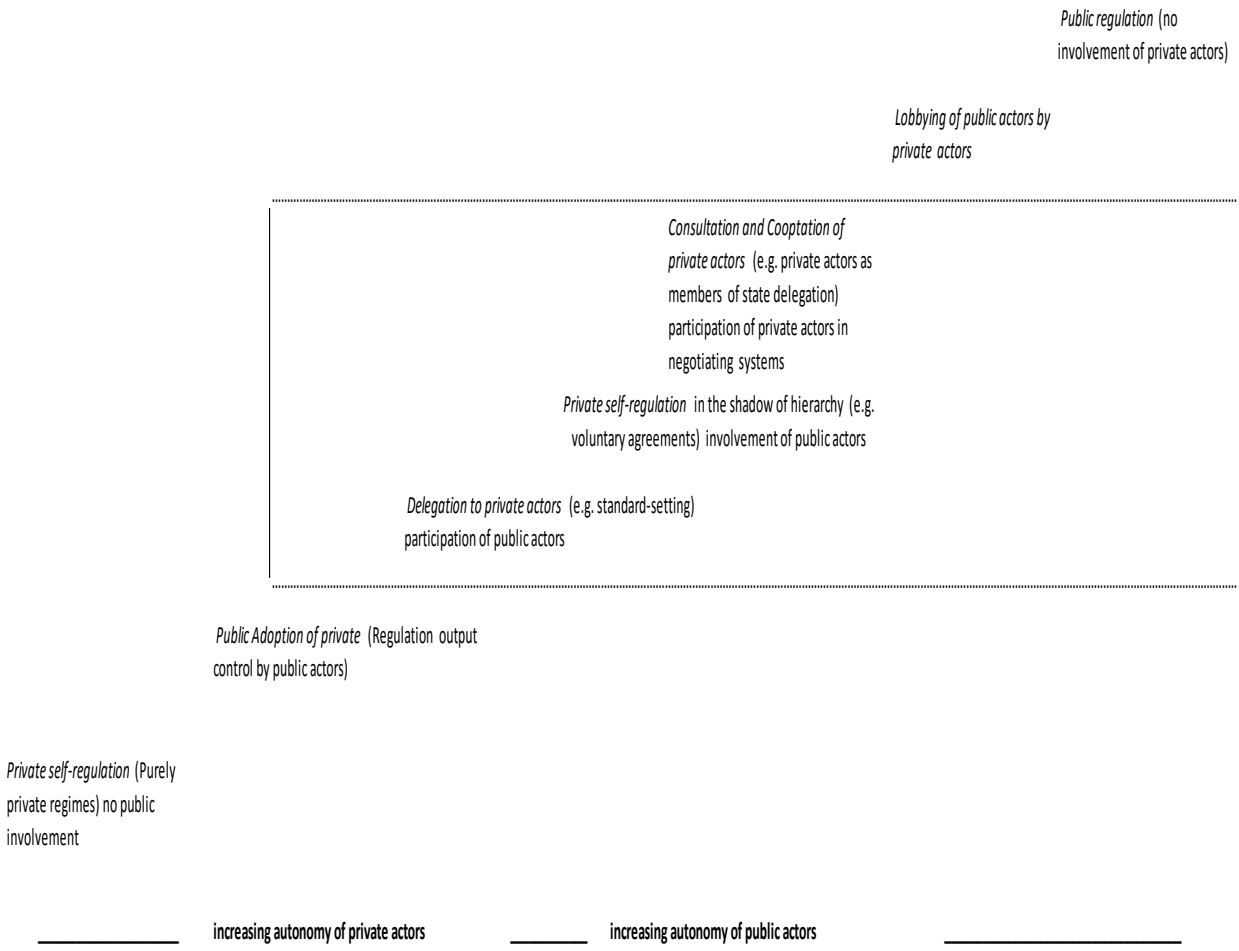


Figure 5: The Realm of Public-Private Partnerships

Proponents of PPPs have long argued that such arrangements improve both the problem-solving capacity and the legitimacy of international governance structures. On the one hand, there is the neoliberal argument in favour of PPPs and private regimes. It claims that, "State failure" in providing public goods and services is at least as relevant as "market failure" in international life; thus, private actors are better suited to regulation of their affairs and coordination of their activities. Moreover, PPPs are favoured because States and IOs alike lack the knowledge and expertise to solve increasingly complex problems in international governance. Hence, PPPs satisfy the plea for an increased role of "epistemic" or "knowledge" communities.

On the other hand, proponents of "cosmopolitan democracy" and "transnational civil society" claim that involvement of INGOs and transnational social movements in international governance increases the democratic nature and accountability of international institutions (Wapner, 1997; Held, 1995). Transnational civil society is widely seen as a beacon of hope in

the global community, and representing the international common good, in contrast to narrow-minded States and the for-profit sector of firms and interest organizations. But then again, do PPPs in fact improve the problem-solving capacity and democratic nature of international governance? We don't know. One problem is that most studies in this area suffer from a selection bias. There are many more studies of successful NGO-public partnerships than there are of failures. For instance, is the world a better place because an INGO coalition killed the prospects for a Multilateral Agreement on Investment (MAI), or would a MAI that included human rights and environmental concerns have been preferable? There are practically no empirical studies on problem solving in international life that compare inter-State regimes with PPPs which are supposed to serve similar purposes.

As to problem-solving effectiveness, the core idea supporting PPPs concerns the mutual resource dependency of public and private actors. Non-State actors are said to come to the rescue in areas in which public actors control only limited material and ideational resources. Pooling of resources and burden sharing between public and private actors are said to increase the problem-solving capacity of governance arrangements (Wolf, 2000). In one area of international development and humanitarian aid, PPPs between UN organizations and the private sector (mainly NGOs) were simply a necessity, given the lack of material resources of the international organizations.

In a similar way, non-State actors often serve as knowledge providers for public actors. Private actors – both firms and the not-for-profit sector – are said to increase the knowledge base (scientific and other) of public actors in various governance arrangements. However, it is unclear whether the mutual resource dependency of public and private actors leading to PPPs increases the problem-solving capacity of transnational governance arrangements. If the international community strips International Organizations, such as the UN, of material resources, and the UN would then have to rely on the INGO sector, the delegation of authority to non-State actors can easily result in problem-shifting rather than problem-solving. In many cases, PPPs are simply neoliberal solutions in disguise, i.e., they amount to the privatisation and de-regulation of formerly public services. This seems to be very much the case concerning PPPs in humanitarian aid and the development sector. Moreover, "taking back" delegation in cases of private failures is not an option since functions were delegated because public actors are not capable of delivering them.

2.6 The State of water and infrastructure in Namibia

Namibia has a naturally a hot and dry climate with sparse and erratic rainfalls (Ministry of Agriculture, Water and Forestry report, 2015). Only an average 285 millimetres (mm) of rain falls annually. The country depends heavily on runoff water that gets harvested and channelled into dams, rivers, lakes and water plants during the rainy season. The Ministry of Agriculture, Water and Forestry report (2010) revealed that, of the total rainfall received in Namibia, 83% evaporates, 14% is used up by vegetation, and 1% recharges underground water. O**nly 2%** becomes runoff water.

Namibia's western border is along the Atlantic Ocean. The country's rivers are the Orange in the south, Zambezi and Okavango in the east, and Kunene in the west. Although Namibia enjoys the benefit of such large sources of water, it lacks the necessary infrastructure to tap, process and transport the water. However, the option of sourcing water from these ample sources has not been fully exhausted. With climate change causing poorer rains, this option will slowly but surely become the only long-term solution to the water problem. The process will be costly; this is where the co-operation of State and NSAs becomes critical in securing funding/financing for water infrastructures.

Through its Ministry of Agriculture, Water, and Forestry (MAWF), Namibia's government passed the Namibia Water Corporation Act, Act 12 of 1997, to establish an autonomous body tasked with managing water affairs in the country (Sherburne, 2013). The Act mandated **Namibia Water Corporation (Namwater)** to manage water resources and water supply. The long-term objective is to achieve equitable access to water for all sectors of the national population, and sustainable development of water resources.

Namwater's role focuses on bulk water supply to urban areas, such as town councils, municipalities, and cities countrywide, which in return commercialise and supply water to their inhabitants' households. Equally, Namwater should also provide water to manufacturing and industrial operations that consume the bulk of water, such as mining operations, manufacturing plants and agricultural irrigation schemes.

At the same time, Government of the Republic of Namibia also assigned the role of communal and rural area water supply to the Directorate of Rural Water Supply within the MAWF. The DRWS is mandated with the following key roles:

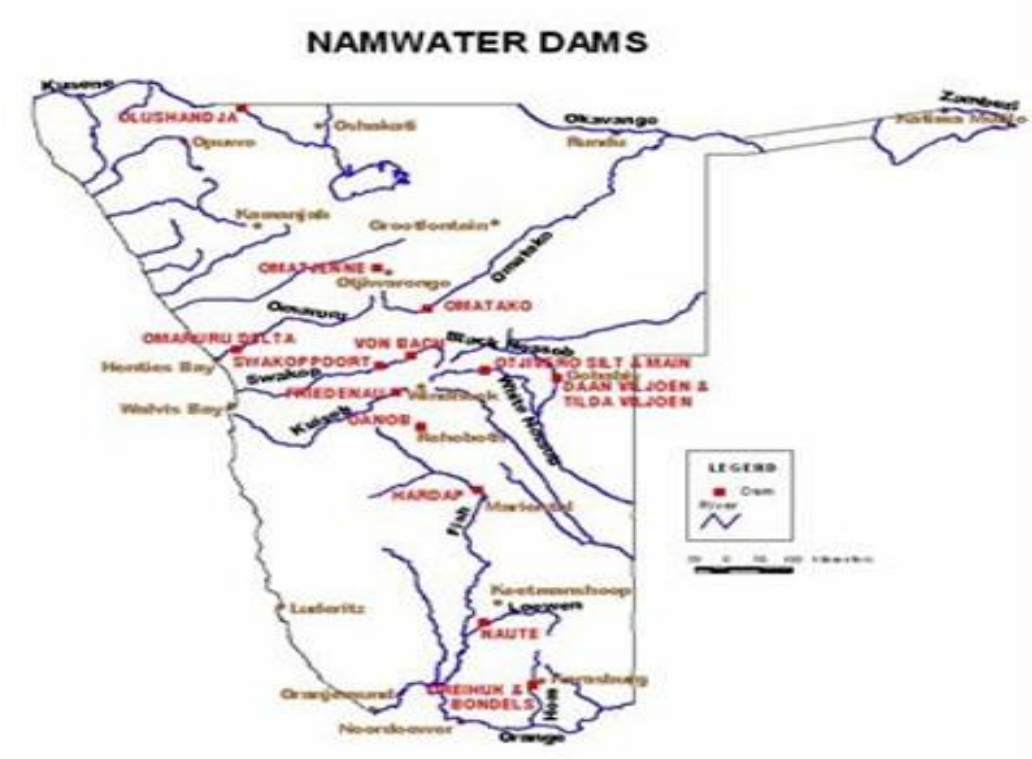
- To provide access to potable water supply and improved sanitation services in rural communal areas.
- To coordinate urban and rural water supply and sanitation services
- At times of flooding and drought, to support the Office of the Prime Minister with the provision of water supply and sanitation services nationally (Sherburne, 2013).

Communities living in the rural areas consist mainly of commercial and subsistence farmers, their families, and labourers. They need to be provided with sufficient water to sustain their animals and farming activities.

The Namwater Annual Report (2015), revealed that the water utility owns and operates:

- 16 dams,
- 14 water transmission lines (called "water supply networks")
- 16 water treatment plants

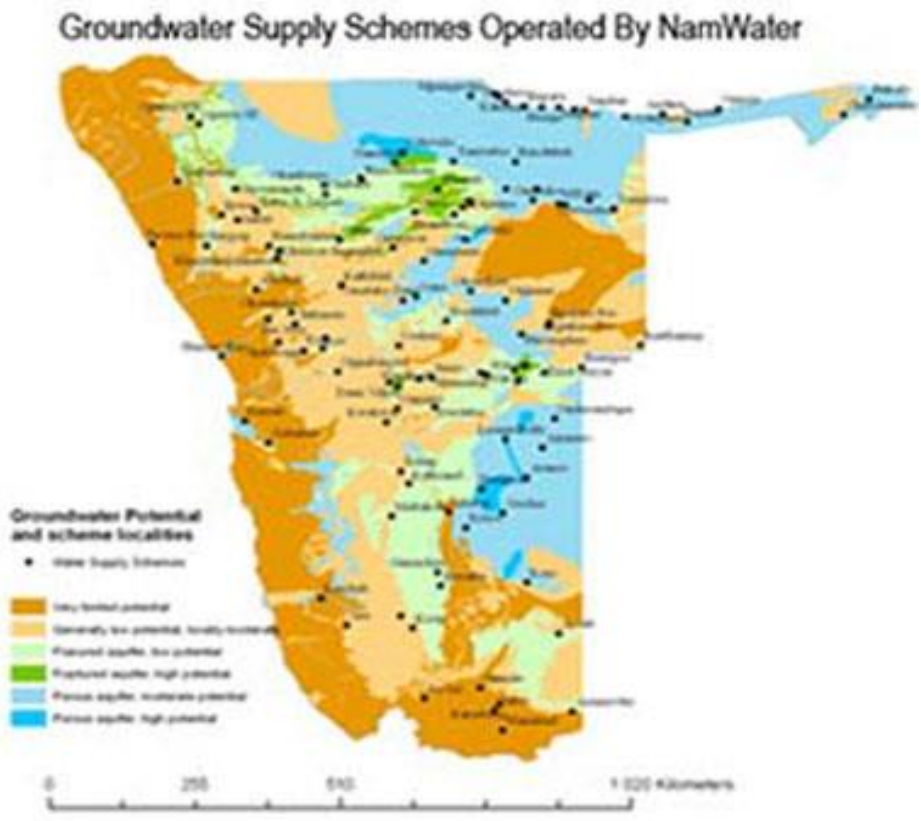
Figure 6: **Map of the existing dams (16) in Namibia:**



- Avis Dam

- Bondels Dam
- Friedenau Dam
- Goreangab Dam
- Hardap Dam
- Naute Dam
- Oanob Dam
- Olushandja Dam
- Omatako Dam
- Omatjenne Dam
- Ruacana Dam
- Swakoppoort Dam
- Von Bach Dam
- Omaruru Delta dam
- Dreihuk dam
- Tilda-Viljoen dam Daan-Viljoen dam
- Otjivero dam
- Otjivero silt dam

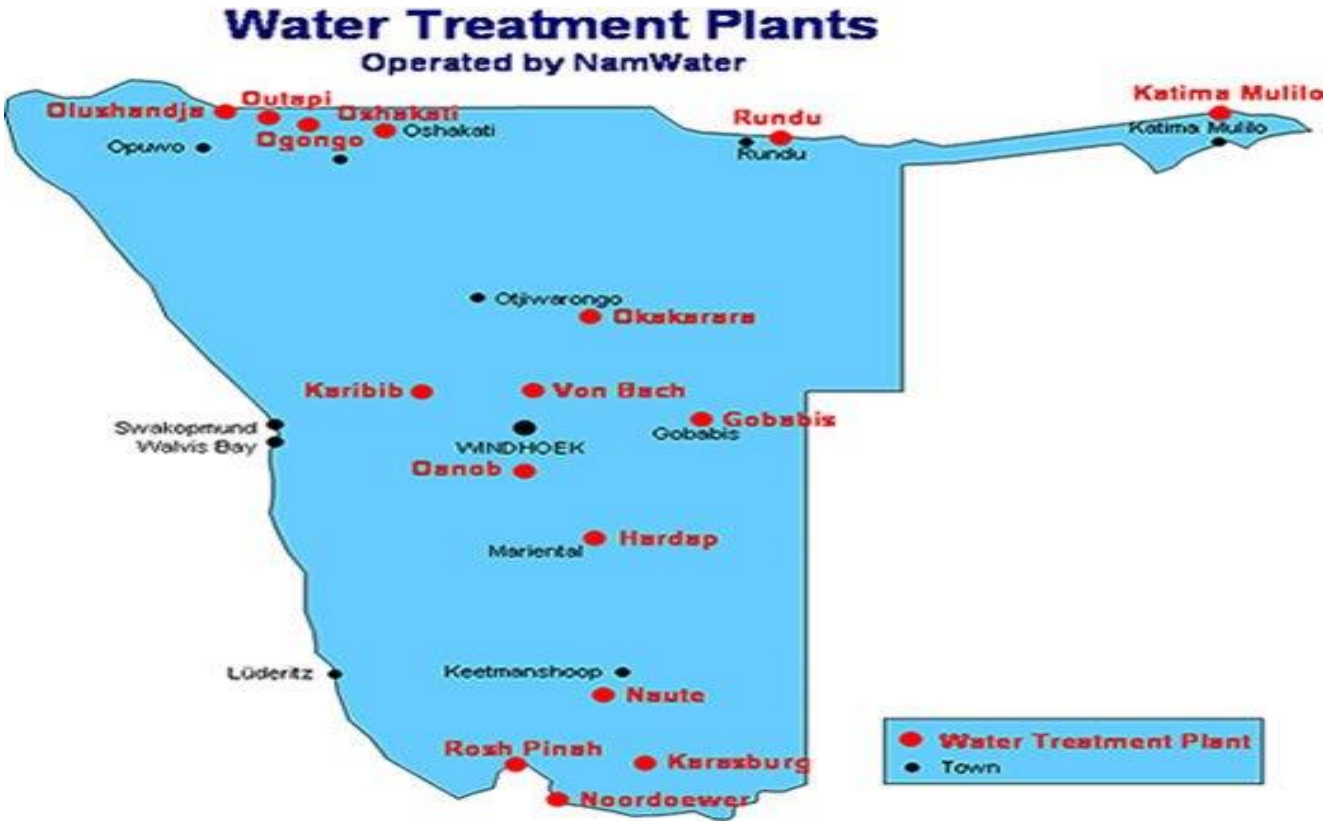
Figure 7: **Map of the existing water transmission lines x 14) in Namibia;**



Name	Purpose	Length in km	Capacity m^3/h	Commissioning
Berg Aukas-Grootfontein scheme	Transfer of ground water from the Berg Aukas Mine in the Grootfontein District to the Eastern National Water Carrier to be supplied to the Central Areas of Namibia during periods of water shortage.	18	720	1998
Dreigratsdrift-Skorpion Mine scheme	Supply of potable water to the Skorpion mine and Rosh Pinah town.	42	870	2002
Koichab Pan-Lüderitz scheme	Potable water supply from Koichab Aquifer to Lüderitz	120	200	2002
Naute-Keetmanshoop scheme	Potable water supply to Keetmanshoop in Southern Namibia and irrigation water to Naute irrigation scheme down stream of Naute Dam	44	400	1972
Omatako-Von Bach scheme	Transfer of raw water from the Omatako to Von Bach Dam.	94	720	1984
Swakopmund-Langer Heinrich scheme	Potable water supply to Langer Heinrich mine, a uranium mine.	82	205	2006
Swakoppoort-Von Bach scheme	Transfer of raw water from Swakoppoort Dam to Von Bach Dam to supply the Windhoek area, with reverse gravity flow option from Von Bach Dam to Swakoppoort Dam.	54	1450	1979/2004
Calueque–Oshakati canal	Transfer of raw water from the Cunene River at Ruacana on the Angolan border through Ogongo to Oshakati purification plant for potable, livestock and irrigation demand. The pipeline had been damaged in 1988 during the Angolan-South African war.	150	n.a.	1997 (Ogongo-Oshakati Canal)
Grootfontein-Omatako canal	A major now unused component of the never completed Eastern National Water Carrier.	300	7,200	1987

Name	Purpose	Length in km	Capacity m^3/h	Commissioning
Kuiseb-Mile7 Scheme	Potable water supply to Walvis Bay	30	800	n.a.
Omafo-Eenhana scheme	Transfer of potable from Omafo to Eenhana.	48	20	1995
Omdel-Swakopmund scheme	Potable water supply to Henties Bay, Swakopmund, Arandis and the uranimum mines Rössing mine and Langer Heinrich mine.	115	685	1975
Swakopmund-Rössing scheme	Potable water supply to Arandis & Rössing uranium mines	55	1,100	1976
Von Bach-Windhoek scheme	Transfer of potable water from the Von Bach Purification Plant to Windhoek	62	2,740	1971/1981

Figure 8: Map of the existing water treatment plants (16) in Namibia



The Ministry of Agriculture, Water and Forestry report (2015), revealed that most of the existing water infrastructures are old and were built as far back as 1920, when the population was slightly smaller than now, and rains were sufficient to produce enough runoff waters for harvesting into dams and other storage facilities.

Water infrastructure development is therefore the backbone and corner stone of clean water supply for human and animal consumption, sanitation, agricultural sector production, manufacturing, and construction, etc. all over the world. It is also established that water is an essential commodity for life continuation and a means of production flow. Water infrastructures are used as medium for water processing, transportation and storage. An efficient and proper water infrastructure network becomes a basic requirement for water security in the country. Comprehensive water infrastructure networks and development initiatives require massive capital investments to be commissioned and realised.

2.7 Conclusion

In summary, the literature above revealed that there is a proven strong correlation between infrastructure development and economic growth. Interestingly, it is recorded that only about 15% of infrastructure investment in developing countries is financed and provided by the private sector. Therefore, this revelation promotes the priority need for non-State actors'/private participation in public infrastructure development to bridge the infrastructure gaps. Sub-Sahara Africa has a combined infrastructure deficit of water and sanitation estimated close to $93 billion annually (World Bank, 2010). For Namibia, particularly, an estimated overall infrastructure gap of US$15.7 billion includes water infrastructure. Its population of 2.5 million is thinly spread. This makes basic infrastructures such as roads, electricity networks and water supply less accessible to the citizenry. Moreover, the desiccating effects of climate change have encroached the dry and semi-arid countries globally. This phenomenon has necessitated the need for increased water resource use and planning. Integrated water resource management and increased infrastructure development will bring better ways of using, saving and storing water to counter the effects of climate change that has led to poor rains.

Governments all over the world push to satisfy their social contract with citizens by developing infrastructure to provide basic services, i.e. water. The Public-Private Partnerships (PPP) model has been adopted in many developing countries and it has worked. This model carries several benefits to users, such as the non-recourse nature of project finance. The use of PPP also frees up public funds for other equally important projects. The conclusion, therefore, is that is the Public-Private Partnerships (PPP) model is the best one to use in addressing water and other infrastructure shortages.

3 RESEARCH METHODOLOGY

3.1 Introduction

To understand the complex relationship between the State and non-State actors in governance and financing of water infrastructure in Namibia, this research utilises a mixed methods approach. It allows the researcher to employ quantitative and qualitative methods simultaneously in analysis and testing of the research problem, to provide validation to the research questions (Hofstee, 2013). In this study, the quantitative method provides an analysis of the financial contributions of the State and non-State actors in water infrastructure initiatives in Namibia. The qualitative methods provide the underlying explanatory factors influencing these financing contributions. The sampling strategy involved a variety of data collection methods and tools, including a questionnaire survey, interviews, and secondary data from published information. The survey was utilised to understand the dynamics in water infrastructure finance. It comprised a series of questions that survey participants or respondents were asked to answer. The interviews were valuable in understanding the variability of infrastructure finance by posing oral questions directly to the respondents. The secondary data collection method obtained or captured information from annual reports, financial reports and project reports.

3.2 Mixed Methods Approach

To capture a more complete and holistic portrayal of the inter-relationships between the State and non-State actors in governance and financing of water infrastructure, the research utilised a mixed methods approach. Per Johnson and Onwuegbuzie (2014, p. 17), mixed methods is a class of research "where the researcher mixes or combines quantitative and qualitative research techniques, methods, approaches, concepts and language into a single study" This approach is commonly used to provide details where a small amount of information exists (Taylor, 2002; Coldwell & Herbst, 2004).

The use of mixed method approach is popular because of its compatibility. Tashakkori & Teddie (2003) proclaimed three specific areas where mixed methods approach came out as more superior than mono-methods (*either* qualitative *or* quantitative) approach. Firstly, the mixed method can answer research questions that other approaches (mono-methods) cannot answer i.e. mixed methods can answer simultaneously confirmatory and exploratory questions.

Secondly, it provides stronger inferences through depth and breadth in answer to complex social phenomena. Thirdly, it provides an opportunity through divergent findings for an expression of differing viewpoints. Bryman (2004) favours a combination of quantitative and qualitative methods to include:

- The logic of triangulation
- An ability to fill in the gaps left when using mono approach
- The use of quantitative method to facilitate qualitative research and vice-versa
- Combining static and processual features
- Gaining the perspective of the researcher and the researched, to address the issue of generality and to study different aspects of phenomena

A mixed methods approach was considered the most appropriate one to use for this type of exploratory study. A deductive approach was used to interpret the graphs, as well as the descriptive and inferential statistics results of the study. Per Uys & Basson (1991, p.38), an exploratory descriptive research portrays the following characteristics:

- It is a flexible research design that provides an opportunity to examine all aspects of the problem being studied
- It strives to develop new knowledge
- The underlying data may lead to suggestions of hypotheses for future studies
- It is usually a field study in a natural setting (Lewis, 2001).

This research project used survey (i.e. questionnaire) and a case study of specific State and non-State actors. These two methods complement each other in increasing the robustness of the results. The survey results and secondary data mostly provide an analysis of the financial contributions of the State and non-State actors in water infrastructure in Namibia. However, these methods did not adequately provide explanations of the contributions of different actors, and the inter-relationships between the State and non-State actors. Therefore, the researcher identified the key State actors and non-State actors involved in water infrastructure in Namibia. These case studies were used to further:

- Respond to other research questions related to drivers and constraints in financial contributions and the relationships amongst the involved actors
- Explore further funding opportunities to water infrastructure

The survey and case study approaches complemented each other in that the survey guided the sampling and data collection strategy for the case study. The sampling and data collection

process was anchored on the survey conducted and the case study presented. Survey was used to elicit information from a limited number of individuals presumed to have the information the research was seeking. It was considered an effective tool in the water infrastructure research as the players in this sector that hold the information required for the research are distinct and limited. Therefore, the combination of the results of the survey and case study analysis guided the researcher in selecting both the State and non-State actor institutions that are considered key players in the water sector. Selection of water institutions/bodies was based on their mandates and history of participation in water infrastructure development and financing.

The ability of the case study approach to cross-validate the results from the survey enhanced the "belief that results are valid and not methodological artefact" (Bouchard, 1976, p. 277; Johnson *et al*, 2003). The mixed methods approach was able to capture a complete portrayal of the inter-relationships in the financing and governance of water infrastructure in Namibia, which might have been neglected by single methods (Creswell and Clark, 2007). The case study played a prominent role by eliciting data and suggesting conclusions that would have been unclear and unconvincing with use of the survey only. In this sense, the mixed methods may be used not only to examine the "same phenomenon from multiple perspectives, but may also be used to enrich the understanding by allowing for new or deeper dimensions to emerge" (Jick, 1979, p. 603).

3.3 Research Context

Public infrastructure has generally been faced with serious challenges in Namibia. There has been a notable infrastructure shortage in the country ranging from water, to power and transportation infrastructures. Namakalu *et al.,* (2014), revealed that Namibia has a combined total infrastructure gap of an estimated value of US$15.7 billion. This gap includes water infrastructures. Of the total gap value of US$15.7 billion, the country has only an economic capacity to raise about US$5.2 billion. This leaves a huge funding gap that would still need to be funded by/through alternative funding sources.

The infrastructure inadequacy is reported to be affecting competitiveness and constraining industrialisation in Namibia (African Development Bank, 2014). Although Namibia has a relatively developed infrastructure compared to most African countries, its vast size and thinly

spread population make the provision of roads, electricity network, and water supply expensive. Below is a summary of the notable infrastructure challenges in Namibia:

- **Water:** Due to Namibia's dry climate and unpredictable and low rainfall pattern, insufficient water resources are a major challenge. Several reservoirs around the country are running low, the reliability of water supply for both industrial use and human consumption is unsatisfactory, and many rural areas lack sanitation services. The country is prone to drought and faced with serious water shortages, especially in the central regions of the country. Dams in the central regions have not collected enough water for the past three to five years, due to poor rains. These dams are not connected to any other sources of water such as the rivers and the sea, and so the country faces a future with no water. Due to the long-term effects of climate change, the trend of poor rains is expected to continue. Namibia's water infrastructure deficit was estimated to be worth around US$1.6 billion in 2016. This dire situation makes water infrastructure development to access water a very urgent priority for the country.

- **Energy/Power**: Namibia imports 60 percent of its power requirements, mainly from South Africa, which is itself currently facing a serious power deficit. If measures are not taken to increase its capacity to generate power, there is a strong likelihood of an energy crisis in Namibia soon. This is already evident in the load-shedding and power outages that Namibia experiences during winter. Load shedding decreases productivity.

- **Transportation:** Weaknesses are emerging in the transport infrastructure, including declining road users' safety; increased maintenance due to increased traffic; traffic jams in Windhoek; high transport costs; ageing and insufficient rolling stock; and an old and worn-out rail network. If not addressed, these challenges could become obstacles to Namibia's goal of becoming a regional leader in logistics and distribution.

A good infrastructure is required to drive economic growth. Namibia has put infrastructure development at the top of its development agenda as spelled out in the national development milestone of Vision 2030, which wants Namibia to be a fully developed country by year 2030. A **developed country** is "*a sovereign State that has a highly developed economy and advanced technological infrastructure relative to other less industrialized nations."* The most common criteria for evaluating the degree of economic development are:

- Gross Domestic Product (GDP)
- Gross National Product (GNP)
- Per capita income
- Level of industrialization
- Amount of widespread infrastructure
- General standard of living

Meaningfully, infrastructure development entails:

- Rehabilitation
- Upgrade and building of new **water infrastructures**
- Road network infrastructures
- Railway infrastructures
- Airport infrastructures
- Seaport infrastructures
- Telecommunication infrastructures
- Energy infrastructures

3.3.1 The State of water and sanitation in Namibia

Like neighbouring countries in the Southern African Development Community (SADC) region such as South Africa and Botswana, Namibia has experienced consistently poor rains in recent years resulting in severe droughts. Scarce rainfall means less runoff water into rivers that are channelled into the country's water catchment dams and lakes. In the past three years, Namibian farmers have lost animals and income. General agricultural-sector production of food for human and animal consumption slowed down/declined significantly also, as a direct result of poor rains.

Without sufficient rain, towns, municipalities and cities may run out of water to supply citizens, manufacturing firms and factories. The City of Windhoek Water and Sanitation Report (2016) revealed to residents that supply dam levels were so low that the city might run out of water supply by October 2016, if no alternative sources of water were found.

3.3.1.1 Access to portable or safe drinking water in Namibia

MAWF has kept recorded statistics of water infrastructure rollout in Namibia and details of accessibility coverage to safe drinking or potable water. Below is the graph that depicts the regional statistics of regional clean water-access coverage ratios per the research conducted by the Namibian Statistics Agency (NSA). It is based on the last national verification per the Namibia 2011 Population and Housing Census.

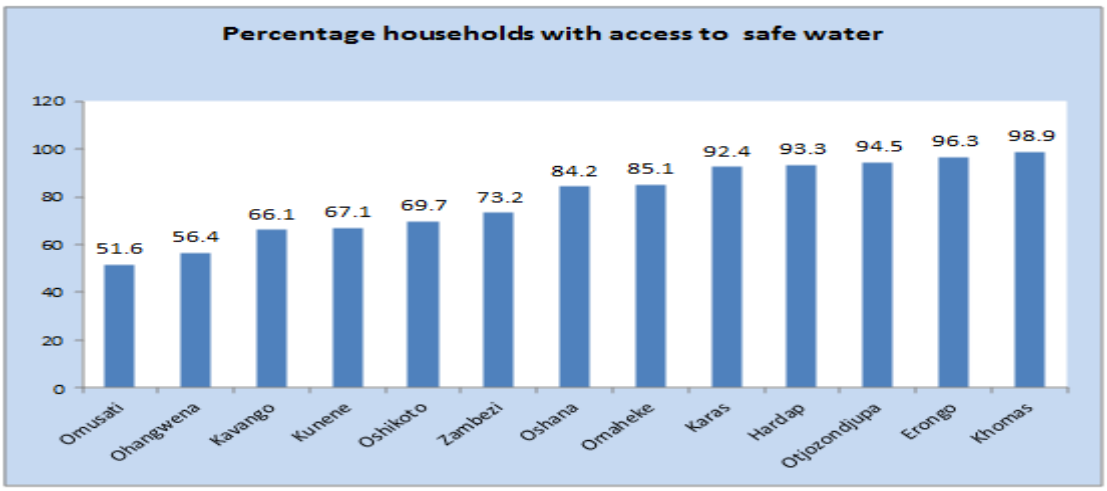


Figure 9: **Access to potable or safe drinking water in Namibia** ***(Source NSA, 2011)***

Namibia has about 13 political regions of governance. The above statistics display a trend of regional safe-water coverage from the lowest covered region to the highest.

- Omusati 51.6%
- Ohangwena 56.4%
- Kavango 66.1%
- Kunene 67.1%
- Oshikoto 69.7%
- Zambezi 73.2%
- Oshana 84.2%
- Omaheke 85.1%
- Karas 92.4%
- Hardap 93.3%
- Otjozondjupa 94.5%
- Erongo 96.3%
- Khomas 98.9%

The statistics show that urban areas have more access to clean water than rural areas. The regions of Omusati and Ohangwena with lowest safe-water coverage are largely populated regions in the country and predominantly inhabited by rural communities. Khomas and Erongo regions have the highest potable water penetration or coverage rate of 98.9% and 96.3% respectively. Both regions are predominantly urban or town centred, where municipalities and town councils run the water services. The great Khomas region houses Windhoek, which is the capital city of Namibia, and has a population of about 342,141 inhabitants. Erongo region includes our harbour, coastal towns, the fishing zone, and the seaports, and has a population of about 150,809 inhabitants.

Goal number six of the United Nations Sustainable Development Goals (UNSDGs) advocates and mandates sustainable management of water resources, availability of safe water, and guaranteed sanitation for all by year 2030. The UN SDGs' target culminates in Namibia's Vision 2030. The table below presents the national (overall) potable water and sanitation statistics per the National Demographics and Health Survey of 2013:

INDICATOR	**2013**
(i) access to safe rural potable water supplies	*71.9%*
(ii) access to safe urban potable water supplies	*97.8 %*
(iii) access to improved rural sanitation facilities	*16.7%*
(iv) access to improved urban sanitation facilities	*53.2%*

Figure 10: **Portable water and sanitation statistics** ***(Source NSA, 2013)***

Per the statistics, an access rate of 97.8% and 71.9% for urban and rural access respectively is highly commendable. However, sanitation remains a challenge in both urban and rural areas of Namibia, with an access rate of only 53.2% and 16.7% respectively. This raises an alert or red flag for the attainment of the UN SDGs.

3.4 Research Design

Figure 11 presents an overview of the design used to carry out a mixed methods research, which combined explorative qualitative and quantitative research. Below Figure 11, the flowchart in

Figure 12 shows the steps taken to collect data, analyse it, and interpret the results. The approach has been discussed in prior sections; it will be discussed further and explained in the following sections of this and other chapters.

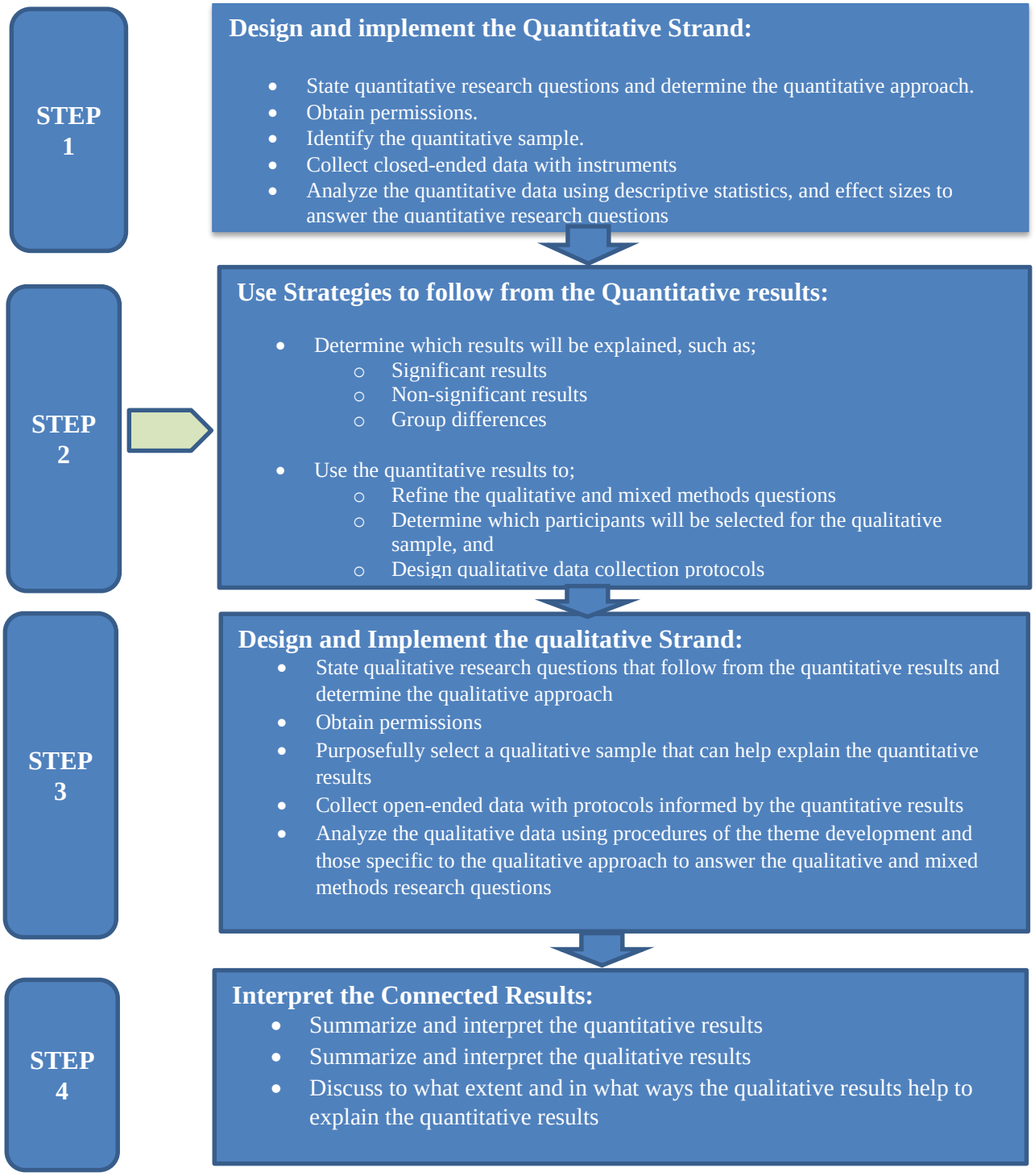


Figure 11: **Mixed methods research approach (*Source:* Nataliya V. Ivankova and Sheldon L. Stick -2007)**

Below is the condensed or abridged illustration of the above flowchart.

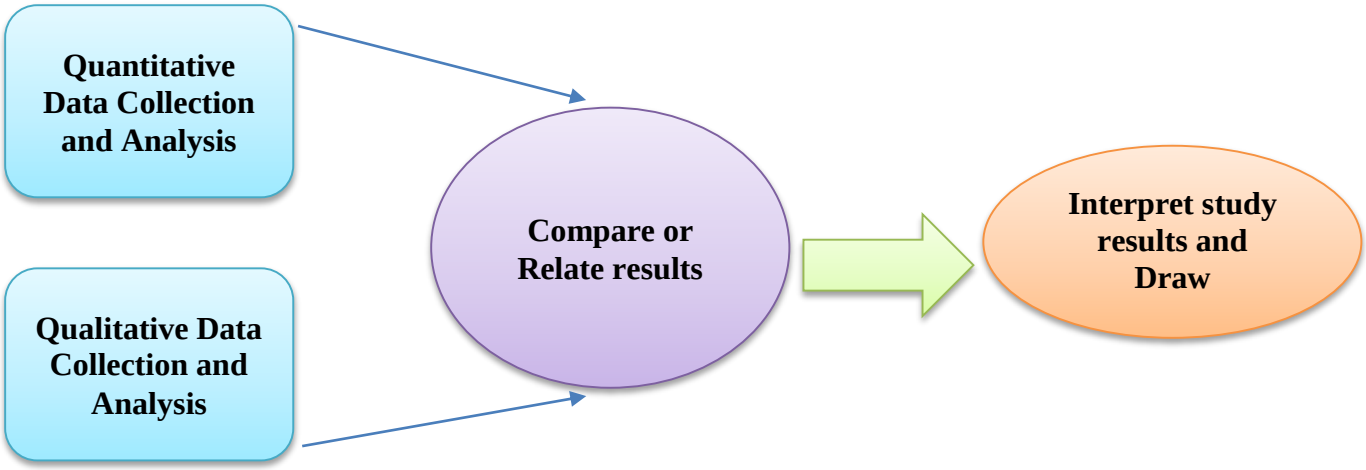


Figure 12: Process Flowchart for the Research

The research used a mixed methods approach that combined quantitative and qualitative methods. The data was collected through both survey questionnaires and interviews conducted to obtain answers to the research questions as primary data collection tools. The research also pursued secondary sources of information from which secondary data was obtained, i.e. financial and statistical reports on water infrastructure and finance from water sector players and institutions.

The flowchart above depicts the convergence of qualitative and quantitative data facilitated by using mixed methods. Secondary data did not give the researcher the opportunity to engage with respondents directly and perhaps probe further. However, this process has some embedded advantages built into it over the use of primary sources. These include unobtrusive access to data, which may help in reducing both social-desirability response bias and the reluctance of a respondent to answer explicit ethical questions (Harris, 2001). Furthermore, given the sizeable number of reports and amount of data required for analysis, the ease of access to the data met the objective of meeting a pre-defined deadline delivery of the report.

3.5 Survey

The survey attempted to obtain understanding of the water-sector setup and its challenges in Namibia. It aimed to provide appropriate answers to the following key questions:

- What are the current water infrastructure gaps in the country?
- What is the role of each player and its contribution to water security in the country so far?
- What investments have there been in water infrastructure in past 16 years of independence and sovereignty?
- What funding methods/tools are there for water infrastructures?

3.5.1 Sampling

The sample of selected respondents comprised both State and non-State actors, and was representative of the total population under study. Respondents were selected from the list of active players in the water sector provided by the Ministry of Agriculture, Water, and Forestry. Research questionnaires were sent out to the five key institutions that form a fair representation of the water sector in Namibia. Though it was not easy to obtain responses, all five of them eventually responded to the questionnaire.

The sample (from a finite population) included the following institutions:

- Five individual surveys (questionnaires), i.e. government departments, national water utility, and funding agencies.
- Funding Agencies: Development Bank of Namibia (DBN), Agricultural Bank of Namibia, and Standard Bank Namibia.
- Regulatory Agencies, i.e. Namibia Water Corporation, and Department of Water Supply and Sanitation (DWSS).

The questionnaires were sent via email to all five participants / respondents comprising government departments, national water utility, and funding agencies. The researcher followed up responses in individual interviews with the designated officers.

3.5.2 Administering the survey

The survey (by structured questionnaires) was administered via email followed up with direct discussions with the respective respondents. Firstly, a research-topic ethical clearance was sought and obtained from the university research committee. Then a sample representative of the population was selected. It comprised the top five key institutions in the water sector in Namibia. Efforts were made to find out the direct-contact persons for research questionnaires

at respective institutions. After contacts were established, questionnaires were sent out to the respondents (representatives of institutions). Post that, individual meetings were arranged with respective institutions to discuss the questionnaire in more detail, if necessary. Some of them needed to discuss it first; otherwise, some just responded straightaway. Though it was challenging at first, because some institutions were hesitant in the beginning, all institutions responded to the research questionnaire in the end. After research feedbacks were received, the responses were scheduled, tabled, and arranged for further analysis.

The study used survey i.e. questionnaire, to obtain primary data for testing. A Questionnaire (Appendix 1) was sent to each institution in the sample to get responses. Hofstee (2013), explained that survey data-collection method is used to elicit information from a limited number of individuals who are presumed to have the information the research is seeking. The individuals should be representative of the larger group, and should be willing to provide information. Surveys range from highly structured questionnaires to unstructured in-depth interviews. They are perceived as better ways of finding out participants' opinions, desires and attitudes. Survey is an effective tool of primary data collection that has been applied in many successful research studies undertaken in the past.

In this study, the survey was conducted by rolling out questionnaires directed to select sampled respondents to provide data inputs for analysis (Table 2 and 10).

3.5.3 Survey analysis

3.5.3.1 Descriptive statistics

These are the most commonly used, and form the basis for more advanced (mathematical) statistical techniques. The statistics used included:

- number, i.e. groups, percentages, and frequencies
- measures of central tendency, i.e. mean
- measures of variation, i.e. range
- standard error and/or standard deviation (Coldwell & Herbst, 2004; Tustin et. al., 2005).

3.5.3.2 Inferential Statistical Analysis

Inferential statistics go beyond describing data. They were used to answer such questions as to whether two or more groups differ on a given attribute; or whether a relationship exists between variable x and y (Taylor, 2002; Coldwell & Herbst, 2004; Tustin et. al., 2005). Inferential Statistical Analysis was applied to interpret results of descriptive statistics tests, and to draw inferences from other mathematical analysis techniques applied, such as graphs and ratios. Their purpose was to enable inferences to be made about the population from which samples were drawn (Taylor, 2002; Coldwell & Herbst, 2004). However, since data were based on samples, they were subjected to sampling error. Inferential statistics were used to determine the level of uncertainty with which the findings should be treated. The techniques used were ANOVA and F-tests. The parametric two-tailed F-test was used for the significance tests.

The statistical analysis for the research topic included the completeness of the survey, and helped to identify any information gaps or data inaccuracies. For statistical analysis and national reporting, the various block structures were normalised into the most-common and standard structure.

3.6 Case-study Approach

The objective of the case study was to present the water case for Namibia. The country is threatened with water scarcity, primarily due to the effects of climate change, growing population, and slow or reduced investment in water infrastructure development.

3.6.1 Case study sampling strategy

The case study focused on the status of water and infrastructure development in Namibia. It provided a screenshot of the water and other infrastructure challenges in the country. It featured key players in the water sector. Key institutions included the following:

Institution	Role in the water sector
Directorate of Rural Water Supply and Sanitation (DRWSS)	Government department responsible for administering rural water supply and sanitation
Namibia Water Corporation Limited (Namwater)	National water utility in the country

Development Bank of Namibia (DBN)	A development finance institution – responsible for providing finance/funding for infrastructure development.
Agricultural Bank of Namibia (Agribank)	A development finance institution – responsible for providing finance/funding for agricultural infrastructure development.
Government Institution Pension Fund (GIPF)	The largest institutional investor in the country. It is the public pension fund and largest pension fund in the country. Has provision within its investment policy to provide finance for infrastructure development.
Standard Bank Namibia (SBN)	The largest commercial bank in the country. It has a specialised division for infrastructure finance under Corporate and Investment Banking function.

Table 1: The key players in the water sector in Namibia

The research population comprised all State and non-State actors, bodies and institutions involved with water-infrastructure finance and governance. Eligibility criteria specified the characteristics that units in the population must possess to be included in the study. The population consisted of the entire target units eligible for selection and testing. A definite population was determined, based on the list obtained of all the active players, i.e. institutions, in the water sector and infrastructure finance space. These institutions range from:

- State departments tasked with water affairs to established independent water utilities and regulators
- Development finance institutions mandated to finance infrastructure
- Commercial banks
- Institutional investors

- International donors and foreign aid agencies

These institutions formed the entire population for the purposes of this study.

The study did not select the whole population for testing. Therefore, a specific sample was selected from the population for data collection purposes. A non-probability sampling method was used to select a sample to curb biasness, and ensure conformity to the standard. Post sample selection, questionnaires were distributed to the selected key actors and players in water-infrastructure development space in the country. Interviews were also arranged with selected institutions to have one on one discussions with the players. There is an established list of all key players in the water infrastructure development. The researcher applied a non-probability sampling method to select the sample, and it worked out successfully.

3.6.3 Case study data collection methods

The case study approach involved two types of data collection methods, that is, interviews and review of secondary data (Tustin *et al.* 2005):

a. Interviews

Hofstee (2013) referred to interview as a data collection method essentially used when trying to obtain information directly from the interviewee in a formal setting environment. In this method, structured questions are presented to the interviewee to provide direct answers/responses. From interview responses, direct and exact quotations are formulated and used as the basis for evaluating research questions. In this study, a representative sample (unit) was selected for measurement from a target population in such a way that, in combination with other representative units, it gave an accurate picture of the Problem Statement being studied (Coldwell & Herbst, 2004; Taylor, 2002; Tustin *et al.*, 2005). The method of selecting a representative sample was to pick random samples from the parent population. This is primary data collection.

The interviews were conducted by arranging individual interview sessions with the sampled respondent institutions. Five interviews were conducted (some telephonic) with the institutions below:

Institution	Designation – Authority
Directorate of Rural Water Supply and Sanitation (DRWSS) – Ministry of Agriculture, Water, and Forestry	Director/ Deputy Director
Namibia Water Corporation Limited (Namwater) - National Water Utility	Chief Financial Officer/ Fixed Asset Accountant
Development Bank of Namibia (DBN) - DFI	Portfolio Manager: Infrastructure Finance
Agricultural Bank of Namibia (Agribank)	Manager: Research
Standard Bank Namibia (SBN)	Executive: Corporate and Institutional Banking (CIB)
Government Institution Pension Fund (GIPF)	GM: Investments/ Senior Manager: Investments

Table 2: List of research interviewees

The interviews posed some of the following critical questions:

1. How many public water infrastructure projects have you funded as an institution?
2. What is the value of water infrastructure projects funded by your institution?
3. What is your institution's appetite for water-infrastructure development projects?

b. Secondary data review

Hofstee (2013) further referred to secondary data collection as a method of obtaining data from existing sources of information, produced from previous reports used for other research purposes. The secondary data is perceived to be reliable, accurate, and readily available. It can provide answers to many outstanding questions by way of inference. In this study, documentation review was used to gather secondary data from existing information sources used for other study purposes. The review included the following documents:

- Namwater capital project list (1998 – 2016) -*215 Sample of water infrastructure projects that were analysed for funding structure*
- Namibia 2011 Population and Housing Census report
- Delimitation Commissions report (2013)
- Fiscus reports, i.e. National budget, National Development Plans (NDPs), etc.
- National accounts, i.e. capital expenditure accounts

- Strategic financial reports i.e. annual financial statements
- Operational reports for DFIs and commercial banks
- Empirical data from other research bodies and institutions, i.e. Central Bank of Namibia.
- Scientific books and reports

All these methods have unique designs, made contributions, and added value to the research topic. They addressed the overall purpose, research objectives, importance, and benefits of the research (Cranston, 2004; Coldwell & Herbst, 2004).

3.6.4 Case study data analysis

The case study outlined the status of water infrastructure in the country. It included the data obtained from the document review, which in turn assisted in gathering secondary data for this research. Secondary sources produced data that was very useful to the study, such as:

- Value of water infrastructure funding gaps in the country
- State budget allocation to water infrastructure development and maintenance
- Water infrastructure projects undertaken between 1990 and 2016, and their cost composition
- Water project funders and funding tools/models

This data information was then arranged, analysed and tabulated to find answers to the research questions. Data analysis was done by using mathematical and graphical tools to make data more meaningful and deducible, and thereby enabling accurate conclusions. Budget allocations for water infrastructure development were graphically presented to assist observation and measurement of trends year-on-year. They show how State has been participating in water infrastructure development. Infrastructure projects undertaken between 1990 and 2016 were analysed by determining the cost composition and funding mix for each project. Findings revealed:

- The real funders of water projects
- Their funding ratios and overall contribution to water infrastructure development

This assisted in providing justice to the main research purpose of analysing the role of State and non-State actors in water infrastructure finance in Namibia. The data analysis has been addressed more appropriately under findings in Chapter 4.

3.6.5 Data validation

To ensure that the data contained in the storage and retrieval system can be used for decision-making, each data quality needs were defined, i.e. the required accuracy and precision (Chapman, 1992; Taylor, 2002; Coldwell & Herbst, 2014; Tustin *et al.*, 2005). It must be noted that all phases of the data collection process, i.e. planning, collection, analysis and data storage, contribute to the quality of the data. Of importance was the care and checking of the original coding entry of the data (Chapman, 1992; Taylor, 2002; Coldwell & Herbst, 2014; Tustin *et al.*, 2005). Careful design of data codes and entry system minimised input errors. Experience also showed that major mistakes can be made in transferring data to databases, even when using standardised data forms. A high level of confidence in the validity of data analysed and interpreted is essential. Without such confidence, further data manipulation is fruitless. If invalid data is subsequently combined with valid data, the integrity of the later is also impaired.

3.7 Reliability and Validity issues

3.7.1 Reliability

Reliability refers to whether a researcher measured something accurately so that, if other people repeat the process, they will obtain the same results (Lewis, 2001). In this research project, the hypothesis was subjected to the same test a second time, to see whether it sustained the test (Coldwell & Herbst, 2004). In addition to this test-retest measurement, several other ways of testing reliability were used. Evidence collected was sufficient, authentic, and valid. It ensured reliability of my Problem Statement. Consistency was the hallmark of my reliability.

3.7.2 Validity including threats to validity or improving validity

This refers to whether the evidence can demonstrate its worth or relevance (validity) for the selected research problem. Validity or valid evidence was central to the way in which this research was conducted. Two fundamental kinds of validity in relation to research designs (Denscombe, 2003; Coldwell & Herbst, 2004) were of importance:

- Internal validity – findings followed in a direct and unproblematic manner/way from its methods and therefore it ‘sustains’ its findings or conclusions
- External validity – findings or conclusions can be generalised beyond the confines of

the design and the study setting

Both types of validity, internal and external, were important and desirable attributes of the research design. There was little point in having coherent results that could only be sustained by the research procedure one utilised, if they were merely self-referring. Similarly, there was no point in conducting research that paid great attention to external validity if the design was flawed and lead to spurious results. Thus, in the context of gathering valid evidence (validity), and to address any uncertainty, the approach (es) or method(s) for my research project were to:

- Use more than one method when investigating the research topic (cf. data collection)
- Recognise the value of using multi-methods for the corroboration of findings and for enhancing the validity of data
- Recognise that the notion of a single financial and/or technical notion is controversial, and therefore adopt a cautious approach and/or position to avoid any controversies
- Appreciate that different methods might point in a similar direction but are unlikely to meet at some precise, unequivocal point of reality
- Avoid the presumption that use of certain methodological and systematic models can prove that data or analyses are correct

3.8 Study limitations

Limitations are causes in research that may affect the research results negatively (Mungenda, 2011). The mixed method approach used in this study poses its own shortcomings and limitations. The major shortcoming lie in the fact that this method is more expensive and time consuming as compared to other methods due to its duplicity content. Also this method may produce conflicting results that may be difficult to interpret. Therefore, effects of these shortcomings bears limitation to the study. During the research study, limitations were encountered with regard to obtaining information on the selected samples, from both the State institutions and non-State actors as agents of infrastructure development. Most respondents took time to respond, and were initially not willing to disclose their information as they regarded it as confidential. However, the researcher ultimately overcame these limitations by presenting an ethics clearance letter from the University assuring them that required information would be used exclusively for academic purposes.

3.9 Limitations

The population and sample, data collection, and data analysis formed the spine or nucleus for adequate research on potential water-infrastructure funding models, as described in the theory and how they can be applied. Substantial primary data captured from surveys (questionnaires) and interviews, and secondary data gleaned from document reports, were used to develop the model(s) described in the results in Chapter 4. Drawing on the theory information, the data collection method and data analysis showed that accurate conclusions can be drawn from the data/information collected on water-infrastructure investment and funding.

4 RESEARCH FINDINGS, ANALYSIS AND DISCUSSION

4.1 Introduction

This chapter presents the results from the survey and case study. The study revealed that Namibia water infrastructures lagged. Limited financial resources and lack of technical capacity came out strongly as the factors underpinning the current state of water infrastructures in the country. There is an observed continued dominance of State participation in general infrastructure development financing, compared with observed global trends of NSAs playing a more active role, shifting out State dominance in the infrastructure space. In Namibia, NSAs have proven to be reluctant, and they stand still in infrastructure development. Therefore, their presence in the water infrastructure space is minimal.

Ample synergies exist between infrastructure development and economic growth, such as efficient and effective public goods and services delivery, and active response to other national strategic needs, i.e. water infrastructure. The cause of the reverse finding to the global trend of increased participation of NSAs was linked to an absence of enabling legislation (Public – Private Partnership Act) in Namibia. Such legislation could guide, incentivise, and protect funders and finance providers to attract their participation and contribution towards infrastructure development. Its absence causes serious limitation in general infrastructure development - a key pillar in continuous economic growth.

A sample of 215 water projects was tested. These projects formed a significant representative of the total number of water infrastructure projects undertaken by Namibia Water Corporation between 1998 and 2016. An analysis of the funding structure of these projects produced a complete skew, and opposing results, in the funding ratios of State versus NSAs towards the projects. State participation came out in the lead at 68%, while the NSAs accounted for the remaining 32%. This finding reverses the much-acclaimed academic position or revelation that "*The role of State in controlling and managing some public infrastructures has diminished worldwide, as non-State actors now play a more significant role"*. In Namibia, the NSAs have not fully responded to this global trend. The absence of a Public-Private Partnership Act appears to be holding back the participation of local and international NSAs (including development finance institutions, institutional investors and commercial banks), in water infrastructure development. Another reason is that typical water-infrastructure development projects do not

seem to capture the interest of commercial investors. Gleick (1999) postulated that water is life and hence a human fundamental right to have access to it. Therefore, its commercial ability to generate required investment returns is sensational and prone to political risk.

4.2 State actors in water infrastructure development in Namibia

There are two agencies of State tasked with water affairs in Namibia:

- The Directorate of Rural Water Supply and Sanitation (DRWSS) - under the Ministry of Agriculture, Water, and Forestry
- Namibia Water Corporation (Namwater) – an independent national water utility.

4.2.1. Directorate of Rural Water Supply and Sanitation (DRWSS)

The DRWSS was established in September 1993, as a direct result of the approval by Cabinet of the Water and Sanitation Sector Policy. Two key activities of the DRWSS are:

- To provide access to potable water supply and improved sanitation services in rural communal areas
- To coordinate urban and rural water supply and sanitation services

Water infrastructure projects commissioned by the DRWSS have been dams, water treatment plants, water supply networks, and ground-water supply schemes. The annual national budget allocation, donor funding, and debt funding from funding institutions financed the projects. Obtaining details from the DRWSS about financial cost and structure of their projects was a bit of challenge. Eventually the researcher obtained and analysed the annual budget allocation to the DRWSS for water infrastructure development and maintenance between 1990 and 2016. It totalled N$7.5 billion (US$577 million).

Figure 13 illustrates the government budget allocation to the DRWSS for water-infrastructure development and maintenance since formation of government in 1990 until 2016.

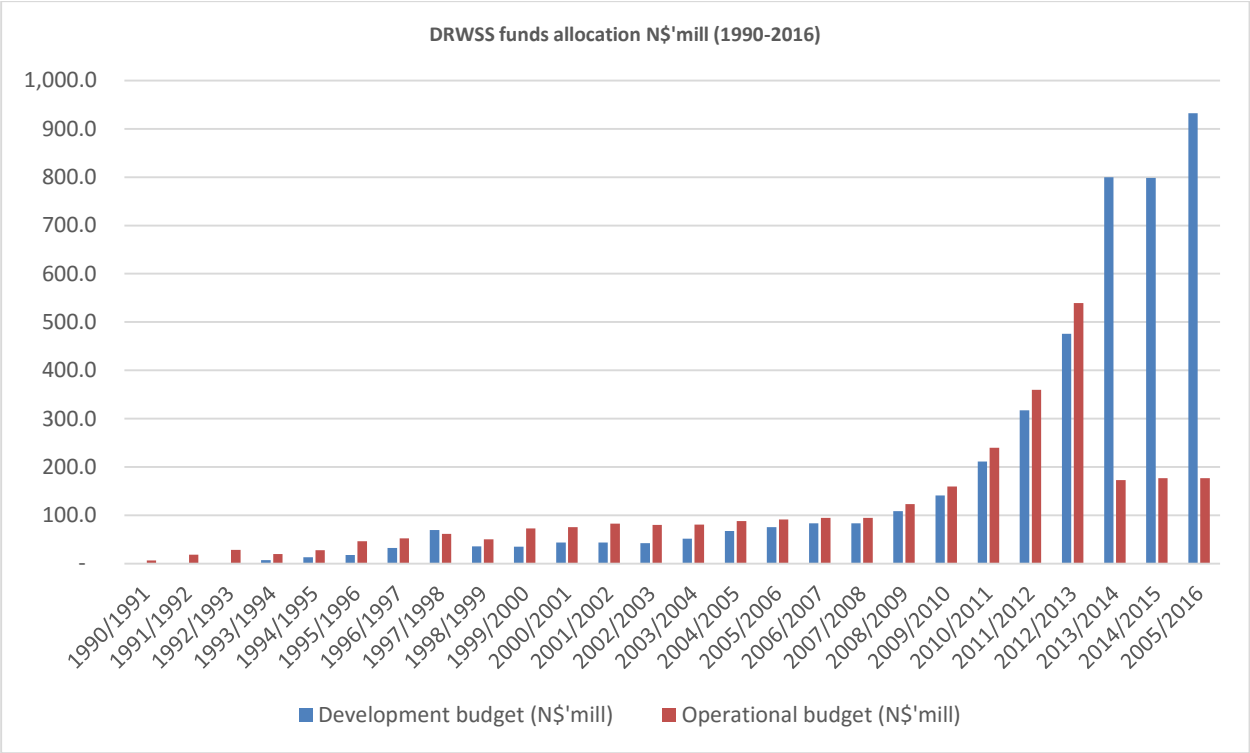


Figure 13: National budget allocation for Rural Water Supply and Sanitation, Namibia

Figure 13 above displays the State budget allocation towards funding Rural Water Supply and Sanitation over the period of study (1990-2016). The development budget allocation aims primarily to fund new rural water infrastructure projects and refurbish existing dilapidated infrastructures. The DRWSS focuses primarily on providing rural water and sanitation through funding from the State. Figure 13 depicts a steadily increasing funding trend towards rural water supply and sanitation infrastructures, growing from a mere N$7.2 million in 1993 to N$933 million in 2016. This trend shows a progressive increase in State resource allocation to fund infrastructure development. Primarily it rolls out new water infrastructures, and refurbishes the existing ones such as major pipeline networks, dams, water canals, water treatment plants, etc. Recent construction of Neckartal Dam in the southern region of the country cost an estimated N$2.4 billion (US$184.6 million) over 36 months (2013-2016). Continued significant infrastructure funding by the State is premised on the lack of private sector and other NSAs' participation in public water infrastructure finance. In an informal interview with the deputy director in the DWSS, he said, "*There has been a bit of reluctance from the non-State actors' side (private sector and other non-governmental institutions) to partake in public infrastructure development, ever since independence in 1990. The State through government has assumed the responsibility of funding and the development of the needed public infrastructures. There has been little support from the non-governmental organizations for infrastructure funding i.e. from*

donor funds and foreign aid organizations. The private sector players have on occasion demonstrated eagerness and willingness to participate in public infrastructure development. However, the absence of the Public-Private Partnership (PPP) law/ act in the country has made it difficult for NSAs to participate. Water is particularly a highly politicized commodity and may not be commercialised to generate returns that the private sector investors may seek." Therefore, the growing trend of increased government funding in the water infrastructure sector provides further evidence of the continuing traditional role of government/ State or government dominance in water infrastructure funding as explored in Chapter 2, on literature.

4.2.2 Namibia Water Corporation (Namwater)

The Namibia Water Corporation Ltd (Namwater) was created by the Namibia Water Corporation Act, Act 12 of 1997, and officially registered as a corporation on 9 December 1997. It is an autonomous commercial entity supplying bulk water to industries, municipalities and the Ministry of Agriculture, Water, and Forestry. The latter supplies water to rural communities. Namwater is mandated to;

- Manage water resource and water supply
- Achieve equitable access to water for all
- Sustain development of water resources

With the support of GRN, Namwater has built several water infrastructures, funded primarily through internally generated cash flows, government assistance/grants, and debt finance through loans and bond issuance. The funding structures of the Namwater projects were analysed to assess the overall impact of participation of State and non-State actors in water infrastructure development in Namibia (Section 4.4).

4.3 Non-State Actors in water infrastructure development in Namibia

There are several NSA players in the water-infrastructure development sector. However, this study was limited to the following NSAs:

- Development Bank of Namibia and Agricultural Bank of Namibia represented development finance institutions, which are strategic partners in the water infrastructure development. These institutions are mandated to provide long-term strategic finance for infrastructure development. The two institutions have funded several infrastructure development projects, i.e. road construction, building construction, town sewerage systems, farming tools and implements, and tractors, etc.

- Standard Bank of Namibia represented the private commercial banks, which are strategic partners in water infrastructure development. The bank provided long-term strategic finance for infrastructure development projects that included residential housing construction, office building construction, and roads, etc.

- Government Institution Pension Fund represented the institutional investors. Institutional investors are strategic partners to infrastructure development in terms of providing finance. The institution has a specialised mandate in providing strategic finance. It has provided funding mostly for projects involving renewable energy (solar), rural electrification, and township servicing of land, etc.

In the interviews, NSAs were asked to provide a narrative on their experience, involvement and participation in water infrastructure finance. Their responses varied and appear below in their respective sections.

4.3.1. Development Finance Institutions (DFIs)

The research question was, "How do you participate in water infrastructure finance?"

Development Bank of Namibia (DBN);

Response:

"We have not really funded water projects as stand-alone items, apart from a small project of N$2.74 million (US$185,000) in 2005. The funding was approved for the construction of a

seawater treatment facility. Water is life. It may not be fully commercialised for a good return. Therefore, chances of funding it all alone become less likely"

DBN's negative response revealed their low interest and participation in water projects. However, the bank has availed funding for some bulk infrastructure projects in water, sewerage, and land servicing for municipalities and town councils across the country. The specific project named by the interviewee was the construction of a seawater treatment facility in 2005 for a municipality at a cost of N$2.74 million (US$185,000). However, DBN revealed a few finance tools available for infrastructure development, such as:

- **Term loan**

  An advance to satisfy a client's medium- to long-term financial needs, repayable within a specific period at specific pre-determined intervals.

- **Project finance**

  Finance for the acquisition, or construction, of immovable properties, or for making improvements to fixed commercial property against the security of a bond registered in favour of the Bank.

- **Project Development finance**

  Short-term loans to finance development of immovable property for re-sale.

The following financing options are made available by the Development Bank of Namibia for infrastructure development:

FINANCING/FUNDING INSTRUMENTS	MINIMUM AMOUNT ALLOWABLE (N$)	DURATION (Years)
Infrastructure Development Facilities:		
Project finance	5,000,000	10 years
Local Authority finance	5,000,000	20 years
Public Enterprise finance	5,000,000	20 years
Public-Private Partnership finance	5,000,000	20 years

Table 3: **DBN infrastructure funding options**

Agricultural Bank of Namibia (*AGRIBANK)*

Summary of response to the interview;

"I wish to advise that the bank is by no means involved in the business of developing water infrastructure projects. Such projects are funded through capital projects of Ministry of Agriculture in collaboration with Namwater and related stakeholders. The case in point is the construction of the Neckartal Dam."

The negative response in the quote above by AGRIBANK indicated that they do not fund, or have never funded, any water infrastructure project. They left this role to Namwater and Ministry of Agriculture, Water, and Forestry. AGRIBANK provides finance for private water-infrastructure development for animal-stock farming and other agricultural purposes. The following are the available options provided by the bank:

- Installation of boreholes to supply water for agricultural activities. Under this product, the bank provides finance for digging and developing boreholes to assist farmers with their water needs.
- Construction of dams, reservoirs, tanks, and other water storage facilities for water supply to agricultural activities. Under this product, the bank provides finance for dams, reservoirs, tanks and other water storage construction to assist farmers with acquiring water collection and storage facilities.
- Installation of water points for livestock. Under this product, the bank provides finance to expand water distribution points within the farm.

DBN and AGRIBANK both revealed their low interest in (appetite for) funding water projects. The main reason is the poor commercial viability for such projects in comparison to achieving expected returns, or required return, on investment.

4.3.2. Commercial banking institutions

The study selected one commercial bank to be interviewed in relation to funding water infrastructure projects. Standard Bank Namibia (SBN) being the largest commercial bank in the country, it was selected for the interview and responded to a host of structured questions. The bank has a dedicated infrastructure finance division - Corporate and Investment Banking (CIB).

Response to the interview questions:

"While we have not funded any water project directly, we were the joint book runners on the Namwater inaugural N$200million bond issuance that was successfully completed in April 2015. The bond was overly subscribed for N$468 million. The oversubscription serves as an indication of the private sector investors' willingness to participate in water infrastructure development."

Standard Bank Namibia's negative response in the quote above revealed its low level of interest in participating in water projects. The bank has never funded any water infrastructure project directly. The reason advanced is that water is essential for life, and so it may not be fully commercialised for a good return. However, the interview revealed that the bank acted as a joint book runner in the fundraising and bond listing of Namibia Water Corporation Ltd, the national water utility in the country. SBN acted jointly with IJG Securities to raise two corporate bonds for Namwater on their inaugural N$200m bond issuance. The bonds were senior unsecured notes that are listed on the Namibian Stock Exchange with issuer ratings of BBB-/ National scale rating AA. The two bonds are listed below;

Issuer	Namibia Water Corporation Ltd	
Ranking	Senior Unsecured Notes	
Listing	Namibian Stock Exchange	
Issuer Rating	BBB-/National Scale Rating AA- (zaf)	
Standard Bank's role	Joint Bookrunner	
Bond Code	NWC20	NWC22
Tenor	5 years	7 Years
Maturity	24 April 2020	24 April 2022
Amount	NAD96mn	NAD106mn
Total Bids Received	NAD304mn	NAD164mn

Figure 14: **Corporate bonds issue for Namibia Water Corporation Ltd** ***(Source: CIB 2015)***

Under this arrangement, two bonds were issued and both were overly subscribed. This reflects a good appetite for water projects from other market investors who subscribed to two bonds. The NWC20 received orders for more than NAD300 million (3.23 times oversubscribed) with 25 bids received in the auction process. The note cleared at 155bps over the R208, representing a fixed rate of 9.05% for 5 years. The NWC22 received orders for more than NAD160 million (1.55 times oversubscribed) with 14 bids received in the auction process. The note cleared at 185bps over the R2023, representing a fixed rate of 9.57% for 7 years.

Therefore, the success of Namwater's Corporate Bond provided further evidence of growth in existing Namibian domestic capital markets, in line with the Namibia Financial Sector Charter.

4.3.3. Participation of local Institutional Investor institutions

For this study, we selected the Government Institutions Pensions Fund of Namibia (GIPF), the equivalent of Government Employees Pension Fund (GEPF) in South Africa. GIPF is the largest pension fund in Namibia, with Assets Under Management (AUM) of close to N$100 billion ($6.7 billion). In line with their investment policy under their Unlisted Investment Programme (UIP), GIPF has two specific mandates focused on infrastructure development:

	Mandates	Focus Area
1	Infrastructure Fund	Invest in businesses operating in the infrastructure space such as renewable energy, water, energy, servicing of land, etc.
2	Developmental Fund	Invest in businesses or projects that have a developmental impact such as in water infrastructures or water distribution infrastructures, energy, affordable housing, education, rail ports and roads, etc.

Table 4: GIPF infrastructure mandate

These two mandates would accommodate the water infrastructure development and may in future benefit the water sector in the country.

Responses to the interview:

"The fund has never funded or invested into any water infrastructure project. Water is a basic commodity that's highly politicised. Therefore, it may not be commercialised for a return on investment. Investors are return driven and always seek for a good return on investment. However, in pursuit of impact investing and social responsibility, the fund takes water infrastructure development as an area of interest"

The negative response in the quote above shows that the largest pension fund in the country has never invested or committed any funds into any water infrastructure related project, citing the reason of poor commercial viability of water projects to generate returns.

4.4 Analysis of water infrastructure finance in Namibia: State and Non-State Actors' participation

The study was aimed at analysing the weight of participation of State versus non-State actors in water infrastructure funding. To test this, the study analysed 215 water infrastructure projects developed and funded under the national water utility, Namwater. The projects undertaken between 1998 and 2016 were funded by/through a hybrid of funding methods. State Actors provided funding in two main ways:

1. With funds appropriated from the national budget/fiscus
2. Internally generated cash flows (IGCFs) of the water utility (Namwater)

Non- State Actors also provided funding for water infrastructures under Namwater, through Development Finance Institutions – i.e. Development Bank of Southern Africa (DBSA), Private investors –Farmers and Mining operations – such as Rossing Uranium Mine, Skorpion Mine, and Langer Heinrich Mine. A total amount of N$2.1 billion (equivalent to US$ 153 million) worth of capital was invested in the 215 water-infrastructure development projects under the stewardship of Namwater between 1998 and 2016.

The analysis revealed that about 68% cost of the projects was funded by the State/Agencies, with only the remaining 32% funded by Non- State participants. Below is the numerical analysis of the finding:

FUNDER(S)	TOTAL (in N$)	TOTAL (in US$)	%
State Actors	1,412,924,036	104,661,040	68%
Non-State Actors	658,405,456	48,770,775	32%
	2,071,329,492	**153,431,814**	**100%**

Table 5*: Water infrastructure finance in Namibia: *State and Non-State Actors participation

The funding was provided by both the State and non-State actors in the proportions illustrated in Figure 15:

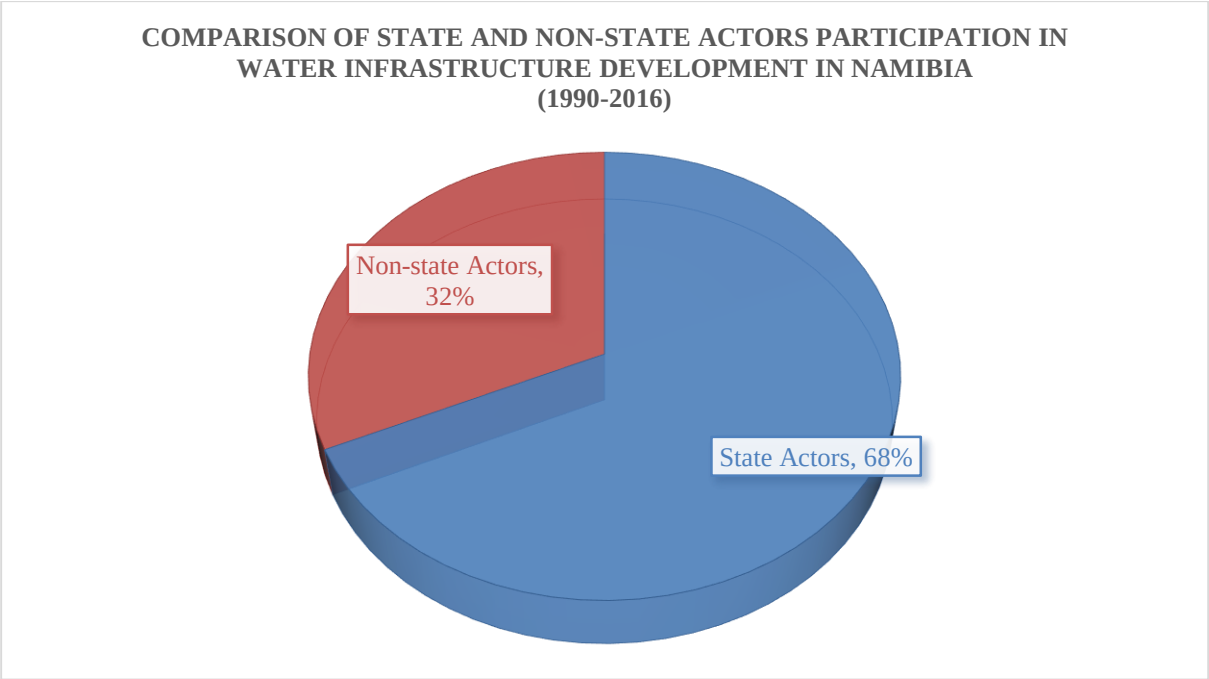


***Figure 15*: State and NSA participation ratio**

The pie chart shows that Namibia's status still defeats the odds that non-State actors are taking an active role, and lead in infrastructure development around the globe. Under this assertion, it is argued that NSAs have overtaken the State in infrastructure development finance. However, the Namibian setup still illustrates that the State and its agencies have contributed more significantly to water infrastructure development at a leading rate of 68%, compared to a 32% contribution by the NSAs. This revelation undermines the renowned assertion that NSAs lead in infrastructure finance and management of public goods.

Active State participation was also measured by assessing the impact of the Directorate of Rural Water Supply and Sanitation (DRWSS) in funding water infrastructure projects. The State allocated a combined budget of N$7.5 billion (US$577 million) to the DRWSS aimed at funding Water and Sanitation between the years 1990 to 2016. The study further revealed that about N$4.5 billion (equivalent to 60%) of the total budget was spent on building major connecting pipelines, dams, water treatment plants, and boreholes for rural communities, etc. About N$3.0 billion (equivalent to 40%) was spent on maintenance of the existing water infrastructure networks. Equally, Namwater applied the following methods to raise finance for 215 new water-infrastructure projects to the total value of N$2.1 billion between 1998 and 2016 (Table 6).

Funding method(s)	Funding Classification	Funding proportion
Through Namwater internally generated cash flows (IGCFs)	State	10%
Through the budget appropriation from the State (Fiscus)	State	26%
Through funding by the Development Finance Institutions (DFIs)	NSA	7%
Through a combined funding by Namwater of internally generated cash flows (IGCFs) and Fiscus	State	33%
Funding by the Mining operations in exchange for subsidised water tariffs	NSA	21%
Funding by private investor through issue of bonds i.e. commercial banks, institutional investors, and investment houses.	NSA	4%

***Table 6*: Water projects funding structure mix (1998-2016)**

The pie chart illustration below depicts the segment proportion of the funding sources above.

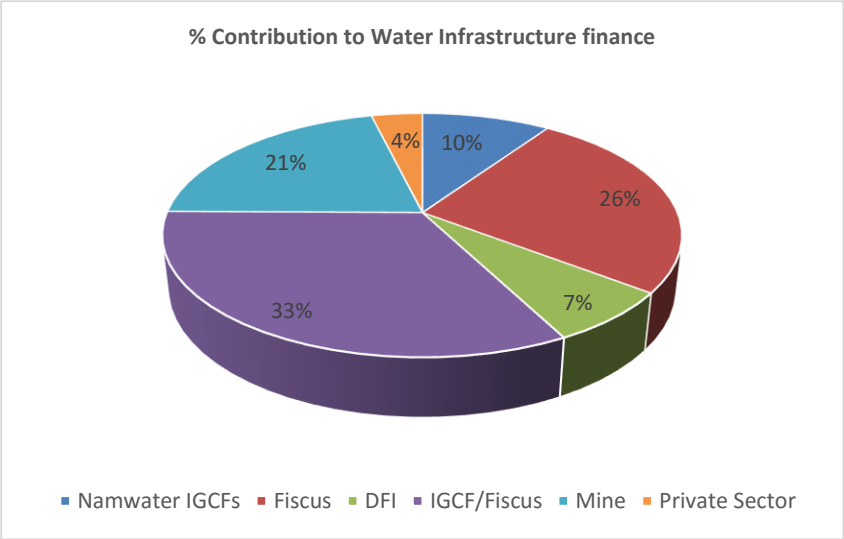


Figure 16: Funding mix or structure for water infrastructure projects by Namwater, Namibia

Figure 16 and Table 6 above display the detailed funding mix of the water infrastructure projects commissioned by or under Namwater since its establishment in 1998 to 2016. Namwater is the commissioned national water utility agency in the Namibia. Its principal mandate is to build new water infrastructures and expand the existing ones. However, water

infrastructure development requires significant capital. Figure 16 shows that a significant proportion of the projects was funded through:

- A combined IGCF/Fiscus at 33%
- Direct Fiscus appropriation at 26%
- Mining operations at 21%
- Namwater's Internally Generated Cash flows at 10%
- Development Finance Institutions at 7% (specifically DBSA)
- Private investors – farmers and regional councils

4.5 The descriptive statistical analysis and interpretation of the results from the study

Table 7 below presents a summary of the descriptive statistics used in this study. It depicts various water-infrastructure funding methods used in relation to the total capital spent on the 215 water projects (worth N$2.1 billion) funded under the national water utility - Namwater. The following measures (ratios) were tested:

- Namwater IGCFs funding to Total Capital Spent (%),
- Fiscus funding to Total Capital Spent (%),
- DFI funding to Total Capital Spent (%),
- IGCF/Fiscus funding to Total Capital Spent (%),
- Mining operations funding to Total Capital Spent (%), and
- Private Sector Institution funding to Total Capital Spent (%)

Table 7: Descriptive Statistics – Capital provided to fund water infrastructure projects under Namwater.

Variable	Observations	Min	Max	Mean	Standard Deviation
Namwater IGCFs funding to Total Capital Spent (%)- ***State***	20	0.00	0.06	0.10	0.06
Fiscus funding to Total Capital Spent (%) - ***State***	20	0.00	0.62	0.26	0.50
DFI funding to Total Capital Spent (%) - ***NSA***	20	0.00	0.15	0.07	0.12
IGCF/Fiscus funding to Total Capital Spent (%) - **State**	20	0.00	0.65	0.33	0.52
Mining operations funding to Total Capital Spent (%) - ***NSAs***	20	0.00	0.30	0.21	0.28
Private Sector funding to Total Capital Spent (%) - ***NSAs***	20	0.00	0.11	0.04	0.09

Source: Extracts from the ANOVA table

All measures above produced low and stable mean values and standard deviation. This is especially in proportion to Private sector funding to Total capital spent mean value and standard deviation from the mean. The value is slightly higher across all infrastructure-funding methods as indicator value for the periods. This is notable due to the hypothesis of a significantly low impact on water infrastructure funding by NSAs (DFIs and Private sector firms). Should this hold true, is this significantly a major setback? The positive or negative nature of this relationship will play a particularly important role in this regard.

Further, it was noted that the observation values of these four statistics are consistent. The greater range between the min and max value of contribution to water-infrastructure funding suggests that the needed participation of non-State actors in infrastructure development is likely to hold true.

4.6 Conclusion

Chapter 4 has established that in Namibia, State funding dominates in public infrastructure development, and resource mobilisation for infrastructure projects. The NSAs' (both local and international), presence in infrastructure development space remains exceedingly low, having left the burden to the State. However, the study revealed that unilateral State funding might never be sufficient to drive the infrastructure development initiatives the country needs. Insufficient water infrastructures have become a serious concern with the worsening effects of climate change. This finding held true at the broad level, and when analysed on water projects funding mix, and structures of Namibia Water Corporation.

Yet, while the significance level was found to be robust after performing separate methodology checks, the nature of the working relationship between State and non-State actors appears divergent. This finding is premised on the fact that the interests of the State and those of the NSAs are not usually aligned and conflict frequently. The State aims to provide the necessary infrastructure to the public in order to retain its position of power, influence, and control over the people. On the other hand, the NSAs want to make an impact for their own presence to be felt. The worst is that commercial NSAs do not only seek to make an impact and get noticed; they also aim for a good return on their investment. These unaligned and conflicted interests culminate into serious tensions between the State and NSAs. The State aims to keep its uninterrupted power base and control over public infrastructure to exert control over government and electorate (people). To ease the tensions between the State and NSAs, a regulated and proper participatory environment needs to be created. Therefore, in the absence of this in Namibia, the local commercial NSAs have not significantly participated in water infrastructure development. They cite the low or poor return on water, given that it is such a highly politicised commodity and may not be commercialised fully. Overall, the 32% funding contribution of the NSAs to water infrastructure finance, in comparison to that of the State and its agencies of 68%, reflects a poor representation of the NSA in the water sector in Namibia. This finding therefore reverses the acclaimed theory that "*the role of government in governance of public goods is diminished as private actors now play a more significant role."* The Namibian setup still reflects a significant dominance of the State participation in water infrastructure development. This therefore nullifies the substance of the hypothesis being tested, that:

- *The role of State in controlling and managing some public infrastructures has diminished worldwide, as non-State actors now play a more significant role.*

This therefore provides a solid basis for providing conclusion on the research questions, objectives, and hypothesis that follow in Chapter 5.

5 RESEARCH DISCUSSION AND CONCLUSIONS

5.1 Introduction

This chapter will build on the research findings and analysis presented in the previous chapter by providing conclusions to the research questions to conclude upon research hypothesis. Further, it will discuss the impact of these conclusions to explore their impact from this and provide recommendation for further research. This chapter will bring in the findings concluded in Chapter 4 to analyse and review them against existing theories in the literature. The discussion will centre on the following points of discussion, to provide a conclusion to the research questions: Water infrastructure financing in Namibia, analysing the participation of State and non-State actors. The study will conclude by providing alternative funding models for water infrastructures in Namibia.

The objective of this study was to test the research hypothesis by exploring the posited research questions. Conclusions on the questions are presented below as the basis of providing a conclusion on the research.

5.2 State and Non-State actors' participation in infrastructure development

There is a growing recognition globally that regulation is not the exhaustive domain of the State (Hutter, 2006). A global emergence of non-State actors in the public-infrastructure development space proves this observation. However, this study revealed and concluded that the State in Namibia continues to dominate public infrastructure development. Based on the analysis conducted on the sampled 251 water infrastructure projects under Namwater, State funding is on the lead at a notable margin of 68%, doubling the efforts of the NSAs (including DFIs and private banks) that stood at 32%. This is a significant margin. It is worrisome because it opposes the global trend of diminishing State funding and involvement in public infrastructure development. Globally, the trends are pointing to more involvement of NSAs in public infrastructure finance and development. These transactions are enabled by legislation that promotes cooperation between State and NSAs. The study therefore concluded that the continued dominance in this intervention is triggered by low interest of the NSAs in funding and managing public infrastructures. The State continues to fund the public infrastructures as part of its wider mandate of serving the public, despite the limited resources at its disposal. Low interest in NSAs, to participate in the crucial development of much-needed infrastructure, is linked directly to an absence of legislation that creates an enabling environment and

participatory framework to encourage NSAs that are willing to participants. NSAs feel that their interest is not served, nor protected, by a standing regulation. The interests of the participants need to be guarded and protected through the enactment of an enabling legislation.

5.3 Relationship between State and NSAs in water infrastructure development

State exerts power over the sovereignty and nationhood of all governments worldwide. The State is pillared on four foundations: Government, People, Territory and Sovereignty. The government runs the affairs of the State and its people, and guards the territory. State actors reside and operate within this territory to effectively drive and implement the development agenda of government. Equally, the NSAs also reside within the territory of the State. Therefore, there is a linkage between these two player institutions. The study has confirmed the existing relationship; it is premised on the complementary efforts between the two virtual institutions. NSAs complement the State in fulfilling its economic and social mandate. Infrastructure development is at the centre of bridging efforts by NSAs fronted by the private sector.

In Namibia, there are huge infrastructure gaps across sectors. In the study, water-infrastructure development came out as a critical area that has been greatly neglected, and solely left to the mercy of the State to rescue. The NSAs have indirectly been very reluctant to put their feet into water infrastructure development, citing the commercial viability of water projects, despite being the only natural source of life for the living, and a means of production.

There are tensions between State and NSAs in Namibia because of a lack of clear and decisive legislation, namely the Public-Private Partnership Act, on the participation of NSAs in infrastructure development. NSAs do not feel protected. Although the relationship is full of synergy, results of the study on the sampled projects revealed the weak participation of NSAs in infrastructure finance as hovering at around 32%. However, it has at least reduced the pressure on State resources. These complementary efforts, though not sufficient, have lessened the State burden and freed up resources for other critical public needs.

5.4 Appropriate funding model for water infrastructure

The researcher has recommended the appropriate funding model that the State can explore to entice NSAs' interest in raising necessary funding for water infrastructure projects in the country. The Public-Private Partnerships policy has not yet been enacted into law in Namibia. Therefore, the solution lies in the following:

- **The immediate enactment of the Public Private Partnerships (PPPs) Act in Namibia**

PPP involves a public service or private business venture that is funded and operated by means of a partnership between government and one or more private sector entities. This funding model is well motivated under discussions on partnerships. Amoa-Gyarteng (2015) recommended the use of this model to boost public infrastructures without over burdening the State coffers. Equally, Nafziger *et al.* (2015, p. 27-33) made several recommendations for increased working relationships between State and non-State actors.

PPPs are praised as a form of a good strategy where government and private sector entities pool their resources and share the risks in undertaking a specific project. Under these contracts, the private entity provides a public service or good, and assumes substantial financial, technical and operational risks and returns of the projects. PPPs are meant to minimise the financial burden on the State, by enticing private sector participation in public goods and services provisioning, without fully commercialising the output and delivery to the public. The PPPs can be structured in various ways, where:

- The cost of using the service is borne exclusively by the users of the service and not by the taxpayer
- Capital investment is made by the private sector based on a contract with government to provide agreed services
- The cost of providing the service is borne wholly or in part by the government (notably the private finance initiatives)
- Government contributions to a PPP may also be in kind (notably the transfer of existing assets)
- For projects aimed at creating public goods such as in the infrastructure development sector, the government may provide a capital subsidy in the form of a one-time grant, to make the project economically viable
- The government may support the project by providing revenue subsidies, including

tax breaks or by guaranteed annual revenues for a fixed term period

All the above forms of finance structures involve a transfer of significant risks from government to the private sector in an integrated and holistic way. They minimise interfaces for the public entity. Therefore, the PPP model is considered very appropriate for water infrastructure projects.

Furthermore, enactment of the PPP Act in Namibia will enable the State to access funding from the NSAs, and share project risk and financial burden. Finance for infrastructure would be accessible in many ways, including the following:

- **Source debt finance from the domestic and international capital markets i.e. Issue of bonds (*Eurobond)***

  Long-term debt finance for infrastructure development project can be raised from capital markets, both domestic and international. This is done through issue of bonds on the stock exchange. Bond instruments are long-term in nature, feature coupon payments payable bi-annually and capital are payable or redeemable at maturity. Bond term maturity ranges from five to 20 years. Bond as a form of debt finance is very common in infrastructure development projects, due the flexibility of duration and maturity terms.

- **Source debt funding from the Development finance institutions (DFIs) in Namibia and around the world.**

  Development finance institutions are strategic partners and key players in infrastructure development. They provide long-term debt/equity finance, soft loans, and grants for infrastructure development projects. They are based on viability of the project, and the balance sheet strength of the borrower. DFIs specialise in funding long-term multimillion/billion infrastructure projects, such as building of water infrastructures, i.e. dams, reclamation plants, bulk water pipes, water canals, pump stations, and water treatment plants. They also fund construction of roads; power generation plants; railways; airports; and seaports, etc. There are three key and well known DFIs in Namibia: Development Bank of Namibia (DBN), Agricultural Bank of Namibia (Agribank) and SME Bank of Namibia.

- **Source debt funding from private sector i.e. financial services sector; commercial banks, pension funds, insurance funds, etc.**

  Commercial banks are dominant players in the private-sector finance-lending for infrastructure development activities. They provide long-term loans or strategic debt facilities to fund economically feasible and viable infrastructure projects. There are about five commercial banks operating in the Namibian banking sector currently: First National Bank Namibia (FNB), Standard Bank Namibia, Bank Windhoek, Nedbank Namibia, and SME Bank Namibia.

  Other sources of strategic finance are:
  (1) Pension funds, i.e. Government pension fund (GIPF), which is the biggest pension fund in the country worth over N$100 billion (US$6.7 billion)
  (2) Insurance funds such as Momentum, Old Mutual, and Sanlam

To conclude, the PPP approach, though not the overall best since it has its own failures, comes out the most tolerable tool so far in addressing public infrastructure gaps commonly prevalent in developing countries.

However, back to the research study, the current findings on water infrastructure finance in Namibia resolved that the research null hypothesis cannot be rejected entirely. Though State funding alone can never be sufficient/ adequate to finance the construction of all new water infrastructures required or to maintain the existing infrastructures, State continues to dominate the water infrastructure space. The need for NSA participation (Donor agencies, DFIs, Commercial banks, Institutional Investors, etc.) becomes more critical in bridging the financing and capacity gaps to complement the State.

Although the State contributed more than NSAs to most of the water infrastructure funding, such funding will still not be sufficient to address the proclaimed need for more water infrastructures across country. Therefore, a complementary relationship between the State and non-State actors is of paramount importance in delivering the required water infrastructures. The study provided absolute results that support the currently held premise that "*The State resources are so limited to meet the water infrastructure development needs for Namibia*." This therefore proves the assertion that participation by the NSAs is indeed critical; their influence

and impact cannot be over emphasised. The discussion and recommendations based on the above conclusions continues below.

5.5 Conclusions

The results in Chapter 4 are meaningful. Either they provide evidence to disprove the theory currently posited in literature for water infrastructure development around the world, or, they support the hypothesis currently held in literature. The current literature holds that active participation of NSAs is key to infrastructure development. The State funding /financing from national budget would not be sufficient to address the infrastructure development needs of any nation. It is proven that developed nations with modern and efficient infrastructures have had a strong participation of NSAs in their infrastructure development programmes.

The study results revealed that NSAs participate minimally in Namibia. In fact, the study revealed that local DFIs and institutional investors have not participated at all in any of the water infrastructure projects under Namwater in Chapter 4. NSAs have demonstrated a low appetite for local infrastructure development projects.

The comparative analysis below shows that Namibia is not alone in this dilemma. Most developing countries are faced with this same predicament. Therefore, the comparative analysis reveals that other emerging and developing countries (economies) faced a similar significant infrastructure-funding deficit. Some of these countries addressed the problem earlier, and have found acceptable methods of integrating private funds and initiatives to help pay for some of their public infrastructure requirements. Namibia can learn from this experience and from countries that have a track record of involving the private sector in some manner in the delivery or financing of their public infrastructure requirements.

Comparative analysis: Solving the water infrastructure problem (Ruiters, 2011);

- In Australia, the first design/build/finance/operate (DBFO) contracts occurred in the early 1990s. In some cases, these failed and the public sector had to resume responsibility for the schemes. Victoria, New South Wales and Queensland have developed partnering policies and ambitious plans for future investment. A Nation PPP Forum was set up in 2004 to facilitate greater consistency and cooperation across 110 jurisdictions in the provision of

infrastructure through public private partnerships (PPPs). Information at the National PPP Forum indicated that, across the country, several infrastructure projects were completed under this scheme.

- Brazil enacted a Public-Private Partnership (PPP) law to attract private investment for important infrastructure projects. The Bill establishes general rules and requirements for public-private partnership bidding processes and contracts within the jurisdiction of the government and public sector entities. It also creates an executive managing group with the objectives of setting procedures for PPP acts or contracts; definition of activities, investments or services; and authorization for starting public tenders. The government is eager to attract investment in utilities using this PPP model, especially in highways and energy projects.

- In Mexico, public/private partnerships were used successfully as a solution to a $20 billion project schedule. Individual States were encouraged to come up with pilot projects as well.

As shown in the literature review, the overwhelming conclusion is that there is a strongly positive correlation between infrastructure development and economic growth (Esfahani *et al.*, 2002). Development can be observed and measured from the state of infrastructure in the country. Literature also revealed that inadequate infrastructure is affecting competitiveness and constraining industrialization in Namibia (African Development Bank, 2014). The conclusions of the two literatures above ties in well with the conclusions reached by this study. Financing of water-related infrastructure was a sleepy backwater: the financing of hydro-power plants, water supply and irrigation systems all depended heavily on government financing (Briscoe, 2010). This just confirms the posit that water infrastructure development is solely the role of State, due to the inherent nature of the commodity. Water is highly publicised and may not be commercialised for a return. NSAs, especially the profit-driven cohort, have no interest in investing in water infrastructure projects based on low anticipated returns. Irrigated regions of the world face the serious problems of aging infrastructures and declining revenues to repair and maintain them (Ward, 2010). There is great need for new water infrastructures, and for repairing and maintaining the existing ones. Therefore, there is dire need of sourcing adequate funding for water projects that State alone just cannot meet.

In summary, the following conclusions and recommendations were drawn from the findings of the study;

- The commonly held premise in literature of significance was disproved, based on no significance in results. The posit that *the role of State in controlling and managing some public infrastructures has diminished worldwide, as non-State actors now play a more significant role*, does not hold. Despite limited resources, State continues to dominate the water infrastructure development space in Namibia. However, State has no adequate resources, nor necessary capacity to undertake the much-needed water infrastructures estimated to cost approximately N$24 billion (Equivalent $1.6 billion) in Namibia.
- Participation of NSAs is a critical element in infrastructure development, especially in the less commercial commodities such as water. Water is a highly politicised and sensitive commodity. Water is life and access to it is a fundamental human right.
- The low appetite for participation of local DFIs, commercial banks and institutional investors in water projects has led to the poor water infrastructure network in Namibia.
- The current water crisis in Namibia is a typical sign of effects of Climate Change. The country received extremely poor rainfall is the past two to three years. This has led to the drought currently roasting Namibia.
- There are many benefits in participating in Public-Private Partnership (PPP) arrangements to provide infrastructure. The non-recourse nature of project finance is well acclaimed. The use of PPP frees up public funds for other equally important projects. Governments all over the world push to satisfy their social contract with its citizens by providing the much-needed infrastructures, ranging from water to health facilities, education facilities – schools, and roads, etc. Namibia has not explored the PPP strategy to the fullest and no PPP law has yet been passed. However, it is expected that this bill will soon be tabled in the Namibian parliament for debate in order to be passed into law. The adoption of this policy has succeeded in solving infrastructure challenges in many developing countries, and it is expected that its adoption will benefit the much-neglected water infrastructure development in Namibia.

The study recommended that Namibia immediately enacts, adopts, and implements the Public-Private Partnership Act (PPP). This act will entice the commercial NSAs to participate in public infrastructure development. The existing low participation of NSAs has triggered the widening shortage/gaps of water infrastructures prevalent in Nam

6 RECOMMENDATIONS FOR FUTURE RESEARCH

Based on this study, there are several research topics that can be recommended to further this area of study:

- Research exploring water sector regulation in Namibia. This study will help to establish the current water sector setup in Namibia. Other research into assessing the commercial viability of water-infrastructure related projects can be explored to assess the appetite levels for investors in water infrastructure projects.

- Another crucial area of research that requires further exploration is the effectiveness of PPPs in water infrastructure projects, to evaluate the efficiency in executing water PPP projects. This study will also assist in exploring other funding opportunities for water infrastructure projects.

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8. APPENDICES

Table 8: List of key NSAs in infrastructure development operating in Namibia

INSTITUTION	DESCRIPTION
▪ ***International Donor funds/Agencies***	Organizations set up as funds by wealthy foreign governments around the world to assist poor and other developing nations. These funds are setup to push the welfare agenda such as; access to clean water, health services, etc. Such funds include; Global fund, Oxfam Canada, International Red Cross Society, Global Environment Facility (GEF), World Health Organization (WHO), International Water and Sanitation Centre (IRC), etc.
▪ ***Development Finance Institutions*** **(DFIs)**	National and multinational institutions that provide long term finance in forms of loans, grants and other funding tools for infrastructure development projects. DFIs include national and multinational institutions such as; Development Bank of Namibia (DBN), Agricultural Bank of Namibia (Agribank), African Development Bank (AfDB), International Finance Corporation (IFC), International Monetary Fund (IMF), China Development Bank, KfW Development bank, BRICS bank, etc.
▪ ***Commercial banks***	Autonomous financial services providers, specialising in money saving by taking deposits from the savers and lending it in loans to the borrowers. Commercial banks are regulated by the central banks in the country. Commercial banks are key players in infrastructure development financing. There are about five commercial banks operating in Namibia, namely:

	1. First National Bank Namibia 2. Standard Bank Namibia 3. Bank Windhoek 4. Nedbank Namibia 5. SME Bank Namibia
▪ ***Private institutional investors***	Wealthy individuals and institutional investors who provide debt/equity finance to fund public infrastructure development initiatives. This is usually done through public private partnerships (PPPs). Institutional investors include: 1. Pension funds. In Namibia, Government Institutions Pension Fund (GIPF) is the equivalent of GEPF in South Africa. GIPF is largest pension fund in Namibia, worth over N$100 billion (US$6.7 billion) 2. Insurance funds such as Momentum, Old Mutual, and Sanlam. 3. Private equity investors Players in asset management market in Namibia are Allan Gray Namibia (Pty) Ltd, Capricorn Asset Management (Pty) Ltd, First Capital Treasury Solutions (Pty) Ltd, Investec Asset Management Namibia (Pty) Ltd, Momentum Asset Management (Namibia) (Pty) Ltd, Namibia Asset Management Ltd, Old Mutual Investment Group (Namibia) (Pty) Ltd, Point Break Equity (Pty) Ltd, Prudential Portfolio Managers Namibia (Pty) Ltd, Sanlam Investment Management (Namibia) (Pty) Ltd, Stanlib Namibia (Pty) Ltd and Stimulus Private Equity (Pty) Ltd.

Table 9: Questionnaire for the collection of data for analysing water infrastructure finance in Namibia.

Institution	Authority	Relevance to research study
Directorate of Rural Water Supply and Sanitation (DRWSS) – Ministry of Agriculture, Water, and Forestry	Director/ Deputy Director	DRWSS is the custodian of rural water supply and sanitation in Namibia. All credible data/ information related to rural water can only be obtained from them, hence very relevant to the study.
Namibia Water Corporation Limited (Namwater) - National Water Utility	Chief Financial Officer/ Fixed Asset Accountant	Namwater is the national water utility in the country, and the custodian of all water infrastructure in the country. Any water project information can only be obtained from them, hence their relevance.
Development Bank of Namibia (DBN) - DFI	Portfolio Manager: Infrastructure Finance	DBN is the largest development institution in the country. It provides finance for infrastructure development, including water.
Agricultural Bank of Namibia (Agribank)	Manager: Research	Agribank is the only agricultural production-related finance institution in the country. It provides finance for agricultural purposes.
Standard Bank Namibia (SBN)	Executive: Corporate and Institutional Banking (CIB)	SBN is the largest commercial bank in the country. It provides finance for infrastructure development including water.
Government Institution Pension Fund (GIPF)	GM: Investments/ Senior Manager: Investments	GIPF is the largest pension fund in the country. As part of the social investment, it provides finance for infrastructure development.

Table 10: Research Questionnaires

Structured questions to the Directorate of Rural Water Supply and Sanitation;
1. How many water infrastructure projects were undertaken by DRWSS since independence?
2. Cost per project and finance structure?
3. Fund raising methods used? Internally generated cash flows or external funding i.e. debt/equity structures
4. What are the challenges/shortcomings with water infrastructure finance?

Structured questions to the Namibia Water Corporations Limited;
1. How many water infrastructure projects has GRN funded since independence through the directorate of rural water and Namwater?
2. How much has government spent so far (since independence) on water infrastructures development country-wide?
3. What funding methods has GRN used in raising funds for water infrastructure projects? Is it through State budget allocation or borrowing/debt/grants/Aid/donations? methods used?
4. What is the combined value of water infrastructure gaps in the country (country-wide) at the moment?
5. Given the current water crisis in the country, what are the water sourcing potentials/opportunities that can be pursued? What are the cost implications for each of these potentials/opportunities?

Structured questions to the Development Bank of Namibia;
1. How many water infrastructure projects were funded/financed by DBN since incorporation?
2. Cost per project and finance structure? i.e. debt/equity structures
3. Methods of funding for water infrastructures?
4. What are the challenges/shortcomings prevalent in water infrastructure finance?
5. Commercial viability of water infrastructure projects?
6. What are the best financing options for water related projects?

Structured questions to the Agricultural bank of Namibia;
1. How many water infrastructure projects were funded/financed by Agribank since incorporation?
2. Cost per project and finance structure? i.e. debt/equity structures
3. Methods of funding for water infrastructures?
4. What are the challenges/shortcomings prevalent in water infrastructure finance?
5. Commercial viability of water infrastructure projects?
6. What are the best financing options for water related projects?
7. What are the challenges/shortcomings with water infrastructure development and financing in the country?

Structured questions to the Government Institutions Pension Fund (GIPF);
1. How many water infrastructure projects were funded/financed by GIPF to date since Namibia's independence in 1990?
2. Cost per project and finance structures? i.e. debt/equity structures
3. Methods of funding water infrastructures by GIPF?
4. What are the challenges/shortcomings associated with water infrastructure finance?
5. Commercial viability of water infrastructure projects in Namibia?
6. What are the best financing options for water related projects?