

**The key success factors in water infrastructure financing: A case study of the  
Rustenburg water services trust**

**Sandra Serumaga-Zake**

Research Assignment presented in partial fulfilment  
of the requirements for the degree of  
Master of Development Finance  
at Stellenbosch University



**Supervisor: Mr M Fombang**

Degree of confidentiality: A

December 2015

Declaration

I, Sandra Serumaga-Zake, declare that the entire body of work contained in this research assignment is my own, original work; that I am the sole author thereof (save to the extent explicitly otherwise stated), that reproduction and publication thereof by Stellenbosch University will not infringe any third party rights and that I have not previously in its entirety or in part submitted it for obtaining any qualification.

SCN Serumaga-Zake

December 2015

18035620

## **ACKNOWLEDGEMENTS**

The completion of this paper would not have been possible, first and foremost without the support, guidance and wisdom from my heavenly Father. All glory and adoration belong only to Him. I also thank my family for their unwavering support, especially the support given to me by my parents Prof and Mrs Serumaga-Zake that have and continue to instil the importance of education within me. I also thank my supervisor Mr Fombang for his guidance and all interviewees that without which, this paper would not have been completed. I pray that the good Lord continues to show His kindness towards you.

## ABSTRACT

The need for infrastructure development, its catalytic effect on economic growth and the importance of the application of project finance to fund development, cannot be underestimated. According to literature, the involvement of the private sector in infrastructure development is recommended to improve service delivery efficiency and in the case of project finance ensure profitability. This is central to the principal-agent, property rights and public-choice theories. Seeing that, water supply has been highlighted by the World Economic Forum as one of the top ten risks that faces the world; the key focus of this study was the application of project finance to the water sector in South Africa.

This study aimed to identify the key success factors of the financing and procurement of water infrastructure in South Africa, using the Rustenburg Water Services Trust as a case. It was a qualitative study inclusive of the coding of data collected through semi-structured interviews and a desktop study.

It was found that the success of the upgrade of the Rustenburg WWTW, Boitekong WWTW and the recommissioning of the Bospoort Water Treatment System, was based primarily on the adequate mitigation of risk. One of the major risks mitigated was the market risk usually covered by the public sector in this case, local municipalities. This risk was mitigated by having “take-or-pay” agreements signed by the mining companies (including Anglo-American Mines) within the area. Other success factors are: political will and collaboration between the private and public sector; the proper allocation of risk to the project participants that are best positioned to manage them; educating public officials about the use of project finance and establishing a Special Purpose Vehicle (SPV); and the effective monitoring of progress made by the private sector. Finally, it was realised that when public and private sector partners take a seat at a round table, infrastructure development can be tackled successfully for the promotion of economic growth.

**Keywords:** Infrastructure finance, project finance, infrastructure development, private-public partnerships, private sector participation, water infrastructure finance.

**TABLE OF CONTENTS**

Acknowledgements	iii
Abstract	iv
Table of contents	v
Chapter 1 Introduction	1
1.1 Introduction	1
1.1.1 Brief background and motivation	2
1.2 Problem Statement	3
1.3 Research Aim and Objectives	3
1.3.1 Research objectives	3
1.4 Research Questions	3
1.5 Significance of the Study	4
1.6 Scope	4
1.7 Limitations of the Study	4
1.8 Chapter Outline	4
1.9 Summary	5
Chapter 2 Literature Review	6
2.1 Introduction	6
2.2 Theoretical Framework	6
2.3 Empirical Literature	7
2.3.1 Key considerations in project finance	7
2.3.2 Private sector participation in water infrastructure provision	13
2.3.3 The application of project finance theory	14
2.4 Summary	19
Chapter 3 An Overview of The South African Water Sector	21
3.1 Introduction	21
3.2 Legislative and Institutional Framework in South Africa	21
3.3 The State of South Africa's Water Infrastructure	22
3.4 The need for water infrastructure spending	23

3.5 The Rustenburg Water Services Trust	24
3.5.1 Project overview	24
3.5.2 Contractual structure	24
3.5.3 Construction and operations	25
3.6 Summary	26
Chapter 4 Research Design and Methodology	27
4.1 Introduction	27
4.2 Research Design	27
4.3 Research Methodology	29
4.3.1 Motivation for using a qualitative approach	29
4.3.2 The use of both secondary and primary data in the study	30
4.3.3 Research population, sample and sampling method	30
4.3.4 Protocol to be observed	31
4.4 Data Analysis	35
4.4.1 Validity and reliability	36
4.5 Ethical Considerations	37
4.6 Summary	38
Chapter 5 Findings	39
5.1 Introduction	39
5.2 Stakeholder Analysis	39
5.3 Risk Analysis	43
5.3.1 Overview of risk analysis procedure	43
5.3.2 A brief discussion on the risk analysis	53
5.4 Financial Returns and Robustness of the Business Case	53
5.5 Economic Development Returns	54
5.6 Lessons Learnt	54
5.7 Main Findings and Discussion	54
5.7.1 Main Findings	54
5.7.2 Discussion on main findings	56

5.8 Summary	59
Chapter 6 Conclusions and Recommendations	60
6.1 Introduction	60
6.2 Conclusions	60
6.2.1 The Rustenburg Water Services Trust	60
6.2.2 Problem statement and research questions answered	61
6.3 Recommendations for Future Projects in the Water Sector	62
6.4 Policy Implications	63
6.5 Priorities going forward	63
6.6 Further Research	63
References	64
Annexure A: Interview Schedule	72
Annexure B: Detailed Risk Analysis	73

## **LIST OF FIGURES**

Figure 1: Private Investment in Water and Sewerage, by region	14
Figure 2: Rustenburg Water Services Trust Organisational Structure	25

## **LIST OF TABLES**

Table 1: The types of contracts that may exist between the government (G) and the Private Sector (P).	12
Table 2: Summary of Empirical Literature	16
Table 3: Respondents selected as part of the data sample	31
Table 4: Stakeholder Analysis of the Rustenburg Water Services Trust	41
Table 5: Scoring based on the consequence of a risk on the financial model	45
Table 6: Scoring based on the likelihood of the risk occurring	45
Table 7: Risk Analysis Key	46
Table 8: The major risks identified for the Rustenburg Water Services Trust during the risk analysis conducted	47

Table 9: Excerpt from Risk Analysis conducted with major risks	52
Table 10: Main findings and their related objective	54

## ACRONYMS

DBSA	Development Bank of Southern Africa
DWS	Department of Water and Sanitation
PPP	Public Private Partnership
PSP	Private Sector Participation
WEF	World Economic Forum
WSA	Water Services Act
TCTA	Trans-Caledon Tunnel Authority
RLM	Rustenburg Local Municipality
MFMA	Municipal Finance Management Act
SAICE	South African Institute of Civil Engineers
SPV	Special Purpose Vehicle
RFP	Request for Proposals
RWST	Rustenburg Water Services Trust

## CHAPTER 1

### INTRODUCTION

#### 1.1 INTRODUCTION

In recent times, infrastructure development has been highlighted as a worldwide concern as existing infrastructure within developed nations continues to deteriorate due to a lack of maintenance. Moreover, the lack of infrastructure within underdeveloped and developing nations has been cited as one of the reasons behind the lack of economic growth, that these countries otherwise could have achieved (Shen, 2011; Allan *et al.*, 2010; Fedderke, 2006; Mineta, 2006). In support of this, various researchers have stipulated the fact that developing countries require billions of dollars in infrastructure investment (Sawant 2010; Medda, 2007; Dailami & Leipziger, 1998). The Infrastructure Productivity Report produced by Mckinsey (2013) estimates that US\$57 trillion in global infrastructure investment will be needed between 2013 and 2030 to meet the infrastructural needs of the world's growing population (Ruiters, 2013).

Seeing that, the African population of 1.1 billion is set to double in the next forty years, more people will require access to water, electricity, housing and affordable transport (Population Reference Bureau (PRB), 2014). Therefore, the responsibility of providing much needed infrastructure weighs heavily on the shoulders of African governments. In order to finance this "infrastructure gap" (Ruiters, 2013; Development Bank of South Africa (DBSA), 2012:6; the South African Institution of Civil Engineering (SAICE), 2011), the public sector has continually looked to the private sector for assistance in the form of public-private partnerships (PPPs) and in general, private sector participation (PSP). Few studies exist on PPPs in the water sector. Studies that would examine the following questions; what are the key success factors in water infrastructure financing? Is the private sector well positioned to take part in this endeavour? This study was intended to fill this gap. In order to answer these questions, the study highlights the best practices that can be applied when seeking to finance and procure bulk water and sanitation infrastructure. To this end, the Rustenburg Water Services Trust (RWST) was chosen as a case for this study.

The focus placed on the water sector is not misplaced. In fact, it is in line with South Africa's concerns and indeed the concerns of the rest of the world (Ruiters, 2013). As highlighted by the World Economic Forum (2014), climate change, extreme weather events such as flooding and water security, feature within the top ten risks that face the world. This is crucial to South Africa because of the state of its water ecosystems. According to the Department of Water and Sanitation, South Africa is ranked amongst the countries with the worst water ecosystems (128<sup>th</sup> out of 132 countries). Equally concerning, in terms of water availability per capita, South Africa is again ranked amongst the worst in the world by being 148<sup>th</sup> out of 180 countries (DWA, 2013b; NPC, 2011).

The rest of this thesis has been organised as follows: in chapter one, a brief background to the problem and the motivation for the study are presented, followed by the problem statement, research questions and research aim, et cetera. The second chapter presents the literature review, whilst the third chapter provides an overview of the water sector in South Africa. The fourth chapter presents the research methodology and the fifth chapter presents the analysis and findings. Chapter six concludes and provide recommendations.

### 1.1.1 Brief background and motivation

*"Safe drinking water and adequate sanitation are crucial for poverty reduction, crucial for sustainable development and crucial for achieving any and every one of the Millennium Development Goals," (UN Secretary General, Ban Ki-moon, 2010).*

That was the statement made by UN Secretary General, Ban Ki-moon in support of making access to water a basic human right in 2010 (UN, 2014). Whilst thought provoking, the claims made within the statement are not far-fetched. In fact, as civilisation has progressed, the strides made in public health (leading to the subsequent increase in life expectancy) have been attributed to access to potable water and the provision of adequate sanitation infrastructure. This makes water a basic need that all must have access to, notwithstanding the poorest of the poor. In the same way, access to sufficient water is enshrined within the Constitution and the South African Bill of Rights (Department of Water and Sanitation (DWS), 2014). This is echoed by the vision of the Department of Water Affairs (2013a:12), "Safe water for all, forever". It is also important to recognise that as more and more people move into cities because of urbanisation, the demand for bulk water supply and sanitation infrastructure will increase. Urbanisation places increasing pressure on existing bulk water systems and reticulation infrastructure, leading to the need for new infrastructure, not negating the amount of maintenance required for existing infrastructure. More explicitly, water services infrastructure includes the following (DBSA, 2012:75; SAICE, 2011):

- "regional bulk water services, managed by water boards and the Department of Water Affairs, whose sole purpose is to supply water to several local municipalities either directly or in bulk;
- local water and wastewater treatment plants; and
- internal distribution and reticulation networks".

Regional bulk water services include infrastructure utilised for the "abstraction of raw water, treatment works, reservoirs and distribution pipelines to supply water in bulk" (DBSA, 2012: 78). In this instance, water boards have the responsibility of managing water and sanitation infrastructure.

Internal distribution and reticulation networks on the other hand include; pump stations, reservoirs, transmission mains and networks of reticulation infrastructure. Water Service Authorities (WSA) have the responsibility of their management. As the demand for infrastructure persists so would the

need for their finance. This is where the public sector calls on the private sector to participate in the development of national infrastructure, and where innovative solutions such as the application of project finance are sought. To this end, the RWST was used as a case, to determine the application of project finance and its key success factors.

## **1.2 PROBLEM STATEMENT**

Currently, there is increasing demand for water, difficulties in financing infrastructure and a need for proper infrastructure asset management (for example, see the World Economic Forum, 2014 and Ruiters, 2013). As a contribution to the debate of the search for real solutions to water and sanitation infrastructure financing, this study was intended to identify the key success factors of financing water and sanitation infrastructure in South Africa.

## **1.3 RESEARCH AIM AND OBJECTIVES**

To identify the key success factors of financing water and sanitation infrastructure in South Africa, using the Rustenburg Water Services Trust as a case.

### **1.3.1 Research objectives**

The research objectives included the following:

- to examine whether the private sector has the capacity to finance water and sanitation infrastructure;
- to analyse whether the PPP deal is the best form of project funding to finance water infrastructure; and
- to determine the factors that influence the successful implementation of a PPP deal.

## **1.4 RESEARCH QUESTIONS**

The questions to be answered at the completion of the research project are:

- Does the private sector have the capacity to finance water and sanitation infrastructure?
- Is the PPP deal the best form of project funding to finance water and sanitation infrastructure?
- What factors determine the successful implementation of a PPP deal?

## **1.5 SIGNIFICANCE OF THE STUDY**

The findings of this research paper contribute to the overall discussion around PSP and the use of PPPs in the financing and procurement of water and sanitation infrastructure. This is critical, considering the large backlog experienced particularly in South Africa, where it is forecasted “that R670 billion, over the next 10 years or R67 billion per year is required which should include the use of private funding” (DWS, 2014:434; DBSA, 2012). This paper is also in response to the statement made by the DBSA (2013b), calling for the increased involvement of the private sector in service delivery, subject to the funding models produced. The findings of this paper might contribute to the design of appropriate funding models that will see to the increased participation of the private sector in water and sanitation infrastructure provision. The study also contributes to literature and will be of assistance to research students and academics in the field of development finance.

## **1.6 SCOPE**

This study was done on the Rustenburg Water Services Trust; therefore, the findings may not apply to all other water projects in South Africa. They may, however, be applied to those projects which are similar to the Rustenburg Water Services Trust.

## **1.7 LIMITATIONS OF THE STUDY**

Even though triangulation was used (in that various sources were consulted to verify the information sourced), the validity and reliability of this study is heavily dependent on the responses received from respondents (Serumaga-Zake, 2012). The researcher, however, tried to convince and assure respondents of the confidentiality and the importance of the study, and that the study was purely for academic purposes. This went towards efforts made to ensure the validity and reliability of the data. That said a number of limitations were encountered. One of which involved the lack of participation from the Rustenburg Local Municipality (RLM). The RLM was approached for comment numerous times, but were unfortunately unavailable. This paper therefore, encapsulates the voice of the private sector more than it does the public sector which was not the author’s original intention.

## **1.8 CHAPTER OUTLINE**

The thesis is organised as follows; chapter two presents a review of both theoretical and empirical literature. The third chapter gives an overview of the water sector in South Africa; the fourth chapter presents the research methodology; the fifth chapter presents the analysis and findings. Whilst chapter six concludes and provides policy recommendations and suggestions for further research *inter alia*.

## **1.9 SUMMARY**

In response to the call for increased private sector participation in the financing of infrastructure development, the researcher sought to identify the key success factors in the financing of water and sanitation infrastructure. The research objectives included; examining whether the private sector has the capacity to finance water and sanitation infrastructure, analysing whether the PPP deal is the best form of project funding to finance water and sanitation infrastructure and lastly, determining the factors that influence the successful implementation of a PPP deal. To this end, the Rustenburg Water Services Trust was chosen as a case.

Chapter two that follows will discuss the study's theoretical framework and current and relevant literature (both theoretical and empirical).

## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 INTRODUCTION

Whilst, chapter one introduced the study, chapter two presents the theoretical framework in section 2.2 and critically discusses empirical literature in section 2.3. As with the various solutions proposed to address the challenges associated with infrastructure provision, in this case the funding problem, there are theories that underpin these solutions as well as other studies that inform their application. This is the objective of the second chapter, to present an exposition of theories that underpin project finance and the use of PPPs in the provision of water and sanitation infrastructure. In particular, the principal-agent, property rights, and public-choice theories are discussed, as well as the key founding principles of project finance. These include the market forces of supply and demand, determining the rate of return on investment, the share of risk between private and public partners, the funding models that exist, the conventional methods used in the structuring of a PPP and the institutional factors that must be considered. Empirical literature highlights the success and failures of projects of a similar nature, within developing and developed country contexts. Finally, the use of PPPs in the water sector, in South Africa, is discussed and a review of the RWST presented.

#### 2.2 THEORETICAL FRAMEWORK

Infrastructure is defined as the “basic physical and organizational structures (buildings, roads and power supplies) needed for the operation of a society or enterprise” (Oxford Dictionary, 2014). Economically, infrastructure is considered to be a capital asset that requires large upfront costs that in some cases, particularly in South Africa and other developing nations, is difficult to fund fully using public funds only. Apart from having high capital costs, they generally have “long-duration and low-volatility cash flows” (Sawant, 2010:76; Esty 2003; Greer, 1997 in Sawant, 2010), which presents the business case for involving the private sector, giving rise to PPPs. As purported by Ruiters (2013:317; Tan, 2011), governments “must embrace and lead innovative financing as the preferred alternative to delivering key large public water infrastructure projects”.

PPPs have been used widely, with approximately “100 urban transit projects being financed worth a capital value of more than US\$65 billion between 1985 and 2010” (Friedman and Siemiatycki, 2012: 284). Within South Africa, PPPs have been proposed to meet the infrastructure funding gap given the limited funds at the disposal of the national government (DBSA, 2012). Furthermore, they are generally preferred despite their higher capital cost compared to public sector funding (as a result of the increase in transactional costs), because of the value for money they propose (Medda, 2007; Shaoul *et al.*, 2007 in Friedman and Siemiatycki, 2012; Siemiatycki, 2007).

Having discussed the state of water infrastructure in South Africa and the long term nature of this investment, the simple provision of infrastructure cannot be sufficient.

They are depreciating assets that have long, but finite lifespans and as such must be maintained regularly (Fourie, 2008; Esty, 2003).

At the core of the argument for privatisation or private sector involvement lies the “principal-agent, property rights, and public-choice theories” (Tan, 2011: 49). Central to the principal-agent theory is the issue of incentives, or the lack thereof within the public sector. In this case the ultimate principal (that is tax-payer) elects the government as the agent, who is responsible for appointing secondary agents that will be tasked with the management of the asset. However, due to a lack of incentives (for example, a lack of motivation) secondary agents do not strive to monitor the performance of employees (Tan, 2011). Conversely, by affording the private sector property rights, the aforementioned chain of command is cut short, increasing the efficiencies of the project. The same could be said with public-choice theory. In this case, privatisation would limit political involvement contributing to the increased efficiency of the project.

The company would be forced to implement efficiencies through innovation and creativity as it experiences pressure from market forces. Should there be success; the private company would reap the rewards. This provides clear incentives for management (Tan, 2011). The need for PSP was first realised in the 1980s, as governments in the US and UK reacted to the inefficiencies associated with public sector development (Akhmouch & Kauffmann, 2013; Tan, 2011). As discussed by Tan (2011), the major reasoning behind the use of PSP would be the maximisation of profits through the driving down of costs as a result of increased efficiencies. This would hopefully lead to better service delivery and lower costs for the consumer. As a result, “central to the incentive argument is the realignment of prices with underlying costs,” (Tan, 2011:50).

## **2.3 EMPIRICAL LITERATURE**

### **2.3.1 Key considerations in project finance**

A project can only be considered financially sustainable and therefore, viable if the project is profitable. In order to determine the financial sustainability of a project, the different factors involved need to be defined. These include; the market forces of supply and demand, the rate of return on investment, the funding model employed and the institutional factors affecting project financing and procurement.

#### ***Market forces of supply and demand***

In the case of infrastructure provision, there is sustained demand which will guarantee the use of the service in the long term. In this way infrastructure is “monopolistic in nature” with a low income elasticity of demand and would therefore provide stable cash flows (Sawant, 2010:76).

This is the case within the water sector, where economies of scale make it uneconomical and bad business sense to duplicate networks or bulk water distribution plants.

Therefore, by having one service provider per municipality the degree of competition is limited, which goes against the theory of private sector participation where efficiencies are achieved as a result of increased innovation due to competition (Tan, 2011).

As highlighted by Tan, (2011:51), “a key feature of infrastructure privatisation has been the introduction of competition in the market through unbundling different (vertical) segments of the network, for example, by separating water storage from treatment and distribution”. Furthermore, the water sector is unique in that the service it offers is considered a basic need and should thus be provided to the poor and the rich alike. Even though the demand for this service is high, the pricing of water service tariffs are often politicised, therefore it is difficult to increase tariffs to reflect this (Tan, 2011; Smoke, 1999). In this case, it is found that the rich would most likely cross-subsidise the poor, leading to a tiered tariff structure (Smoke, 1999). It is interesting to note that, in the early 1990s, public revenue covered only 30 percent of the costs for water (World Bank, 1994).

### ***Rate of return on investment***

The cash-flow received over a project's lifespan would be used to recover initial costs at a premium. Therefore, investors can expect a return on investment that will have long payback periods (Sawant, 2010; Flinders 2005). This is assuming a PPP is entered into when financing a project. In this case, return on investment as a result of sustained demand is certain, depending on the sharing of risks between key stakeholders. That being said, what complicates matters, particularly within the water sector, would be the pricing of offering the service. Historically, tariffs charged for water service provision have been less than capital expenditure, owing to poor pricing and poor tariff collection in municipalities. This leaves many municipalities running at a loss (Smoke, 1999). The “mispricing and technical inefficiency in water, railroads, roads and electricity were estimated to cost developing countries around US\$180 billion in annual losses by the early 1990s,” (Tan, 2011: 50).

Therefore, tariffs that accurately reflect the cost of providing the service are necessary for the private owner or partner to reap the benefits of efficiencies achieved and earn a return on investment (Tan, 2011; Smoke, 1999).

According to Estache and Fay (2007), the average tariff necessary to generate the minimum required rate of return in the poorest developing countries has to be higher than elsewhere and is increasing, because it needs to cover a higher and increasing cost of capital. When considering Africa, these would have to be increased by a factor of ten to take all the risks involved into account. This tends to make private sector participation and/or privatisation particularly in African nations (and other developing nations) unattractive (Estache & Fay, 2007; Annez, 2006). In order to facilitate private sector participation, it is advised that the risks involved in the financing and procurement of water infrastructure are shared.

### ***The sharing of risk in a private-public partnership***

There are various ways in which a project can be financed. Project finance which is defined to be “the financing of a single-purpose infrastructure asset with a finite life” (Rigby, 2008 in Sawant, 2010: 75) can be provided “through separate incorporation, non-recourse or limited recourse debt, high-debt levels, and detailed long-term contracts”. As stated by Tan (2011:50), “the type of Public Sector Participation (PSP) determines how much risk is transferred to the private sector”. Bosso and Garvin (2008:163) (also see Bel *et al.*, 2013; Medda, 2007) define a PPP to be the following:

*“A PPP is a long-term contractual arrangement between the public and private sectors where mutual benefits are sought and where ultimately (a) the private sector provides management and operating services and/or (b) puts private finance at risk.”*

As aforementioned, one of the key elements of a PPP is the sharing of financial risk. The success of a project is in many ways dependant on the way in which financial risks are shared. The risk of cost-overruns and inadequate designs could be transferred to the private sector or the service provider that will ensure the quality of the service provided. In this scenario, the private sector has a vested interest in delivering a good service, ensuring demand. This is well within the control of the private sector or service provider and so would reflect an accurate distribution of risk. In the same way, the demand risk for a service could be allocated to the public sector entity that is directly involved with the shaping of public policy. There are various ways in which the demand risk can be distributed between the private and public sector stakeholders.

According to Friedman and Siemiatycki (2012), and supported by Gerrard (2001), there are three ways in which the demand risk can be distributed;

- a) **Freestanding PPPs:** A long-term contract is entered into between the private sector and public sector, where the private sector is contracted to design, build and operate a service. All payback for initial capital investment and operating costs from the private sector is paid for through user fees. According to Tan (2011:50), the privatization of a service – which could also be a freestanding PPP – would offer the greatest incentives for efficiency as opposed to when risk remains with the public sector.
- b) **Availability Payments:** In this case a freestanding PPP is adjusted in the sense that a pre-set amount is paid by the public sector to the private sector concessionaire that has been contracted to design, build and operate the service. All revenue collected in the form of service fees is paid to the public sector, they assume the demand risk.
- c) **Unbundled PPPs:** In this case the roles that must be fulfilled to deliver a project are unbundled into various contracts or concessions and the public sector acts as the intermediary between the various players and may fulfil some of the responsibilities itself.

The PPP must make good business sense for both parties and thus prove to be financially viable. The service provided must be of good quality, meeting the needs of the consumer at an affordable cost which is the government's mandate. It must be profitable and provide a good rate of return on investment for private sector investors. In order to reduce the private sector's share of risk, it is advised that the public sector absorbs the demand risk, ensuring the viability of the project by providing government grants or subsidies (Heilman & Johnson, 1992 in Tan, 2011). That said there are researchers that are against this school of thought. One such researcher is Norton Rose (2006: in Tan, 2011: 53), who has gone as far as to say that, "the general perception that all PPP should transfer demand risk to the private sector is altogether flawed".

### ***The funding model: structuring the private-public partnership***

As discussed, there are varying levels of private sector participation ranging from a limited transfer of risk through service contracts to the full privatisation of assets (full divestiture). These include "management contracts, lease contracts, concessions, build-operate-transfer and joint ventures," (Akhmouch & Kauffmann, 2013: 341). The key factors that will affect the selection of the right kind of PPP deal, and influence the success of the funding model selected (Casadesus-Masanell & Ricart, 2011), include the following:

- i) the funding model should enable the organisation to meet their goals. It should therefore be aligned to the organisations goals and objectives;
- ii) the way in which the model is designed should be reinforcing, in other words its characteristics should complement each other; and
- iii) finally, the model should be agile and sustain its effectiveness over time.

The different funding models that can be used are illustrated on Table 1.

### ***Institutional factors that affect the choice of funding model***

As aforementioned, there are various theories and institutional factors that affect the financing and procurement of a project (Akhmouch & Kauffmann, 2013; Tan, 2011; Smoke, 1999). These include:

- i) long chains of command and the lack of incentives within the public sector (as explained by the principal-agent theory);
- ii) the lack of competition as a result of state-ownership or property rights and lastly; and
- iii) the degree to which governments interfere in the procurement process.

When there is a lack of competition within a particular sector, the water and sanitation sector would be a case in point, "regulation could be used to monitor the performance of the service provider and ensure that cost savings are being made and distributed equitably amongst owners (returns on investment) and consumers (lower charges for a service)," (Tan, 2011:51).

Whether or not developing countries have the resources or the legal framework required to undertake such an exercise is yet to be seen.

Interestingly, regulation has been recognised to be a greater determinant of a project's success rather than the type of ownership (Tan, 2011; Kessides, 2005, 2004). The problems encountered with regulation, particularly in the context of developing countries, have to do with the lack of access to adequate information and institutional weaknesses that stem from the lack of skilled personnel (Akhmouch & Kauffmann, 2013; DBSA, 2012; Tan, 2011). As stated by Tan (2011:64), "weak political and economic institutions mean that the state lacks the credibility to commit to contracts or implement proper, consistent regulatory procedures, and fails to safeguard property rights" (see also Kessides, 2005). In addition, "poor coordination across different ministries, public agencies and levels of government" can hinder the success of a PPP seeing that it would require the multiplying of efforts made by the different stakeholders - resulting in inefficiencies (Akhmouch & Kauffmann, 2013: 349).

Table 1: The types of contracts that may exist between the government (G) and the Private Sector (P).

	Service contract	Management contract	Affermage/lease	Concession	Build-operate-transfer	Joint venture	Divestiture
Asset ownership	G	G	G	G	P/G	G/P	P
Capital investment	G	G	G	P	P	G/P	P
Commercial risk	G	G	Shared	P	P	G/P	P
Operations/maintenance	G/P	P	P	P	P	G/P	P
Contract duration	1–2 years	3–5 years	8–15 years	25–30 years	20–30 years	Infinite	Infinite
Source of revenue of operator	Municipality	Municipality: fee is fixed or based on performance	Operator collects user fees ( <i>lease</i> : fee paid by municipality; <i>affermage</i> : revenue shared)	Users	Municipality	Users	Users
Occurrence, 1991–2009		111		278	292		32

Note: Blank cells indicate information not available in the World Bank PPI Database.

Source: adapted from OECD (2009a). Occurrence (number of projects) based on the World Bank PPI Database (World Bank, n.d.).

Source: OECD, 2009:18

Further to institutional weaknesses, the degree of corruption within an institution greatly affects the success of the institution and the projects it manages. As reported by Tan (2011:64), “corruption has been blamed for the failure of privatisation in Zambia and many other parts of Africa.” Smoke (1999: 1562) discovered the fact that central officials are given “enormous and widely abused discretion” that leads to failures in meeting basic economic goals. Therefore, the role that the government plays cannot be overstated. The government is required to establish “adequate policies, regulatory frameworks and contractual arrangements that must act in the best interest of the population’s basic needs” (Akhmouch & Kauffmann, 2013: 349).

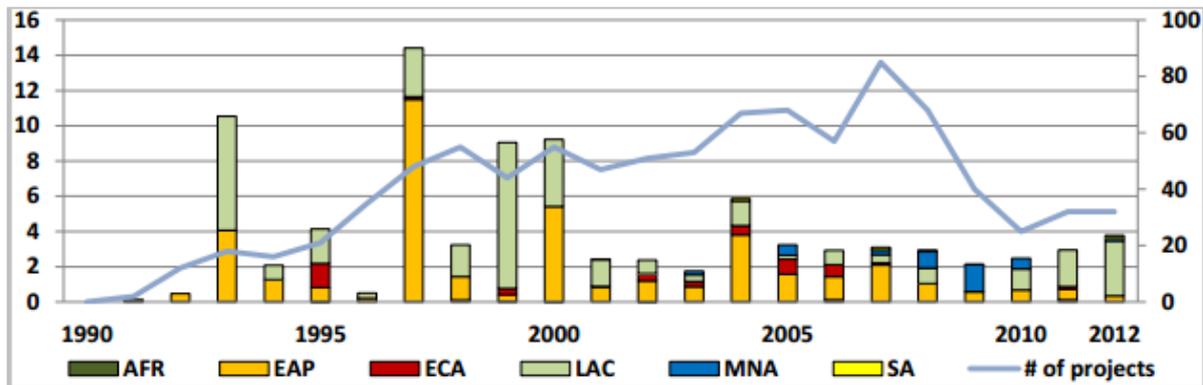
Akhmouch & Kauffmann, (2013: 349), suggests the following actions to improve the water governance framework and in that way encourage PSP:

- i) “The creation, updating and alignment of water information systems and databases that will be used to share water policy needs on a local, national and international level
- ii) To encourage performance monitoring and measurement of the outcomes of water policies at the different levels of government. This must be accompanied with the provision of incentives for capacity building
- iii) To encourage the co-ordination of the different stakeholders involved with the water and sanitation sector
- iv) To encourage capacity building at all levels, including strengthening applicable institutions enabling them to fulfil their duties effectively and investing in the infrastructure required to meet increasing backlogs”

### **2.3.2 Private sector participation in water infrastructure provision**

After considering the use of PPPs and project finance in the financing of infrastructure, its applicability to the water sector must be looked into. As highlighted previously, the profitability of the deal and the ability of the service provider to generate sufficient cash-flow to service debt are critical. Whether or not the water sector is prepared to deliver on these promises is yet to be seen and has been recognised as a point of contention. When considering the successes experienced within PPP deals, one may list the deals made within the telecommunications sector where higher profit margins can be realised (Tan, 2011). Unfortunately, very few examples of a PPP within the water sector exist, particularly within developing countries.

This is evidenced by the World Bank PPI database, (2013) that highlights the fact that public sector investment far outweighed private sector investment over a thirteen year period (see Figure 1). Also that, where there have been instances of private sector investment, this has occurred within wealthier nations rather than developing nations and lastly, private sector investments have been decreasing over the same period.



Source: World Bank, 2013:1

Figure 1: Private Investment in Water and Sewerage, by region

In 2013 on average, however, 14 percent of the world's population was served "to some extent" by the private sector compared to 5 percent in 1999 (Akhmouch & Kauffmann, 2013: 340). Within the South African context, before the successful procurement of the Roodeplaat Temba Water Supply Scheme Project, the first PPP deal with private sector involvement was that of the Ilembe District Municipality through the Ilembe – Siza Water Concession (Robbins, 2004). It is noted, that the water concession did not involve project finance, whereas the Roodeplaat Temba Water Supply Scheme or (for the purpose of this study), the Rustenburg Water Services Trust does.

The reason for the lack of private sector involvement may include the mismatch between high capital expenditure and the inability of municipalities to recover costs by setting tariffs that encapsulate the true cost of providing that service (Tan, 2011). Therefore, adequate rates of return cannot be earned making infrastructure projects of this nature, more risky without subsidies or grants from the governments.

### 2.3.3 The application of project finance theory

When considering the application of project finance theory or the theory that underpins PPPs, it is interesting to note that the promises generally made with the application of PSP are not always appropriate and are dependent on the context in which it is applied. For instance, when considering the efficiencies promised through the delivery of a project through a PPP, it is interesting to note the different conclusions arrived at by empirical studies. The study conducted by Seroa da Motta and Moreira (2004 in Estache *et al.*, 2005), where 4000 municipalities were surveyed during 1996-2002, established the fact that private operators stimulated "catching-up" but there were no significant productivity differences. Conversely, the survey conducted on 21 African municipalities that included 3 private operators found out that the private operators were more cost effective than the public operators (Tan, 2011).

In the study conducted by Marin (2009) of the 65 large PPP water projects implemented from 1993-2008, situated in 32 developing countries “the most consistent contribution of private operators has been the reduction of water losses and an improvement in water collection rates (Akhmouch & Kauffmann, 2013). This is further illustrated by the studies reviewed by the researcher, summarised within Table 2. With the studies reviewed, both Marin (2009) and Estache & Trujillo (2003) demonstrated an improvement with private sector involvement, particularly in developing contexts. However, Giulia *et al.* (2013), Hunt & Lynk (1995) and Bhattacharyya *et al.*, (1994) did not report an improvement in public utilities (where developed countries were surveyed).

Table 2: Summary of Empirical Literature

Study Conducted by	Countries and/or Municipalities Covered	Period Covered	Estimation Method	Methodological or Data Sample Issues	Summary of Findings
<b>Municipal efficiencies: Public vs Private Service Providers</b>					
Seroa da Motta & Moreira (2004)	4186 Municipalities within Brazil	1998-2002	Non-parametric Analysis, using Data Envelopment Analysis (DEA).	May not be readily applicable to the African context.	Although, private operators helped recoup costs, there were no significant productivity differences between private and public operators.
Kirpatrick <i>et al.</i> (2004 in Seroa da Motta & Moreira 2004)	110 African Utilities	1998-2001	Non-parametric and Parametric Analysis	Lack of adequate or correct information. Seeing that, regulation tends to be found lacking in developing countries.	Public operators perform more efficiently than private operators
Estache & Trujillo (2003)	4 Provinces within Argentina	1992-2001	A survey was conducted	There are three main data problems. The first is the measurement of capital. The second is the difficulty of modelling the size of employment correctly. The third data problem comes from the poor accounting standards of most developing	An improvement in efficiencies was recognised with private operators compared to public operators.

Study Conducted by	Countries and/or Municipalities Covered	Period Covered	Estimation Method	Methodological or Data Sample Issues	Summary of Findings
				countries and the weak commitment to regulatory accounting standards by privatization teams.	
Estache & Kouassi (2002)	21 African Municipalities	1995-1997	Panel data method for unbalanced data analysis - a parametric analysis is conducted.	Lack of adequate or correct information. Seeing that regulation tends to be found lacking.	Private operators were more cost effective than public operators.
Hunt & Lynk (1995)	10 Water Utilities in the United Kingdom	1979-1988	Pooled, Cross-Section data was utilised for a regression analysis	Not readily applicable to the African context and a small sample was used.	Public operators were favoured because of the economies of scale that could be leveraged. Privately managed utilities were found to have failed in self-regulation
Bhattacharyya <i>et al.</i> , (1994)	225 Public and 32 Private Water Utilities within America	1992	Hypothesis testing using a generalized cost function model where capital is fixed in the short term. A generalized non-minimum restricted variable cost function.	May not be readily applicable to the African context.	Public water utilities are more efficient than private water utilities on average, but are more widely dispersed between best and worst practice.

Study Conducted by	Countries and/or Municipalities Covered	Period Covered	Estimation Method	Methodological or Data Sample Issues	Summary of Findings
<b>Private Sector Participation and Public-Private Partnerships in the Water and Sanitation Sector</b>					
Marin (2009)	32 Developing Countries, Survey conducted on 65 large PPP water projects	1990-2007	A trend analysis was conducted	Largely based on information provided by the World Bank PPI database which includes private sector commitments made and not actual investments. This may skew results of the study.	The most consistent contribution of private operators has been the reduction of water losses and an improvement in water collection rates. Noted Increased efficiencies in private utilities.
Meggison & Setter (2001)	Multiple Empirical Studies	2001	Qualitative analysis: an extensive survey of empirical surveys	This did not analyse the water and sanitation sector specifically.	Privatised firms performed better than state-owned enterprises
<b>Profitability and regulation of firms within the water and sanitation sector</b>					
Reynaud & Thomas (2013)	1820 firms, of which 71 are directly involved in the water and sanitation sector	2006-2009	A non-parametric approach is utilised followed by the use of econometric profitability models	The involvement of African developing countries is not clear – the applicability of this study is thus thrown into question.	The firm's size is an important determinant of profitability, within the water sector specifically the type of regulation, and form of price regulation, et cetera. are also considered essential
Giulia <i>et al.</i> (2013)	54 Water Utilities in Italy	2007-2010	Descriptive statistics, a non-parametric and parametric approach was used	Not readily applicable to the African context.	Ownership affects the amount of investment in water utilities as well as their financial structure and costs. Public operators were found to be efficient

## 2.4 SUMMARY

As previously discussed, there are various theories that underpin project finance. These include “the principal-agent, property rights, and public-choice theories,” seeing that, these underpin the argument for privatisation (Tan, 2011: 49). The principal agent theory makes a recommendation for privatisation as a way to mitigate the low efficiency levels generally expected from government institutions. As explained, the ultimate principal (that is the tax-payer) elects the government as the agent that is responsible for appointing secondary agents, tasked with the management of the asset. However, due to a lack of incentives (and a lack of motivation) secondary agents do not strive to monitor the performance of employees (Tan, 2011). Therefore, the privatisation of an asset is recommended to improve efficiencies and in the case of project finance – ensure profitability. This is central to the property rights theory.

The public-choice theory is used to explain the fact that placing a limitation on political involvement will contribute to increased efficiencies, which is desired. The reasons for this lie in the fact that the private sector (because of competition) is forced to innovate to remain profitable. They in effect, do not have a sense of complacency or comfort that the government has been accused of. As proven by the empirical studies reviewed, this has been found to be the case within developing countries more than developed (Giulia *et al.*, 2013; Marin, 2009; Estache & Trujillo, 2003; Hunt & Lynk, 1995; Bhattacharyya *et al.*, 1994). In addition, the key founding principles of project finance were also discussed, in that the project would need to prove its feasibility and financial viability by meeting all project finance requirements before being implemented. This includes its requirement to meet a need and ensure that there is sufficient demand, and perhaps a lack in supply, that would ensure its profitability.

Moreover, when planning the project, it is imperative that risk be allocated to the project member(s) that are in the best position to mitigate them. This would ensure the bankability (the degree to which the project is acceptable and can be financed by the bank) of the project. Following which, a discussion of the funding models that exist and the institutional factors that affect the choice of funding model was expounded. The funding model that will be delved into, for the purposes of the Rustenburg Water Services Trust, would be the PPP (joint-venture) founded on the use of project finance. Contrary to development finance or grant funding, project finance is largely commercial in nature and would therefore need to be motivated by sound business practices and the project company’s (or Special Purpose Vehicle (SPV)) ability to service debt and pay shareholders’ dividends.

Finally, an overview of the use of PPPs for water and sanitation infrastructure was presented. It was noted that there is a lack of private finance investment in water and sanitation across the continent and that the little private funding injected is in fact declining. The reasons for this could not be found in literature.

This therefore prompts us to ask, “What are the key success factors of financing water and sanitation infrastructure”? Chapter three that follows gives an overview of the South African Water Sector.

## CHAPTER 3

### AN OVERVIEW OF THE SOUTH AFRICAN WATER SECTOR

#### 3.1 INTRODUCTION

Chapter two discussed the theoretical underpinnings of the study and gave a detailed account of what has been found on the topic. The third chapter presents an overview of the South African water sector, inclusive of the legislative and institutional framework that sets the tone for the provision and management of water infrastructure. Key to these would include the Municipal Finance Management Act (MFMA) No 56 of 2003 and the Municipal Structures Act (MSA) No 117 of 1998 that provide the framework to govern local municipalities. In light of the fact that South Africa is a water scarce country, the lack of adequate infrastructure and the financing thereof is then motivated, and finally an overview of the Rustenburg Water Services Trust is presented.

#### 3.2 LEGISLATIVE AND INSTITUTIONAL FRAMEWORK IN SOUTH AFRICA

The National Water Act (NWA) of 1998 and the Water Services Act (WSA) of 1997 regulate the water and sanitation sector (Government of RSA, 1998, 1997). The water and sanitation sector gets its directive from the Strategic Framework for Water Services that has changed the delivery of water services over the years (DBSA, 2012; Department of Water Affairs and Forestry, 2003). Key stakeholder institutions within South Africa comprise of; government, private and non-governmental organisations (DBSA, 2012). Private stakeholders consist of professional bodies and consultants that design and construct infrastructure, whereas non-governmental organisations are instrumental in the driving of community initiatives. Within governmental organisations (DBSA, 2012:81), the following institutions have notable roles:

- “The Department of Water and Sanitation (DWS): is responsible for the oversight of the water and sanitation sector at national and regional levels.
- Catchment Management Agencies (CMA): are responsible for the management of water resources at a catchment level, and water management area (WMA) at the provincial level.
- The Trans-Caledon Tunnel Authority (TCTA): is tasked with the responsibility of implementing bulk water infrastructure programmes on behalf of DWS.
- Water Boards: are DWS agencies that deliver bulk water services to local and district municipalities on a regional scale”.
- The National Water Resources Infrastructure Agency: is tasked with the overall funding, construction, maintenance and management of water infrastructure in South Africa. This leads to the dissemination of the TCTA and National Water Resources Infrastructure Branch (Government of RSA, 2008).

- Metropolitan, District and Local Municipalities: are tasked with the responsibility of providing water services to commercial, agricultural and residential users. In return, all users are required to pay a tariff reflective of the cost of providing that service.

When one considers the provision of potable water in South Africa, the pivotal role that local municipalities and indeed the Department of Water and Sanitation (DWS) play cannot be understated. In the same way, the laws that provide the governing framework for local municipalities should be carefully looked into. Within the South African context, both the Municipal Finance Management Act (MFMA) No 56 of 2003 and the Municipal Structures Act (MSA) No 117 of 1998 govern local municipalities. As highlighted by National Treasury, the aim of the MFMA is to “modernise budget and financial management practices in municipalities in order to maximise the capacity of municipalities to deliver services to all their residents, customers and users,” (National Treasury, 2004). The aim of the MSA is to guide the establishment and categorization of municipalities, it dictates the delegation of duties that is critical to this study (Republic of South Africa, 1998). Together these laws govern the financial management of municipalities and their structures and are considered in the assessment of the case study.

### **3.3 THE STATE OF SOUTH AFRICA’S WATER INFRASTRUCTURE**

When looking to the country’s water sector, it is important to note that it has limited water resources and has indeed encountered difficulties in the past with the provision of access to water for all, the poor and rich alike. These have led to changes in legislation and have left the country’s government battling with a backlog in bulk water supply and network infrastructure in a bid to provide the poorest of the poor with clean potable water (DWA, 2013a; DBSA, 2012).

According to the DBSA (2012: 72) South Africa’s, “main source of water is surface water from rivers and dams that are sustained by rainfall”. Unfortunately, these remain inadequate when compared to the total demand for water that this country expects. This has led to major infrastructural projects such as the Lesotho Highlands Water Project, in hopes that it would feed into South Africa’s water supply and contribute to meeting the needs of its people. Apart from meeting human consumption needs, water plays a pivotal role within various industries without which, the ease of conducting business is strained. The DBSA (2012:73) noted that “industries that generate approximately 70 percent of the gross domestic product (GDP) are supported by the country’s major rivers”. This warrants the participation of the private sector to see to the adequate maintenance and management of water infrastructure.

According to the SAICE Infrastructure Report Card for South Africa (2011:6), “the Department of Water Affairs scored a D-, major urban areas scored a C+ and all other areas a D-”. The reasons for this include the further deterioration of water infrastructure, the lack of spending on the maintenance and management of these systems and the shortage of skills required to do so.

Therefore, there is an immediate need for further spending on infrastructure, particularly maintenance and management (SAICE, 2011). According to the DBSA (2012: 8), the South African government intends to spend “7 percent of the country’s GDP on infrastructure development”. Of the 7 percent, R25 billion will be spent on water and sanitation.

This is stated in the country’s infrastructure development plan that was launched during the State of the Nation Address in February 2012, where the national government intends to address the infrastructure backlog found at the start of democracy (DBSA, 2012). However, it is noted that even though strides have been made in increasing access to potable water, 5.3 percent of the population still do not have access to safe water. These amounts to approximately 2.65 million people (DWA, 2013b:1). Coupled with the need for new infrastructure (particularly network infrastructure) existing infrastructure continues to deteriorate because of a lack of maintenance. According to SAICE (2011), South African water infrastructure has a weighted average age of 39 years – with some being more than 100 years old. This highlights the eminent need to replace some existing infrastructure (DBSA, 2012).

### **3.4 THE NEED FOR WATER INFRASTRUCTURE SPENDING**

As previously alluded to, infrastructure is critical to the eventual success of a country as it not only contributes to the quality of life of a country’s citizens but also contributes to the ease of conducting business (DWA, 2013; SAICE, 2011). This is true in the case of water infrastructure and services which is pivotal to manufacturing and mining industries and contributes to the demand for an expansion in services, new water sources and at the same time calls for the effective management and maintenance of infrastructure (Ruiters, 2013; SAICE, 2011).

Therefore, the backlog that exists comes as no surprise, seeing that “this is in part the outcome of two decades of underinvestment [...] public infrastructure spending tailed off from the early 1980s. From the mid-1990s, government began to increase capital spending, with a sharp rise after 2003 as prudent management of the economy created the fiscal space for long-term investment” (DBSA, 2012:8). The question asked at this point, however, is whether the government has the financial capacity to support infrastructure development of this extent and nature. This brings to the fore the various funding models that can be utilised to finance infrastructure (Ruiters, 2013). It is noted that, infrastructure is generally funded by “non-financial public enterprises”, provincial and local government.

For instance, of the expenditure predicted in 2010/2011 only 4 percent was done through private-public partnerships (PPPs), (DBSA, 2012:8). As the use of PPPs is being encouraged, a pertinent question with regards to its applicability to the water sector arises (DBSA, 2008); is private sector participation well suited to the water sector? The researcher attempts to answer this by using the Rustenburg Water Services Trust as a case.

### **3.5 THE RUSTENBURG WATER SERVICES TRUST**

#### **3.5.1 Project overview**

The Rustenburg Water Services Trust (RWST) is a municipal entity that was established to address the water pollution problem that ensued in the Rustenburg area from the late 1990s. It was during this time that the RLM approached, the then Department of Water Affairs and Forestry (DWAF) now the Department of Water and Sanitation (DWS), for approval to develop the Rustenburg area further. The RLM, however, was informed that before any more development could take place the challenges experienced with the water quality of the area would need to be addressed.

After the investigation launched in 1998, it was found that “the major source of pollution emanated from two sewage treatment works operated by the municipality,” (Fouche *et al.*, 2005). The key findings of the investigation included the fact that the inefficiency and lack of capacity of the Rustenburg and Boitekong Sewer Treatment Works (WWTW) led to the pollution of the Bospoort Dam (Fouche *et al.*, 2005). The RLM thus explored options of upgrading the Rustenburg WWTW, Boitekong WWTW and the re-commissioning of the Bospoort Water Treatment Works that had since been decommissioned. The investigation, led by Magalies Water, involved key stakeholders that included the mining houses within the area and the RLM. This is discussed further in section

#### **3.5.2 Contractual structure**

The desire to upgrade the Rustenburg WWTW, Boitekong WWTW and the recommissioning of the Bospoort Water Treatments works led to the Request for Proposals (RFP) from the private sector in 2003. The RFP included the “financing, design, construction, operation and maintenance of the refurbishment and extensions to the Bospoort water supply scheme and the Rustenburg sewer disposal scheme,” (Fouche *et al.*, 2005). Of the four concessionaires that submitted tenders, the Mati Ya Vanhu Consortium was awarded the tender. As part of the consortium; Magalies Water served as the operator, ABSA as the lead arranger and financier, the design and construction of these upgrades were completed by a consortium of engineers under the leadership of Bigen Africa (Fouche *et al.*, 2005).

The project finance facility, underwritten by ABSA, is approximated to be R241,6 million (ABSA, 2005). No grant funding was received or applied for. The contractual design of the Rustenburg Water Services Trust (the Special Purpose Vehicle) is depicted within Figure 2.

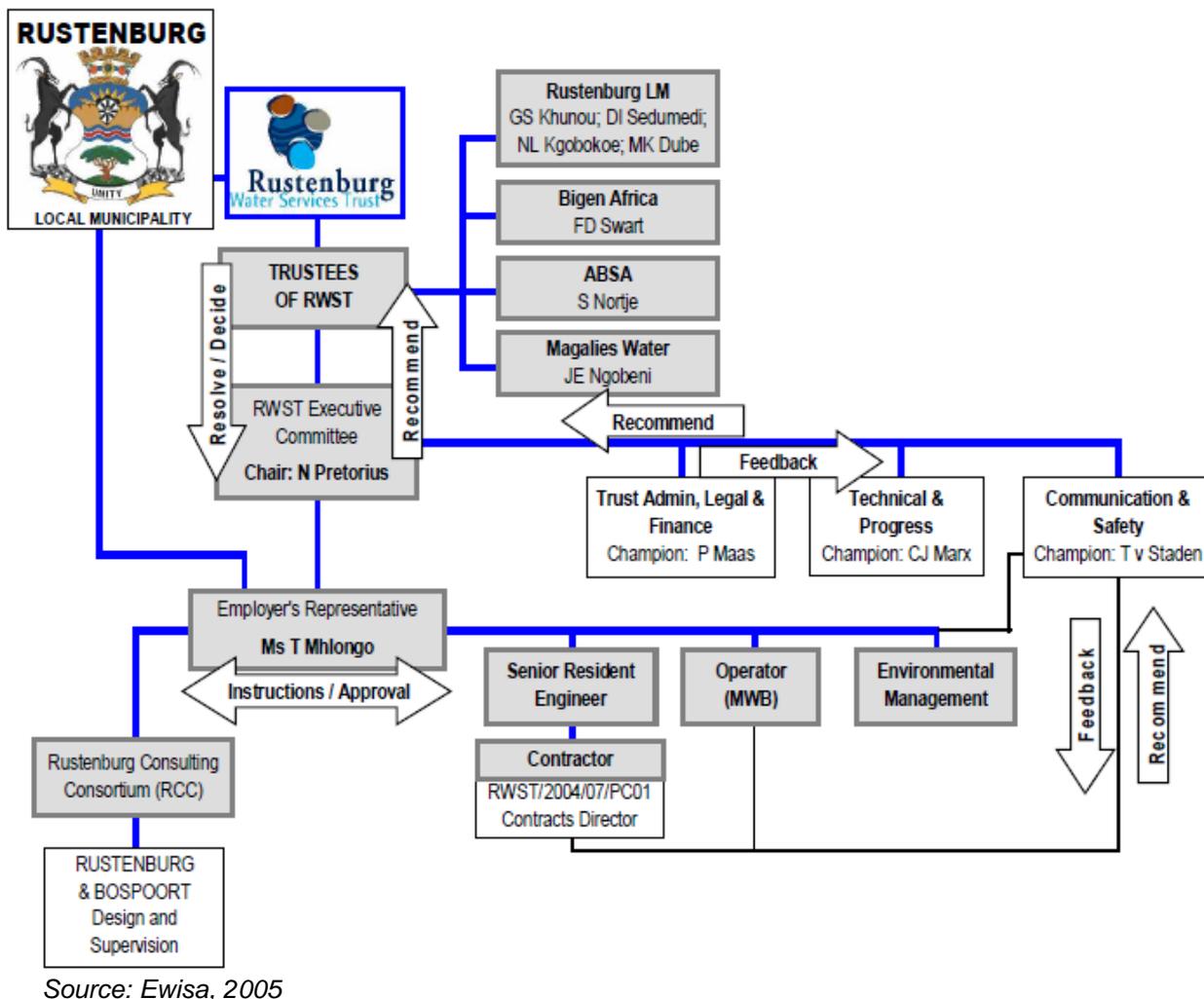


Figure 2: Rustenburg Water Services Trust Organisational Structure

### 3.5.3 Construction and operations

When constructed, although having experienced delays and more sewage flows than originally projected, the quality of effluent produced in the first year was poor but later corrected. This is testament to the efficiencies and level of quality that have become synonymous with private sector involvement. This is continuously seen with the operation and maintenance of the upgraded and recommissioned systems. That said, according to the audit outcomes of the North West Local Government prepared by the Attorney General (2012/13), the performance of the RWST was not monitored against the agreed performance objectives and indicators as required by section 93B(b) of the MSA.

### 3.6 SUMMARY

Given the highlighted need for new infrastructure and the rehabilitation of existing infrastructure, one of the key considerations governments across the African continent have, is the means through which the “infrastructure gap” will be funded (Shen, 2011; Allan *et al.*, 2010; Fedderke, 2006; Mineta, 2006). This can be seen in South Africa, where the national government intends to spend R670 billion, over the next 10 years or R67 billion per year on the entire water value chain (DWS, 2014). This is justified when considering the fact that South Africa’s water infrastructure has a weighted average age of 39 years – with some being more than 100 years old (SAICE, 2011). This is the point at which the exploration of the use of project finance in some of these applications becomes crucial, as many governments (local governments in particular) do not have the financial strength to fund these projects themselves.

A further consideration, to the methods used to secure finance, would be whether or not this solution can be applied across the various sectors (these include; transportation, electricity, water and sanitation, housing et cetera.). Project finance has proven to be relatively successful within transportation for example, its use within the water sector in South Africa, however, has been scarce with its first application being in the Rustenburg Water Services Trust and its second, the Roodeplaat Temba Water Supply Scheme. Therefore, to model the successes obtained within these projects and to pinpoint the key challenges faced, this study hopes to highlight the best practices that can be used when looking to finance and procure water infrastructure. In this regard, the Rustenburg Water Services Trust is used as a case.

Chapter four will discuss the research design and methodology used in this study.

## **CHAPTER 4**

### **RESEARCH DESIGN AND METHODOLOGY**

#### **4.1 INTRODUCTION**

Chapter three presented an overview of the South African water sector. This chapter discusses the research design and methods applied in this study. This study was largely qualitative in nature although encompassing quantitative elements that included the coding of qualitative data to assist in its analysis. The case study design was applied and in-depth interview(s) were conducted with key stakeholder members that informed statistical inferences and therefore the findings of the study. In order to answer the research questions, both secondary and primary data were utilised. Finally, a stakeholder analysis and risk analysis were performed and the key success factors when funding water and sanitation infrastructure identified. Each activity or research instrument selected and the motivations for these are discussed further within section 4.3.1.

#### **4.2 RESEARCH DESIGN**

The case study design was used in this study. A case can be a particular event, programme or individual studied in depth. The study may focus on two or three cases to make comparisons, build a theory, test a theory or propose a generalisation (for example a proposition). Case studies are detailed investigations of individuals, groups, institutions or other social units. The researcher conducting a case study attempts to analyse the variables relevant to the subject under study (Hungler & Polit, 1983). The main difference between case studies and other research studies is that the focus of attention is the individual case and not the whole population of cases. Normally, the focus is not on generalisation but on understanding the particulars of that case in its complexity. Case studies are normally used to investigate complex issues or objects. They emphasize detailed contextual analysis of a limited number of events or conditions and their relationships. It is basically a qualitative research method used to examine contemporary real-life situations.

A case study is an in depth study of a particular situation rather than a sweeping statistical survey. It is a method used to narrow down a very broad field of research into one easily researchable topic. While it may not answer a question completely, it may give indications and allow further elaboration and hypothesis creation on a subject. Yin (1984: 23) defines the case study research method as “an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used”.

Guidelines for the case study design are as follows:

- the problem demands further conceptualisation.
- The problem requires the exploration of a phenomenon.
- The causal links of the problem is complex with no single, clear outcome.
- The problem aims to address how and why questions of real –life events.
- The problem is to determine the particular pattern of factors significant in a given case.
- The problem requires a holistic portrayal of experiences and results.
- Existing theory regarding the phenomenon of change seems inadequate.

However, the method is criticised in that a study of a small number of cases cannot offer grounds for establishing reliability or generality of findings, and that the intense exposure to the case(s) might bias the findings. Some suggest that case studies should be used only as an exploratory tool. Generally, the case study approach has been criticised for being ‘soft’ with many uncontrolled variables, for being ambiguous in design and inherently biased (Mouton & Marais, 1990). The types of case study are theory testing or theory building research (intended to develop a theory) and practice oriented research, of which purpose is to contribute knowledge by identifying and describing not yet known variables. Miller and Brewer (2003) advises that just like how an experiment is used, a case study can be used to create a theory, particularly when observations are considered in concert with the results from other studies – considering a certain degree of transferability. Yin (1989) urges that case studies are particularly useful in examining the ‘how’ and ‘why’ aspects of real life phenomena, which cannot be manipulated by the researcher. The extent of the how and why questions inherent in the case study serves to strengthen it as an approach that will yield meaningful results.

As previously mentioned, The Rustenburg Water Services Trust (RWST) was selected as the case to be studied for this paper. The reasons why the RWST was adopted as the case for this study include the following (DBSA, 2008:11):

- i) It was one of the first municipal projects delivered through a PPP
- ii) It is said to address the “political sensitivities of privatising water services by maintaining ownership in public institutions”
- iii) The operator, Magalies Water, was given a short contract of five years allowing for flexibility
- iv) The project could be fully geared (100%) because of the ring-fencing of assets and cash-flows

This innovative approach, in the face of an increasing infrastructure backlog and now a decreasing budget for municipalities, has proven to be a success running effectively from 2005 to date.

### **4.3 RESEARCH METHODOLOGY**

In this study, qualitative methodology was applied and an interview guide containing semi-structured questions (see Annexure A) was used as a data gathering instrument (Keller, 2012). This was selected as the preferred collection method because of the expected response rate. In this case, the response rate would be higher than if a normal or self-administered survey were utilised. It was also preferred because the sample required is less than the usual requirement for a survey (Serumaga-Zake, 2012). This also led to fewer incorrect responses, because the researcher was able to clarify key-questions when asked to (Keller, 2012). In this way, the researcher ensured that there was room for flexibility during interviews sessions, allowing respondents to freely express themselves and share their own ideas and experiences naturally. Furthermore, qualitative methodology is most suitable to case studies because it enables the researcher to collect detailed and comprehensive information about the case.

#### **4.3.1 Motivation for using a qualitative approach**

When considering conducting a research project, there are two main approaches to a research problem that can be used, namely, quantitative and qualitative research. According to Abusabha and Woelfel (2003), quantitative and qualitative research may be considered polar opposites. Qualitative research is said to rest on the principle of subjectivity, whereas quantitative research rests on the principle of objectivity. Qualitative research tends to be more contextual in nature, allowing the researcher to immerse herself in the phenomenon of interest. Therefore, the most appropriate approach for this study was a qualitative approach because the study was in some ways exploratory, seeing that much about the phenomenon (the use of PPPs in water infrastructure) is unknown and contextual in nature. Qualitative research studies are also considered to be flexible, highly-focused, and are designed to be completed quickly (Serumaga-Zake, 2012; Leedy & Ormrod, 2005).

Furthermore, according to Yin (2003), case study design is good at investigating complex issues, especially if questions of 'how' and 'why' are to be answered. A major disadvantage of the qualitative approach is that it is normally affected by subjectivity. It is not easy to not bias the results by the investigator's biases and opinions on the issue being investigated (Abusabha & Woelfel, 2003). As aforementioned, an advantage to this is that this research method calls for a smaller and more "purposeful" or "focused" sample, instead of a large random sample as would be required within a quantitative approach. In "purposive sampling", key informants are interviewed to collect data (Barrios & Guarte, 2006: 277).

Barrios and Guarte (2006:277) have defined purposive sampling as “a random selection of sampling units within the segment of the population with the most information on the characteristic of interest”.

Finally, the qualitative approach was selected because of limited resources. If more time and resources were provided to the researcher, the mixed methodology approach (that is, engaging the quantitative methods as well for triangulation) would have been used to strengthen the findings of this paper, as validity and reliability issues would have been more adequately addressed.

#### **4.3.2 The use of both secondary and primary data in the study**

Primary data was obtained through the in-depth interviews conducted with respondents and secondary data was gathered to supplement the primary data collected to determine the key success factors in water infrastructure finance. Secondary data included annual reports and studies conducted on the Rustenburg Water Services Trust. It is noted that there are a number of challenges that the use of secondary data presents. For example, the data may not be perfectly fitted to the research study. For instance, data may be too general, vague or ambiguous and may not have enough content to help evidence findings. It may also harbour information that is inaccurate or that is old and out of date (Serumaga-Zake, 2012). To guard against this, the researcher used data published by reputable companies only. At the same time, secondary data has many advantages but it is important for the researcher to identify, reduce, and manage the disadvantages that are accompanied with its use.

#### **4.3.3 Research population, sample and sampling method**

According to Keller (2012), the population includes participants that meet the criteria for the study. A sample is defined as a subset of population selected to participate in a research study so as to understand the population as a whole (Keller, 2012). In this study, the population was the Rustenburg Water Services Trust as a case. This means that the unit of analysis for the study was different from the respondents, who simply provided the required information. A total of 10 respondents were purposively selected from all key private and public stakeholders of the Rustenburg Water Services Trust, and approached for interview. Of the 10, only 8 were actually interviewed. Respondents were chosen based on eligibility criteria including; work experience and familiarity with the project and water infrastructure financing. Barrios and Guarte (2006) (also see Serumaga-Zake, 2012) affirms that in purposive sampling, a non-probability sampling method, respondents are chosen based on some features or characteristics of interest to the study. The respondents selected (their real names not revealed for ethical requirement) and the motivation behind their selection is presented in Table 3.

Table 3: Respondents selected as part of the data sample

Full Name	Company Name	Designation	Motivation
Respondent A	Rustenburg Water Services Trust, Tigros Consulting	CEO of the RWST CA (SA), Tigros Consulting	Chief administrator and instrumental to the packaging of the project finance deal
Respondent B	Bigen Africa Services Pty (Ltd)	Executive Director	Part of the originating team, project finance delivered as part of Bigen Africa product offering
Respondent C	Cresco Project Finance	Director of Capital Projects	Specialist consultant in project finance and strategic partner of Bigen Africa
Respondent D	Cresco Project Finance	Director	Specialist consultant in project finance and strategic partner of Bigen Africa
Respondent E	Absa Capital	Public Sector and PPP specialist	Part of the originating team working on the project from Absa (the lead arranger)
Respondent F	Murray and Roberts	Operations Executive	Experienced in the contracting of bulk water projects and knowledgeable of how this relates to the water sector in South Africa
Respondent G	i @ Consulting Pty (Ltd)	Principal Finance Unit	Key experience in revenue enhancement strategies for municipalities and the development of infrastructure asset management strategy on a national level
Respondent H	Development Bank of Southern Africa	Project Preparation Specialist	Part of the project preparation team at Bigen Africa that produced the RWST. He is also experienced in the field of project finance particularly as it relates to the water sector.
Respondent I	Rustenburg Local Municipality	Municipal Manager	The RLM was the client and key stakeholder within the project.
Respondent J	Rustenburg Local Municipality	Technical Representative (Bulk Infrastructure)	The RLM was the client and key stakeholder within the project.

#### 4.3.4 Protocol to be observed

After its design, the interview guide was piloted with three preferred but knowledgeable individuals in water infrastructure financing that were not part of the main study but representing the same target population. The researcher conducted the pilot test under similar conditions as those of the main study.

Pilot interviews ensured that shortcomings were identified early and rectified before conducting the main study with the help of experts in the field including the supervisor (Serumaga-Zake, 2012). Before conducting an interview the researcher formally wrote to respondents to ask for an appointment to conduct interviews. Once approved, semi-structured interviews were held with respondents. Semi-structured interviews are perceived to be time consuming and intense, nevertheless, the researcher made it a point that the respondents feel secure and comfortable during interview sessions (Serumaga-Zake, 2012; Benoit *et al.*, 2010).

In-depth interviews were preferred to questionnaire data collection for the reason that they are open, flexible and help the researcher to have an in-depth understanding of the issue within a specific setting and time frame (Abusabha & Woelfel, 2003). The purpose of the study was clearly explained to the respondents and their input acknowledged in advance. In order to have privacy during interview sessions, secured offices were used. Interviews lasted between 45 minutes to an hour allowing all respondents to respond appropriately.

According to De Vos (2005), the first step in analysing qualitative data is to plan for the recording of information. In line with this, the researcher used an interview guide to gain an understanding of the experiences and ideas of the respondents. The respondents were asked for permission to record the interview to ensure the accuracy of information collected. Additionally, during interview sessions, notes were taken (Stuckey, 2015). De Vos (2005) explains that, writing memos in the margins of the transcripts helps in classifying and interpreting the data. Such memos are often short phrases, ideas or key concepts that can occur to the reader. In order to capture all the ideas from the respondents, the researcher wrote memos after reading the data several times, that helped in identifying patterns and themes that are unfolding (Stuckey, 2015; Serumaga-Zake, 2012).

#### ***Administrative procedure for the in-depth interviews (protocol):***

There were five stages of the in-depth interviews:

##### *Stage One: Preparing the interview*

- i) an appointment with the interviewee was made;
- ii) when making the appointment with the interviewee, not too much detail on the topics of the interview was given;
- iii) A suitable place was obtained to carry out the interview in less than one hour;
- iv) the interview was recorded with permission from the interviewee;
- v) recording equipment was checked; and
- vi) background noises were avoided.

*Stage 2: Arrival*

The arrival stage of the interview included the following activities:

- i) friendly greeting;
- ii) Introduction;
- iii) background noise checks were conducted;
- iv) the researcher and respondents got to know each other;
- v) recording equipment used was set up; and
- vi) the interviewee and interviewer settled down to ask the questions et cetera.

*Stage 3: Introducing the research: including explanations*

The interviewer explained:

- i) the purpose of the interview,
- ii) why the participant had been chosen, and
- iii) the expected duration of the interview.

The researcher sought informed consent of the interviewee and included:

- i) an explanation of how the information is confidential, et cetera.
- ii) an explanation of the use of the tape recorder, and
- iii) obtained written or documented oral consent.

Once the interviewee had consented, the researcher conducted the interview

The interviewer:

- i) made the interviewee feel comfortable;
- ii) appeared interested in what the interviewee is saying;
- iii) avoided “yes/no”, vague/ambiguous and leading questions;
- iv) used appropriate body language.
- v) kept personal opinions in check.
- vi) The interviewer tried to be a good listener while the interviewee made most of the talking

*Stage 4: Starting the interview*

- i) this was gradual, unhurried and relaxing; and
- ii) General questions were asked first and more specific/sensitive questions were asked later

*Stage 5: The Interview*

- i) Although there were pre-planned (open-ended) questions to ask during the interview, the interviewer also allowed questions to flow naturally, based on information provided by the interviewee.
- ii) The interviewer did not insist upon asking specific questions in a specific order.
- iii) The flow of the conversation dictated the questions asked, and those omitted, as well as the order of the questions.
- iv) The Interviewer kept focused and used probing questions as needed. The interviewer tried to encourage the interviewees to expand on their answers and give as many details as possible

These included for example, the following questions:

- o Would you give me an example?
  - o Can you elaborate on that idea?
  - o Would you explain that further?
  - o I'm not sure I understand what you are saying...
  - o Is there anything else?
- v) The interviewer sought understanding and interpretation. This included the following:
- o She tried to interpret what she was hearing, as well as seeking clarity and a deeper understanding from the interviewee throughout the interview.
  - o She remained conversational but remembered her role was primarily that of a listener.
  - o She would not push the pace unnecessarily, or 'put words into the participant's mouth' but would always try to make sure that the conversation revolved around the objectives of the study.
  - o She avoided interrupting the interviewee.
  - o The interviewer listened attentively and expressed interest in what the interviewee was telling her
  - o It was more of a friendly conversation but the interviewer remained professional and neutral: not to approve or disapprove something
  - o The interviewer would not move on to a new topic until she felt she had explored the interviewee's knowledge on the question at hand
  - o She would let interviewee's answers determine the direction the interview took (keeping within topics of interest)
  - o She would speak directly to the interviewee
  - o She would keep eye contact with the interviewee
  - o There would be smooth transitions from one topic to the next
  - o Participant body and facial gestures, pauses, silence, laughter, et cetera, were taken into consideration. Body language helped to address issues of validity.

- vi) The interview would be finished on time if possible, but the interviewer would try to make sure that everything has been covered sufficiently.
- vii) She would then thank the interviewee for his/her valuable time.

#### **4.4 DATA ANALYSIS**

Data analysis is a mechanism for reducing and organizing data to produce findings that require interpretation by the researcher (Benoit *et al.*, 2010; Burns & Grove, 2003; LeCompte, 2000). When analysing data, qualitative researchers often categorize data into themes and patterns as the primary basis for organizing, interpreting and reporting results (Stuckey, 2015; Benoit *et al.*, 2010; LeCompte, 2000). Data analysis for qualitative research consists of a number of steps which involve the recording of data, preliminary analysis, reading and writing memos and generating themes and patterns. The focus in this regard, is on common themes (Serumaga-Zake, 2012). To ease the interpretation of data, these themes were coded and their frequencies determined.

The method of analysis, of case study data generated through semi-structured and unstructured interviews is split between content analysis and grounded theory, which relies on intuitive analysis to develop themes or patterns for further analysis or interpretation (Stuckey, 2015; Serumaga-Zake, 2012). Therefore, the researcher in this study collected data from the respondents while provisionally formulating meanings of their experiences around the phenomenon of water infrastructure financing.

The following steps were taken to identify common patterns, themes and/or trends:

- statements made by respondents that relate to the topic were identified and numbered;
- the information collected was broken into smaller segments, reflecting one thought;
- statements with similar meanings were grouped together forming categories;
- any divergence in thoughts or perspectives were sought;
- a composite was then constructed; and
- finally the overall description of the phenomenon was built.

As mentioned above, when analyzing qualitative data, it has been found useful to convert this data into themes and codes using quantitative methods (Stuckey, 2015; LeCompte, 2000).

After completing the process of reading and writing memos - categories, themes and patterns were generated and coded to create frequency distributions (Stuckey, 2015; Serumaga-Zake, 2012). The information gathered through the interviews was further analysed by classifying the statements made into groups reflecting various meanings of the phenomenon. In addition, common themes were carefully identified along trends (Stuckey, 2005; Serumaga-Zake, 2012).

The researcher noted common expressions or phrases used by the respondents in recognising what they expected from a water project. The last step involved searching for alternative explanations through considering the ways in which the respondents viewed the concept of water infrastructure financing.

#### **4.4.1 Validity and reliability**

According to LeCompte, (2000) validity is concerned with the accuracy, meaningfulness and credibility of the research project as a whole. Reliability, on the other hand, is defined by Leedy and Ormrod (2001) as the extent to which the same study can be replicated and yield the same results. To ensure validity, the research instrument (the interview guide) collected accurate and credible information (LeCompte, 2000). The researcher sought in-puts from the supervisor and finance experts and also piloted the data collection instrument to make sure that the questions were straight forward and clear, not ambiguous or vague, not leading questions, and easy to understand. So, after piloting the instrument, the research fine-tuned the questions.

The very subjectivity of the inquiry leads to difficulties in establishing the reliability and validity of the strategies and information. However, triangulation was used to address this issue. Triangulation is about using more than one method of data collection or source of data. The researcher used in-depth interviews and observation to collect data. These were supplemented by the use of secondary data. The researcher also made an effort to ensure that the interview guide was constructed using simple language to the benefit of respondents.

Efforts were made to ensure that the questions were clear without any ambiguity or vagueness and that they addressed the objectives of the research study. The researcher also made sure that the findings and conclusions drawn were credible and authentic. After the interpretation of the data was done, member checking was done to make sure that the researcher interpreted the data correctly. In terms of the reliability of the study, due to the nature of the study (the fact that it depends on perceptions, attitudes and experiences of individuals) it is noted that the study is not likely to yield the same result when replicated. That said respondents who are knowledgeable and experienced about the study objectives were involved in this study in order to improve the dependability of the results.

Moreover, triangulation was used to increase the validity and reliability of the study by using more than one data collection method. Triangulation is one of the methods used for meeting the trustworthiness criteria. The idea behind triangulation is that the more agreement of different data sources on a particular issue, the more reliable the interpretation of the data. The problem with qualitative research though as already alluded to is that the interpretations of qualitative data are subjective for a researcher cannot separate his or her own feelings completely from the opinions of the participants. Data collection methods involved interviews, documentary evidence as well as observation.

#### 4.5 ETHICAL CONSIDERATIONS

To facilitate this process and ensure the quality of the information provided, ethical clearance was obtained from the University of Stellenbosch Business School, ethical clearance committee. Moreover, the importance of the study was provided to respondents. This process included the following:

##### *Informed Consent*

The respondents were asked for their consent to participate in the study after the researcher had explained to them what the study was all about including its purpose. In other words, no one was pressurised to participate. This was done in writing and verbally.

##### *Anonymity*

The anonymity of the respondent was ensured. This made sure that the researcher took steps to ensure that what participants had said will not be traced back to them when the final report is produced.

##### *Confidentiality*

Similar to anonymity, confidentiality of the respondent was ensured. The researcher confirmed that the information supplied during the research process (in confidence) would not be disclosed directly to third parties.

##### *No harm*

The researcher made sure that no harm, whether physically or emotionally, happened to the respondents during the research process.

##### *Privacy*

The privacy of respondents was respected. In keeping with this, permission was obtained from the respondents prior to conducting the interview(s).

##### *The final report*

It was useful for participants to know what was going to happen with the results of the study and how they can get or receive a free copy of the final report, and whether it will be on public display or not as per the rules and regulations of the University of Stellenbosch Business School. The researcher also convinced participants of the potential benefits of the study, they were also told that they could withdraw from the survey at any time without any negative consequence. The researcher was honest and made sure that no fabrication of results was made.

#### **4.6 SUMMARY**

As previously discussed, this study was qualitative in nature with some quantitative elements, which included the coding of data collected through semi-structure interviews and a desk study. After the data required was collected, themes and patterns were generated leading to findings and ultimately a conclusion. Both a desktop study and semi-structured interviews were conducted for the purposes of collecting data and answering the key questions highlighted within section 1.4. A stakeholder analysis and risk analysis was conducted in this regard. When conducting interviews the ethical considerations discussed within section 4.5 were followed along with the protocol prescribed. It is however, noted that the subject matter is readily available in public media and is therefore, not sensitive in nature. When deriving a “story” from the data collected, the researcher ensured the validity and reliability of the data collected by using different sources of information that reinforced the findings from the interviews.

Chapter five will present the findings of the study.

## CHAPTER 5

### FINDINGS

#### 5.1 INTRODUCTION

Previously, chapter four discussed the research design and methodology used to address the research questions. Chapter five presents and discusses the findings of the study. As previously introduced, both primary and secondary data were used to provide the main findings of this research paper. These, in addition to the primary data collected from the semi-structured interviews conducted, informed the stakeholder and risk analysis. The interviewees were individuals that were either directly involved with the setup of the RWST or were considered experts in the field of project finance particularly in the South African water sector. After the introduction, the structure of this chapter is as follows. Stakeholder analysis is presented in section 5.2, then risk analysis is presented in section 5.3, financial returns and robustness of the business case is discussed in section 5.4, economic development returns is presented in section 5.5, lessons learnt are discussed in section 5.6, and finally, the main findings and discussion (of the findings) are provided in section 5.7. A summary of the chapter is given in section 5.8.

#### 5.2 STAKEHOLDER ANALYSIS

As with the development of other projects, there were a number of stakeholders involved that in many ways determined either the success or failure of this project. A discussion of the stakeholders is as follows:

##### ***The Department of Water and Sanitation***

As previously discussed, the DWS is charged with the responsibility of managing South Africa's water resources and ensuring the effective management and treatment of sewage. As such, the DWS ordered the RLM to address its failure in performance with regards to both its water and sewage treatment. This was a condition that had to be fulfilled before the further expansion of Rustenburg town could be considered. If it was not met, it would have had an adverse effect on the development and economic growth of the town.

##### ***The South African Local Government Association***

The South African Local Government Association (SALGA), an association of municipalities, is mandated to represent the interests of the local government such as the RLM. SALGA interfaces with National Parliament, the National Council of Provinces (NCOP), cabinet and provincial legislatures on behalf of 278 municipalities (SALGA, 2015). They held an indirect interest in the project.

### ***The Rustenburg Local Municipality***

The RWST managed by a board of trustees, is under the ownership of the RLM and therefore serves the Rustenburg community. Rustenburg is a town within the North West Province that is approximately 130km from Pretoria and Johannesburg (Rustenburg IDP Plan 2012). The RLM that falls under the Bojanala District “a category B municipal council” that consists of thirty-eight wards, (Rustenburg IDP Plan, 2012:24).

It is noted that, the growth in development within Rustenburg is attributed to the impact made by the “world’s four largest mines, i.e. Anglo Platinum, Impala Platinum, Xstrata and Lonmin. (Rustenburg IDP Plan, 2012:24)”. Seeing that, the RWST is a municipal entity of the RLM. The municipality had a direct interest in the project; if the conditions placed on it by the DWS were not made they would not have been permitted to develop the town further.

### ***Rand Water***

Rand Water is the appointed water service provider for Rustenburg. Its vision includes, “being a provider of sustainable, universally competitive water and sanitation solutions for Africa” (Rand Water, 2015). Prior to the establishment of the RWST, Rustenburg in conjunction with the mines in the area solely received raw water from Rand Water. This provision was reduced in favour of reusing Rustenburg’s own water resources, that included treated effluent from the WWTW. Anglo-American mines, in particular, opted to receive reused water from the WWTW for industrial processes at a reduced cost when compared to Rand Water prices. This was the main motivation for signing take-or-pay agreements with the RWST.

### ***Residents of Rustenburg Town***

According to the 2011 census, Rustenburg has a 3.5% growth rate and a population of 549 575 (Stats SA, 2011). If the WTW and WWTW left to deteriorate, the residents of Rustenburg would have been left vulnerable to E.coli infection for example. The reason for this is that bacteria within sewer treatment and/or the water treatment works would go undigested and as a result contaminate water sources. Therefore in the interest of the general health of residents, and to improve their living conditions the Rustenburg WWTW, Boitekong WWTW were upgraded and the Bospoort Water Treatment System recommissioned.

### ***Bigen Africa Service Pty (Ltd)***

Bigen Africa Services were the lead consultants within the Mati Ya Vanhu consortium that won the tender published by the RLM. It contracted Tiaan Consulting’s Pet Maas, partnered with Absa Capital, the DBSA and Magalies Water. It designed the upgrade for both the Bospoort water supply scheme and the Rustenburg Sewer disposal scheme. It also maintains a seat on the RWST and is actively involved in the maintenance and operation of the systems.

***Absa Capital***

In order to fully fund the upgrade, finance was sought from the private sector. To this end ABSA was appointed as the lead arranger and part financier of the project. They were therefore instrumental in organising the funding needed, dependant on the mitigation of a significant amount of risk. This is addressed further within section 5.4.

***The Development Bank of Southern Africa***

The DBSA, a development finance institution that supports the development of infrastructure within Southern Africa, served as a part financier of the project in collaboration with Absa Capital.

***Magalies Water***

Magalies Water served as the initial operations and maintenance contractor (O&M contractor). As a result of a performance review they were later replaced. This function is overseen by Bigen Africa Services Pty (Ltd).

***Anglo-American Mines***

Anglo-American is a global and diversified mining company that specialises in finding new resources, construction, processing and marketing their products. This includes, bulk commodities and base metals to precious metals and diamonds. Their key interest in the project was their ability to guarantee the supply of treated effluent for use in their industrial processes.

***The Rustenburg Water Services Trust***

The Rustenburg Water Services Trust is the special-purpose vehicle established to operate and maintain the upgraded WTW and WWTW and is also responsible for making debt repayments. It remains under the ownership of the RLM.

A summary of the stakeholder analysis is presented within Table 4.

Table 4: Stakeholder Analysis of the Rustenburg Water Services Trust

Key Stakeholder	Description or Role	Interest in Project	Relationship with stakeholders
The Department of Water and Sanitation	Government entity that ensures the provision of adequate levels of service	Direct Interest. The DWS is charged with the responsibility of ensuring water quality and adequately digested treated effluent.	The DWS encouraged the RLM to improve its treatment processes

Key Stakeholder	Description or Role	Interest in Project	Relationship with stakeholders
South African Local Government Association	Association of 278 local municipalities	Indirect interest. The project would have to be done according to industry standards.	SALGA interfaces with national parliament, NCOP, cabinet and provincial legislature on behalf of the RLM
The Rustenburg Local Municipality	Water Service Authority	Direct interest. Responsible for delivering safe water	The RLM retains ownership of the upgraded systems.
Rand Water	Water Service Provider	Direct Interest. The success of the project led to a reduced off-take from Rand Water.	Rand Water is a bulk water supplier to the Water Services Authority (RLM)
Residents of Rustenburg	Recipient of services rendered	Direct Interest. Consumers of the water produced by the water treatment works.	The WSA (RLM) is charged with the responsibility of adequate service delivery including good quality potable water
Bigen Africa	Engineer and Trustee	Direct Interest. Lead consultant within the Mati Ya Vanhu consortium	Engineering consultant to RLM and trustee of the RWST
Absa Capital	Lead Arranger and Trustee	Direct interest. Absa organised the funding needed and partially invested in the project.	Absa served as a lead lender and is a trustee of the RWST.
DBSA	Partial Financier	Direct interest. DBSA, a development finance institution, partially funded the RWST.	DBSA served as a lender to the RWST
Magalies Water	Initial Operations and Maintenance Contractor	Direct Interest.	Magalies Water served as the initial operations & maintenance contractors.
Anglo-American	Off-taker/ Commercial user of water	Direct Interest. Anglo-American is a mining company.	Contractual off-taker, with a signed contract with the RWST.
Rustenburg Water Services Trust (RWST)	The municipal entity established to manage the project	Responsible for loan repayments and managing systems	The SPV created to manage and operate the upgraded facilities

### **5.3 RISK ANALYSIS**

#### **5.3.1 Overview of risk analysis procedure**

As previously alluded to, the risk analysis that was performed and the ability of the project sponsors to adequately mitigate risk was instrumental to the success of this project. In light of this, a risk analysis was conducted for the purposes of this study, highlighting the major risks mitigated associated with the project (the RWST). The major risks analysed are presented within Table 8. The full risk analysis can be found appended to this study as Annexure B.

The following approach was taken when conducting the risk analysis:

- i. a risk was first identified and named - informed by either the interviews conducted or the literature review. This was then allocated to a stage of the project, whether it be project preparation, procurement, construction or operation and maintenance;
- ii. the source of the would be risk was described and its consequence on the financial model ranked from 1 to 7, 1 being a “catastrophic” consequence on the financial model, and 7 being “insignificant.” This is summarised within Table 5

Table 5;

- iii. the risk was then either allocated to the private or public partner, or both;
- iv. a pre-mitigation scoring was then allocated, depending on the impact and the likelihood of that risk taking place. The likelihood of the risk occurring was scored between A and E, with “A” being rare (having a probability less than 1%) and “E” being almost certain (having a probability equal to or more than 90%). This is summarised within Table 6.
- v. the financial impact was then estimated using the pre-mitigation scoring achieved. This is depicted within Table 7.

The following section discusses the major risks encountered and the way in which they were mitigated. An instance where mitigation was inadequate is also highlighted.

Table 5: Scoring based on the consequence of a risk on the financial model

Score	Interpretation
1	Insignificant
2	Negligible
3	Minor
4	Moderate
5	Major
6	Severe
7	Catastrophic

Table 6: Scoring based on the likelihood of the risk occurring

Score	Interpretation	Probability
A	Rare	< 1%
B	Unlikely	≥ 1% < 20%
C	Moderate	≥ 20% < 50%
D	Likely	≥ 50% < 90%
E	Almost Certain	≥ 90%

Table 7: Risk Analysis Key

Likelihood		Impact/Consequences						
		7- Insignificant	6- Negligible	5- Minor	4- Moderate	3- Major	2- Severe	1- Catastrophic
E - Almost Certain	≥90% probability	IV	III	III	II	II	I	I
D - Likely	≥50%<90% probability	IV	IV	III	III	II	II	I
C - Moderate	≥20%<50% probability	V	IV	IV	III	III	II	II
B - Unlikely	≥1%<20% probability	VI	V	V	IV	III	III	II
A - Rare	<1% probability	VII	VI	VI	V	IV	IV	III

Consequence Category		VII	VI	V	IV	III	II	I
% Likelihood		<10	≥10<20	≥20<30	≥30<45	≥45<60	≥60<80	≥80
Financial Impact Rand Operating Profit		<625	625 – 6 249	6 250 - 62 499	62 500 – 624 999	625 000 – 6,249 million	6,25 million- 62,49 million	> 62,5 million
Time Delay Impact (Months)		<1	≥1<2	≥2<3	≥3<6	≥6<12	≥12<24	≥36

Table 8: The major risks identified for the Rustenburg Water Services Trust during the risk analysis conducted

Category	Risk No	Risk Source	Risk Event	Consequence on Financial Model	Risk Treatment	Allocation of Risk
Design Risk	3	Design scope changes requiring re-design	Ongoing scope changes will delay the completion and approval of design.	Delays in design timelines and subsequent construction delay.	This process was adequately managed between the design engineer and the RLM	Public Sector Partner (Rustenburg Local Municipality)
	8	Lack of demand from funders	The risk that the required funding for the project is not obtained due to: i) Un-cooperative and difficult lenders. ii) Debt and/or equity not being available or not of the required amount with anticipated conditions; iii) Competitive pricing and participation not available. iv) Lenders not satisfied with the funding security package offered for the Project.	Not obtaining the debt/capital previously modelled for	A feasibility study was carried out to, assess the appetite from investors, lenders and/or donors to participate in the project. The security package included, amongst other things: i) Cession in security of all of the Borrower's rights, title and interest in and to the Project Accounts, insurances, guarantees and performance bonds; ii) Sponsor support (MMM and Treasury), if required on terms and conditions to be agreed et cetera.	Public Sector Partner (Rustenburg Local Municipality)

Category	Risk No	Risk Source	Risk Event	Consequence on Financial Model	Risk Treatment	Allocation of Risk
Construction Risk	15	Construction completion	The risk that the upgrades of the systems (construction works specifically) will not be completed on time. Due to increased expenditure required or variations made to the designs.	This will cause a time delay that will have a negative impact on the financial model. An example would be the date at which at which the upgraded and recommissioned systems would start.	The construction contract was at a fixed price and completion date. An experienced contractor with the financial strength required to cope with the negative impact of delays was also appointed.	Private Sector Partner (Construction Contractor)
	16	Cost over-run risk	The possibility that the actual project costs will exceed projected project cost during the design and construction phase of the project.	This will lead to increased construction costs and the potential of reduced returns	This risk was managed through site investigations and the use of experienced quantity surveyors. Experienced contractors with adequate financial strength to withstand impact of cost overruns were also utilised.	Private Sector Partner (Construction Contractor)

category	Risk No	Risk Source	Risk Event	Consequence on Financial Model	Risk Treatment	Allocation of Risk
Construction Risk	21	Failure to meet design standards during and after construction	As a result of the project failing to reach design capacities, additional changes or adjustments would be required that may delay project completion	This has the potential to prolong the period of construction and as a result delay operations.	To guard against this, one needs to verify equipment delivered with design specifications and appoint an independent quality assurance specialist	Private
Operations and Maintenance Risk	22	Reduced revenue as a result of a reduction in water demand	The possibility that the estimated water consumption may be lower than actual numbers that will be experienced due to: envisioned development or growth in population not occurring; or users not affording the tariffs set up by the RLM. This could lead to people choosing to having illegal connections or simply choosing not to pay tariffs	Reduced revenue and consequently potential bankability risk.	In managing the demand risk, Take or Pay contracts with the mines in the area were signed.	Private Sector

category	Risk No	Risk Source	Risk Event	Consequence on Financial Model	Risk Treatment	Allocation of Risk
Operations and Maintenance Risk	23	Sub-par operations and maintenance of infrastructure	The cost of maintaining and operating the assets may vary from projected costs. This risk includes factors that impact on the operating requirements of the project. This included skills requirements, for example; labour disputes, employee competence, employee fraud, technology failure, environmental incidents and any failure to obtain, maintain and comply with necessary operating guidelines and KPIs.	This would have increased total project costs, inevitably decreasing potential financial returns	A reputable O&M contractor with the skills and expertise needed to operate and maintain bulk water supply infrastructure was appointed. Their performance is constantly regulated with the use of KPIs et cetera.	Private Sector Partner (Magalies Water)
	25	Low/High Project Expenditure	In this case, funds may or may not be available, at a specific point in time during the project. Depending on the way in which the projects progressed and expenses were incurred.	This may have had an effect on the ability of the RWST to service debt or pay dividends as it were.	Project progress and expenditure was monitored on a monthly basis and communicated to relevant stakeholders	Private

category	Risk No	Risk Source	Risk Event	Consequence on Financial Model	Risk Treatment	Allocation of Risk
Political Risk	26	Political risk	<p>This risk is based on the possibility of;</p> <p>(i) unforeseeable conduct by the RLM or by any other government authority that materially and adversely affects the completion and/or operation of the project, or expected return on equity, debt service or otherwise results in increased costs to the Private Party or</p> <p>(ii) expropriation (and or/ creeping expropriation), nationalisation or privatisation of the assets of the RWST by the MMM</p> <p>(iii) the testing of water according to Blue Drop indicators and the impact that this would have</p>	<p>Depending on the scale and impact of this risk, this has the possibility of increasing capital costs of the project or even throwing the implementation of the project into question. If the RWSTs assets are expropriated, the investment made by project sponsors and/or lenders would be at risk.</p>	<p>This could be mitigated by the introduction of a compensation regime in the Concession Contract or PPP Agreement that protects the Private Party in the event of termination of the Concession Contract due to default by Public Sector.</p>	Public

Table 9: Excerpt from Risk Analysis conducted with major risks

Rustenburg Water Services Trust									
Phase	Category	Risk Nr.	PRE-MITIGATION SCORING			Financial Impact			Time Delay Impact
			Likelihood	Impact	Pre Overall Results	Minimum	Most Likely	Maximum	Months
Project Development	Conceptual Design	3	D - Likely	4- Moderate	III	R 625 000.00	R 3 437 000.00	R 6 249 000.00	≥6<12
	Funding	8	C - Moderate	2- Severe	II	R 6 250 000.00	R 34 370 000.00	R 62 490 000.00	≥12<24
Construction	Construction	15	D - Likely	4- Moderate	III	R 625 000.00	R 3 437 000.00	R 6 249 000.00	≥6<12
		16	D - Likely	4- Moderate	III	R 625 000.00	R 3 437 000.00	R 6 249 000.00	≥6<12
		21	B - Unlikely	3- Major	III	R 625 000.00	R 3 437 000.00	R 6 249 000.00	≥6<12
Project Operation	Design	22	A - Rare	3- Major	IV	R 62 500.00	R 343 749.50	R 624 999.00	≥3<6
	Operations and Maintenance	23	B - Unlikely	3- Major	III	R 625 000.00	R 3 437 000.00	R 6 249 000.00	≥6<12
	Commercial/ Financial Risks	25	B - Unlikely	4- Moderate	IV	R 62 500.00	R 343 749.50	R 624 999.00	≥3<6
All	Political	26	A - Rare	2- Severe	IV	R 62 500.00	R 343 749.50	R 624 999.00	≥3<6

### **5.3.2 A brief discussion on the risk analysis**

As aforementioned, the purpose of the risk analysis performed was to ensure that all major risks were adequately mitigated and that the parties best positioned to manage a risk, were allocated that risk. When considering the operation of the Rustenburg and the Boitekong WWTW, it was documented that of the risks analysed; risk number 14 and 20 were realised (see Table 8). After one year of operation, the 2004/5 Rustenburg Water Services Trust Annual Report dated 30 June 2005, stated that both the Rustenburg and Boitekong Waste Water Treatment Works (WWTW) operated over capacity and as such, the quality of effluent produced was sub-par. The Boitekong WWTW began operation later than scheduled on the 28 February 2005. During the four month period, 860 448 kilolitres of sewage was treated.

In the same way, the Rustenburg WWTW only began operation on the 30th of April 2005, which was later than scheduled. At the start of operation, the plant was overloaded having treated 1 228 743 kilolitres of sewage. According to the 2013 Green Drop Assessment, Rustenburg WWTW achieved a Green Drop Score of only 78.7%, whilst Boitekong WWTW achieved 69.5%. Both are considered average (DWS, 2015). This, however, is being addressed particularly at the Boitekong WWTW that operates in excess of its hydraulic design which compromises effluent quality compliance. It is thus in the process of being upgraded. To improve effluent quality compliance at the Rustenburg WWTW, a new Dissolved Air Flotation (DAF) plant is being constructed.

### **5.4 FINANCIAL RETURNS AND ROBUSTNESS OF THE BUSINESS CASE**

Once the financial model for the RWST was finalised, the business case for the transaction was made clear. It could be seen, that the project would add value to trustee members and meet the requirements of the lending institutions involved (debt covenants). This includes meeting required Debt Services Coverage Ratios (DSCRs) and providing trustee members an attractive Internal Rate of Return (IRR). As previously explained, the reason for this was based on the effective management of risk. In particular, the mitigation strategy selected that involved the signing of off-take agreements between the RWST and the mines within the area. This in effect, safe-guarded the SPV against defaulting on loan repayments and enticed banking institutions. As noted by one of the respondents, the financial strength and therefore reliability of the off-taker is important and not to be ignored. Seeing that, Anglo-American mines (a large international company) was involved, the degree of risk for default reduced significantly.

Moreover, since the contracts between the trust and the service providers included key performance indicators the successful operation and maintenance of the upgraded systems was ensured. This can be seen with the initial O&M contractor, Magalies Water that was replaced after a 5 year term as a result of less than favourable performance reviews.

These coupled with the continuous involvement of trustees solidified the business case presented, making it an interesting pioneering project that should be replicated particularly in the South African context.

## 5.5 ECONOMIC DEVELOPMENT RETURNS

The economic development returns as a result of the successful implementation of this project are varied and include, but are not limited to the following:

- i) improved water treatment processes that led to better quality drinking water;
- ii) health benefits realised as a result of achieving a better quality effluent;
- iii) reduced incidences of E.coli infection;
- iv) the provision of construction jobs;
- v) contributed to the skills development of local labourers;
- vi) meeting the demands made by DWS at the time and therefore getting the stamp of approval to develop the Rustenburg town further; and
- vii) enabling the RLM to foster economic growth within the region.

## 5.6 LESSONS LEARNT

The lessons learnt from this project, which can be considered to be the first application of project finance in South Africa, are summarised within section 5.7 that follows.

## 5.7 MAIN FINDINGS AND DISCUSSION

### 5.7.1 Main Findings

The main themes or concepts that were derived from the interviews held with respondents are listed below:

Table 10: Main findings and their related objective

Objective 1: To examine whether the private sector has the capacity to finance water infrastructure		
No	Description of finding	Source
1	The private sector is willing to participate in the financing of water infrastructure, even in municipal environments provided that the funding model allows	Semi-structured interview(s)
2	The private sector has the skills and experience necessary to operate and maintain infrastructure assets that municipalities tend not to have	Semi-structured interview(s) Desk study

<b>Objective 2: To analyse whether the PPP deal is the best form of project funding to finance water infrastructure</b>		
<b>No</b>	<b>Description of finding</b>	<b>Source</b>
3	No other method of financing was identified, seeing that municipalities generally lack the financial capability needed to fund infrastructure themselves. Therefore, private sector participation (therefore, PPPs) in the right context is encouraged.	Semi-structured interview(s)
4	Given the efficiencies typically associated with private sector involvement, PPPs are encouraged. In this case, there is a trade-off between having a purely profit driven motive and meeting social objectives.	Semi-structured interview(s) Desk Study
<b>Objective 3: To determine the factors influencing the successful implementation of a PPP deal</b>		
<b>No</b>	<b>Description of finding</b>	<b>Source</b>
5	For a project of this nature to be carried out, there are four key factors that must be considered. There must be an EPC contractor, an operator charged with maintaining the project, an off-taker and a financier	Semi-structured interview(s) Desk study
6	Key to the success of the Rustenburg Water Services Trust were the Take or Pay agreements signed by the mining companies in the area	Semi-structured interview(s)
7	In many instances, it is found that grant funding either from National Treasury, Development Finance Institutions or a National Department is required. An example of the Municipal Infrastructure Grant (MIG) was cited.	Semi-structured interview(s) Desk Study
8	The sharing of risk among public and private parties of a PPP deal is crucial. The party that has the most control over a risk must be allocated the risk to manage and mitigate	Semi-structured interview(s) Desk Study
9	Political will and involvement in such projects was cited as a key success factor to these deals. It was noted that, municipalities (and governmental institutions at large) would prefer to have control over projects and not have them managed by a municipal entity (SPV) which is outside of their control. They would therefore, be reluctant to adopt a project finance model for those reasons.	Semi-structured interview(s) Desk Study

Objective 3: To determine the factors influencing the successful implementation of a PPP deal		
No	Description of finding	Source
10	Since the establishment of the RWST, the use of project finance in water infrastructure financing has not been taken up because of the lack of education and understanding around the use of project finance	Semi-structured interview(s)
11	It was noted that projects of this nature tend to be taken onto to the balance sheets of the respective municipality, despite the lack of skills necessary to run these successfully. This is because of the prospect of gaining control over the revenue generated by the project. The reasons for this are therefore political in nature and in some cases involve corruption.	Semi-structured interview(s)
12	The public sector (in this case the municipality) is encouraged to monitor progress made by the private sector partner by having performance agreements in place that include penalties if necessary to optimise the benefits of PPPs.	Semi-structured interview(s) Desk Study

### 5.7.2 Discussion on main findings

When considering the financing of bulk water infrastructure, “the three T’s of Tariffs, Transfers (in the form of grant funding) and Taxes” are usually looked to, to bridge the funding gap (Fonseca, 2015). This, however, has proven unsustainable given the large backlog in infrastructure development, even at a local level and is exacerbated by the fact that service tariffs for potable water and sanitation infrastructure are largely unreflective of the cost of operating and maintaining infrastructure. Respondents shared that in many instances the tariffs set by municipalities are rarely reviewed and as such, are not reflective of the production or maintenance costs of infrastructure. This is particularly the case within rural municipalities, where the need for new infrastructure is greater than in more established areas. This is supported by Estache and Fay (2007: 24) that state that, the average tariff necessary to generate the minimum required rate of return in the poorest of developing countries has to be higher than elsewhere and is increasing because of the higher capital outlay.

That said, a discussion around the financing of water and sanitation infrastructure cannot be held without the consideration of service tariff charges and the ‘sensitives’ that encompasses the tariff. Water is a basic need that all must have access to, therefore, water tariffs must be priced by taking cognisance of this expectation on the one hand, and on the other the pricing levels required to operate and maintain infrastructure. In balancing these two objectives it is recommended that the “polluter pays” and “user pays” principles apply.

Moreover, municipalities must review their tariff structures in favour of a more reflective tariff that will contribute to their efficiency. Be that as it may, tariffs alone cannot be looked to the panacea to solve the challenge at hand. Indeed, the only strategy that will work when circumventing this challenge is a multi-pronged one.

This has been recognised by the South African government and is seen with its support of new innovative approaches to financing water infrastructure. As previously discussed, PPPs have been proposed to meet the infrastructure gap given the limited funds at the disposal of the national government (DBSA, 2012). This approach is also endorsed by various researchers, including Ruiters (2013:317) and Tan, (2011) that state that, governments “must embrace and lead innovative financing as the preferred alternative to delivering certain large public water infrastructure projects”. The reasons for this are varied and are not limited to the value for money they tend to deliver despite their high capital costs (as a result of the transactional costs incurred) (Medda, 2007; Shaoul *et al.*, 2007 in Friedman and Siemiatycki, 2012; Siemiatycki, 2007).

This preference for the use of PPPs (and project finance in particular) was also echoed by respondents that shared that, municipalities were largely incapable of funding bulk infrastructure using corporate finance and were forced to rely on either grant funding or PSP.

The value a PPP applied in the right set of conditions can bring to the table is undeniable. Therefore, the context in which it is applied cannot be ignored. As proven by empirical evidence reviewed in section 2.3.3, the effectiveness of a PPP is dependent on the context in which it is applied. This was seen with the studies conducted by Giulia *et al.*, 2013, Hunt & Lynk, (1995) and Bhattacharyya *et al.*, (1994) that found that PPPs were found to have performed better in developing countries rather than developed. In addition, Marin (2009) concluded that of the 65 large PPP water projects implemented from 1993-2008, situated in 32 developing countries, “the most consistent contribution of private operators had been the reduction of water losses and an improvement in water collection rates (Akhmouch & Kauffmann, 2013).

That said, before a PPP is implemented there are various conditions that must be considered and later applied. The following have been prescribed by Fonseca (2015), Akhmouch & Kauffmann, (2013:349), Ruiters (2013) and the DWA (2012);

- Water consumers (both private and commercial) should contribute to the capital cost of water and sanitation infrastructure, its operation and maintenance in the form of service tariffs. In other words, the polluter pays and user pays principle must apply;
- there should be clearly defined investment needs for water and sanitation;
- there should also be a clearly defined and long term stable institutional and legal framework and the separation of roles between regulator, local government and service providers;

- performance monitoring and the measurement of the outcomes of water policies at the different levels of government must be encouraged. This must be accompanied with the provision of incentives for capacity building,
- benchmarking and the credit rating of service providers should be done systematically and the service providers must have the required management level;
- there must be a good pipeline of projects in place based on bankable proposals including the required level of guarantees for the repayment of debt so that loan providers have the required level of comfort to fund the project; and
- the country must have a favourable credit rating.

The conditions prescribed above are necessary to reduce the risk that otherwise would have been present, increasing the costs associated with PPPs. This is crucial, considering the fact that many African countries, tend to be without the above mentioned pre-conditions, including; “a clearly defined and long term stable institutional and legal framework; and the separation of roles between regulator, local government and service providers” or benchmarking and credit rating agencies with the required systems in place. As stated by Tan (2011:64), “weak political and economic institutions mean that the state lacks the credibility to commit to contracts or implement proper, consistent regulatory procedures, and fails to safeguard property rights” (Kessides, 2005). In addition, “poor coordination across different ministries, public agencies and levels of government” can hinder the success of a PPP seeing that it would require the multiplying of efforts made by the different stakeholders - resulting in inefficiencies (Akhmouch & Kauffmann, 2013:349).

It is interesting to note that the key success factors highlighted by respondents were not unlike those prescribed by Fonseca (2015). They too are largely focused on the mitigation of risk as far as is possible. This ensures the bankability of the project by comforting loan providers. The key success factors of the RWST (that can be applied to similar projects) as described by the respondents were the following:

- addressing market risk by having Anglo-American (or large industrial consumers) sign off-take agreements;
- political will and collaboration between the private and public sector;
- the proper allocation of risk to the project participants that are best positioned to manage them;
- educating public officials about the use of project finance and establishing an SPV; and
- the effective monitoring of progress made by the private sector.

It was noted that a large part of the success of the RWST involved the signing of off-take contractors with Anglo-American that guaranteed the revenue of the RWST, offering lenders and project sponsors the comfort they need.

In addition, political will and collaboration between the private and the public sector was cited as a key success factor. This would improve the level of trust the public sector has within the private sector and vice versa. As it was raised in the interviews, in such transactions the public sector generally chooses to have the municipal entity (or SPV established) brought into their books and effectively only under their control. The reasons for this were varied and in some instances included either corrupt intentions or a misunderstanding of the structure of the entity established.

In addition to researching the use of project finance in the water and sanitation sector, areas for further research include the possibility of mobilising additional funds from institutional investors such as pension funds and/or insurance companies that seems to be the trend in more developed countries, and may be applicable within the African context (DWA, 2012).

## **5.8 SUMMARY**

This chapter started off by discussing the key stakeholders involved with the Rustenburg Water Services Trust (RWST) by describing what their interests were and how they contributed to the success of the project. Following which, the risk analysis presented in section 5.3 sought to highlight the major risks analysed and later mitigated. The financial returns and robustness of the business case was analysed, economic development returns and lessons learnt from the project discussed. Finally, the main findings of this study (particularly from the semi-structured interviews) were presented and later discussed. As highlighted within the discussion on the main findings of the study, the private sector is in a position to take part in the development agenda and is in fact willing. In addition, it was found that the PPP is the best financing mechanism that can be used to fund water and sanitation infrastructure. The key success factors of the RWST (that can be applied to similar projects) as described by the respondents include:

- addressing market risk by having Anglo-American (or large industrial consumers) sign off-take agreements;
- political will and collaboration between the private and public sector;
- the proper allocation of risk to the project participants that are best positioned to manage them;
- educating public officials about the use of project finance and establishing an SPV; and
- the effective monitoring of progress made by the private sector.

## **CHAPTER 6**

### **CONCLUSIONS AND RECOMMENDATIONS**

#### **6.1 INTRODUCTION**

Chapter five presented the main findings of this study, including the stakeholder and risk analysis conducted. Chapter six, on the other hand, brings the study to a close by summarising the study's main findings and presenting a number of recommendations that should be considered when faced with a project of a similar nature. This includes the financing of bulk water supply and sanitation infrastructure particularly at a local government or municipal level. Furthermore, policy implications of the study and recommendations for further research are also presented.

#### **6.2 CONCLUSIONS**

##### **6.2.1 The Rustenburg Water Services Trust**

As proven above, the success of the upgrade of the Rustenburg WWTW, Boitekong WWTW and the recommissioning of the Bospoort WTW, was based upon the adequate mitigation of risk. One of the major risks addressed was the market risk that tends to be covered by the public sector in this case, municipalities. As is usually the case in the South African context, local municipalities tend to have weak balance sheets therefore if the RLM were the sole off-taker, lender confidence would waiver. This risk was addressed by having "take-or-pay" contracts signed by the mines within the locality (including Anglo-American). As indicated by respondents and supported by literature, the strength of the off-taker is a key consideration that cannot be overlooked. Since the mines were brought on board, lenders were made confident of the ability of the RWST to make loan repayments. In so doing, finance was made available. In addition, the overall involvement of the private sector led to the successful completion of the project.

Finally, it was found that the private sector is willing to take part in deals of this nature. Therefore, when public and private sector partners take a seat at a round table, infrastructure development can be tackled successfully. The key factors that have been identified to have contributed to the success of the RWST, and similar projects that follow, include the following:

- addressing market risk by having Anglo-American (or large industrial consumers) sign off-take agreements;
- political will and collaboration between the private and public sector;
- the proper allocation of risk to the project participants that are best positioned to manage them;
- educating public officials about the use of project finance and establishing an SPV; and
- the effective monitoring of progress made by the private sector.

### **6.2.2 Problem statement and research questions answered**

The objectives of this study have been met as was shown in chapter 5 and the key questions addressed (see Table 10). Each question and the way it has been addressed within the study is summarised below:

#### ***PSP in financing water infrastructure***

The key question asked that relates to the first objective was:

*Does the private sector have the capacity to finance water infrastructure?*

As a result of the semi-structured interviews held, it was found that the private sector is in a good position to finance water infrastructure and is in fact willing to participate. This includes the more traditional roles played in PPPs, either as service providers or operators, as well as project sponsors that will either invest equity or debt in a project. This is dependent on the returns projected for a prospective project and in so doing, the ability of the self-maintained entity (or SPV) to service debt.

#### ***Application of the PPP in financing water infrastructure***

The question that related to the second objective of this study was the following:

*Is the PPP deal the best form of project funding to finance water infrastructure?*

The only alternative available other than project finance or using a PPP deal would be funding projects on “balance sheet”. That is, using corporate finance rather than project finance principles. As extensively discussed, South African municipalities generally do not have the financial strength needed to fund infrastructure projects ‘on balance sheet’ leading to their sometimes, over-reliance on grant funding. Therefore, the use of project finance circumvents this challenge. In addition, as highlighted within the response to the first question asked, a PPP model leads to the best solution, given the efforts made by both the private and public sector. Furthermore, the success of a project is reliant on the effective sharing of risk among contractors and project sponsors.

#### ***The factors that influence the implementation of a PPP deal in the water sector***

The question asked that relates to this objective was the following:

*What factors determine the successful implementation of a PPP deal?*

As highlighted by the review of the Rustenburg Water Services Trust, there are a number of factors that must be considered when delivering a successful water project using project finance principles or establishing a PPP model. The factors that have had an impact on the successful delivery of the project include; the effective sharing of risk amongst partners that would be in the best position to manage them, as well as holding service contractors accountable. It was noted that simply appointing a service provider is not enough, key performance indicators leading to either penalties or rewards would be required to ensure the desired level of service.

This was noted particularly in the municipal environment where a counterpart from the private sector is left unmonitored. It was recommended that municipalities appoint an independent expert with the skills necessary to monitor progress made by a private contractor.

Secondly, and what is crucial to the use of project finance, the bankability of the project must be proven by meeting desired IRRs and DSCRs et cetera. To assist in this process, and as was the case with the RWST, Take or Pay agreements with bulk water users must be entered into ensuring the income stream as predicted by the funding model. This will increase the confidence levels of lenders and encourage their investment into the project, particularly if the off-taker is a large commercial company that has financial “weight”. It is noted, however, that this is generally possible only with larger municipalities that service large industrial users. When smaller and in so being, “poorer” municipalities require infrastructure investment they may need to rely on grant funding as provided by Municipal Infrastructure Grants (MIG), government departments, Development Finance Institutions (DFIs) and/or the National Treasury.

The third and perhaps the least researched factor that influences the successful delivery of a PPP project is ‘political will’. What was found in the case of the Rustenburg Water Services Trust, and what differentiated the RWST from Roodelpaat Temba Water Supply Scheme, is the fact that the special purpose vehicle has remained independent despite the political pressure to gain control over the RWST’s assets. As discussed, there is a tendency for municipal governments to assume full responsibility (including the funding and management thereof) for the delivery of service despite the reported lack of skill and finance. This is the case because of the lack of education around the use of project finance in particular and its role in the modelling of PPPs.

It also includes the preference of having control over the revenue of the project for either corrupt or misguided reasons. This is the case because of the sensitivity with which the costing of water provision is treated.

### **6.3 RECOMMENDATIONS FOR FUTURE PROJECTS IN THE WATER SECTOR**

As alluded to above, the following is recommended for future bulk water supply and sanitation projects:

- the use of project finance to fund public projects, leading to a collaboration between private and public partners;
- ownership of the SPV and systems is to remain with the municipal entity according to the precepts set within the Municipal Structures Act;
- the reuse of wastewater in industrial processes that do not require potable water;
- as far as is possible, the signing of off-take agreements with large industrial consumers;
- a review of the ensuing tariff structure of the municipality;

- municipalities are encouraged to outsource the monitoring function of the private sector to a well-informed consultant provided the skills are not available in-house;
- the proper allocation of risk between private and public partners; and
- grant funding from the Municipal Infrastructure Grant (for example) as may be required for rural municipalities.

#### **6.4 POLICY IMPLICATIONS**

From the case study undertaken, a number of policy implications can be seen. Firstly the South African government, in conjunction with making participation in the Green Drop or Blue Drop system compulsory, should force municipalities to reuse treated waste water particularly for large industrial users as this will improve the bankability of projects such as these (the establishment of the RWST). It is hoped that this will be seen with the rolling out of the “No Drop System.” The South African government is also encouraged to enact policy that supports further collaboration between private and public sector partners and the adequate management of treated waste water. This could perhaps include a tax-break for large industrial users of potable water when they agree to sign off-take agreements at reduced rates (particularly when wastewater is reused).

#### **6.5 PRIORITIES GOING FORWARD**

Increased dialogue between the private and public sector is encouraged, as this will see to the continued education of public officials and/or the private sector regarding the use of PPPs and project finance. A case in point would be the promotion of the Strategic Water Partners Network-South Africa (SWPN-SA) that provides such a platform. This has the potential of increasing the use of this successful model when funding bulk water infrastructure.

#### **6.6 FURTHER RESEARCH**

It was proven, using the RWST as a case, that project finance can be used to fund water and sanitation infrastructure particularly with metropolitan or larger municipalities that are able to strike deals with large industrial users. For the more rural municipality, grant funding is required and for that reason the use of microfinance techniques will be an interesting exploration. Seeing that like the poor, microfinance addresses the risk of default by charging higher interest rates whilst perhaps improving the risk profile of the lender which in this case would be the rural municipality. A further area of research would be the use of project bonds to source funding and therefore the ability of project sponsors to obtain finance from institutional investors such as pension funds and the like. That said projects must not be wholly funded by the private sector (leading to the privatisation of the asset). Thirdly, further research needs to be conducted on the design of water tariffs and their effectiveness considering the impact that this has on the potential affordability of a municipality.

## REFERENCES

- ABSA. 2005. *Black Economic Empowerment*. Available at:  
[http://absa.quickreport.co.za/absa\\_ar\\_2005/downloads/Segmented/Black%20economic%20empowerment/absa\\_ar\\_2005\\_achievements\\_of\\_bee\\_objectives.pdf](http://absa.quickreport.co.za/absa_ar_2005/downloads/Segmented/Black%20economic%20empowerment/absa_ar_2005_achievements_of_bee_objectives.pdf) Online [08/03/2015].
- Abusabha, R. & Woelfel, M.L. 2003. Qualitative Vs Quantitative Methods: Two Opposites that make a Perfect Match. (Commentary). *Journal of the American Dietetic Association*, 103(5).
- Akhmouch, A. & Kauffmann, C. 2013. Private-Sector Participation in Water Service Provision: Revealing Governance Gaps. *Water International*, 38(3).
- Annez, P.C. 2006. *Urban infrastructure finance from private operators: What have we learned from recent experience?* The World Bank
- Allan, J., Andreas, G., Farley, L., Kao, J.K. & Mladenova, I. 2010. Towards the Development of a Rating System for Sustainable Infrastructure: A checklist or a Decision-Making Tool? *Cities of the Future/ Urban River Restoration*. Available at:  
[http://research.gsd.harvard.edu/zofnass/files/2013/05/COF-2010\\_5B\\_Georgoulas.pdf](http://research.gsd.harvard.edu/zofnass/files/2013/05/COF-2010_5B_Georgoulas.pdf) Online [01/06/2014].
- Barrios, E. & Guarte, J. 2006. Estimation Under Purposive Sampling. *Communications in Statistics - Simulation and Computation*, 35(2). Bel, G., Brown, T. & Marques, C.R. 2013. Public-Private Partnerships: Infrastructure, Transportation and Local Services. *Local Government Studies*, 39(3):303-311.
- Bender, P & Gibson, S. 2010. Mbombela (Nelspruit) Water and Sanitation Concession South Africa. Available at:  
<http://www.ppp.gov.za/Legal%20Aspects/Case%20Studies/Nelspruit%20Case%20Study%20Final%2029%20May%202010.pdf> Online [19/08/2015].
- Benoit, E., Dunlap, E. & Johnson, B.D. 2010. Organizing "Mountains of Words" for Data Analysis, both Qualitative and Quantitative. *Substance use & misuse*, 45(5).
- Bhattacharyya, A., Parker, E. & Raffiee, K. 1994. An Examination of the Effect of Ownership on the Relative Efficiency of Public and Private Water. *Land Economics*, 70(2).
- Bigen Africa. 2010. *The Bigen Picture: Providing Clean, Potable Water to the People of Tshwane*. Available at: <http://project.bigenafrica.com/newsletter/pdfs/201012.pdf> Online [09/10/2014].
- Bosso, D. & Garvin, M. 2008. Assessing the effectiveness of infrastructure public-private partnership programs and projects. *Public Works Management and Policy*, 13:162-178.

- Burns, N. & Grove, S. K. 2003. *Understanding nursing research*. (3rd Ed). Philadelphia, PA: W. B. Saunders.
- Casadesus-Masanell, R. & Ricart, J.E. 2011. How to Design a Winning Business Model: Smart Companies' Business Models Generate Cycles that, Over Time, make them Operate More Effectively. (Spotlight on Business Model Innovation). *Harvard business review*, 89(1).
- Dailami, M. & Leipziger, D. 1998. Infrastructure Project Finance and Capital Flows: A New Perspective. *World Development*: 26(7):1283-1298.
- Dawson, P. 2002. *Understanding organizational change: The contemporary experience of people at work*. London: Sage Publications Ltd in Serumaga-Zake. P.E.A. 2012. Research Methodology: Guidelines for Master's and Doctoral Students. *Unisa (Unpublished)*.
- Department of Water Affairs (DWA). 2012. *Review of Financing Mechanisms for infrastructure: Project to Revise the Pricing Strategy for Water Use Charges and Develop a Funding Model for Water Infrastructure Development and Use and a Model for the Establishment of an Economic Regulator*. Available at:  
[https://www.google.co.za/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0CCAQFjAAahUKEwiKmNm14c7IAhVBsRQKHdXiAIM&url=https%3A%2F%2Fwww.dwa.gov.za%2FProjects%2FPERR%2Fdocuments%255CFinancing%2520Models%2520Review%252029%2520June%25202012.pdf&usq=AFQjCNEys4-1uhAGHtIPMrQxbEZYQDAIvA&sig2=QW0rePtY\\_ZYHvO4jfGcxXw&bvm=bv.105454873,d.bGQ](https://www.google.co.za/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0CCAQFjAAahUKEwiKmNm14c7IAhVBsRQKHdXiAIM&url=https%3A%2F%2Fwww.dwa.gov.za%2FProjects%2FPERR%2Fdocuments%255CFinancing%2520Models%2520Review%252029%2520June%25202012.pdf&usq=AFQjCNEys4-1uhAGHtIPMrQxbEZYQDAIvA&sig2=QW0rePtY_ZYHvO4jfGcxXw&bvm=bv.105454873,d.bGQ). Online. [19/10/2015].
- Department of Water Affairs (DWA). 2013a. *2012/2013 Annual Report: Department of Water Affairs*. Available at:  
<http://www.dwaf.gov.za/documents/AnnualReports/DWA%20AnnualReport%202012-13.pdf>  
Online [10/10/2014].
- Department of Water Affairs (DWA), 2013b. *Strategic Plan for the Fiscal Years: 2013/14 to 2016/18*. Available:  
<http://www.dwaf.gov.za/documents/Other/Strategic%20Plan/2013/Strategic%20plan%20draft%20-%202011%20Mar%202013.pdf> Online [10/10/2014].
- Department of Water Affairs and Forestry (DWAF). 2003. *Strategic Framework for Water Services*. Available at:  
<http://www.dwaf.gov.za/Documents/Policies/Strategic%20Framework%20approved.pdf> Online [20/10/2014].

- Department of Water and Sanitation, 2015. Green Drop System (GDS). Available at: [https://www.dwa.gov.za/Dir\\_WS/GDS/DefaultTopPerformers.aspx?ProvCode=NW](https://www.dwa.gov.za/Dir_WS/GDS/DefaultTopPerformers.aspx?ProvCode=NW) Online [08/09/2015].
- Department of Water and Sanitation, 2014. Water Affairs: South Africa Yearbook 2013/14. Online Available: [http://www.southafrica-newyork.net/consulate/Yearbook\\_2014/2013-4Water\\_Affairs.pdf](http://www.southafrica-newyork.net/consulate/Yearbook_2014/2013-4Water_Affairs.pdf) [04/08/2015].
- Development Bank of Southern Africa (DBSA). 2008. *Funding Water Services: A Presentation to Municipal Indaba*. Available at: <http://www.dwaf.gov.za/events/MunicipalIndaba/Finance/Presentations/FundingWSDBSA.pdf> Online [20/10/2014].
- Development Bank of Southern Africa (DBSA). 2012. The State of South Africa's Economic Infrastructure: Opportunities and Challenges. Available: <http://www.gov.za/documents/download.php?f=174619> Online [25/06/2014].
- De Vos, A.S. (2005). *Qualitative data analysis and interpretation*. Research at grass roots for the social science and human service professions. 3<sup>rd</sup> ed. Pretoria. Van Schaik Publishers.
- Estache, A. & Fay, M. 2007. *Current debates on infrastructure policy*. The World Bank.
- Estache, A. & Kouassi, E. 2002. *Sector organization, governance, and the inefficiency of African water utilities*. The World Bank.
- Esty, B.C. 2003. The Economic Motivations for Using Project Finance. Working Paper, Harvard Business School. Available: <http://www.people.hbs.edu/besty/bce%20pf%20motivations%202-14-03.pdf> Online [06/06/2014].
- Ewisa. 2005. Rustenburg Water Services Trust Municipal Entity of the Rustenburg Local Municipality. Annual Report for the Financial Year 2004/2005. Online. Available: [http://www.ewisa.co.za/ewisawaterworks/misc/MunicipalDocuments/NWDisBojanala\\_Platinum/LMRustenburg/ANNUAL%20REPORT%202004-05%20water%20service%20trust\\_nologo.pdf](http://www.ewisa.co.za/ewisawaterworks/misc/MunicipalDocuments/NWDisBojanala_Platinum/LMRustenburg/ANNUAL%20REPORT%202004-05%20water%20service%20trust_nologo.pdf) Online [13/07/2015].
- Fedderke, J.W. 2006. Infrastructural Investment in Long-Run Economic Growth: South Africa 1875-2001. *World Development*, 34(6):1037.
- Flinders, M. 2005. The politics of public-private partnerships. *British Journal of Politics and International Relations*, 7, 215-239.

- Fonseca, C. 2015. *Financing universal access: the role of Water Financing Facilities*. Online. Available: <https://water.tallyfox.com/groups/water-and-sanitation/blog/financing-universal-access-role-water-financing-facilities> Online [13/07/2015].
- Fouche, L., Pretorius, N., Marx, C., St Arnaud, J. & van der Walt, M. Turning the Sewage Tide Around: A Good News Case Study About the Hex River Catchment. Available: <http://www.ewisa.co.za/literature/files/274%20van%20der%20Walt.pdf> Online [04/02/2015].
- Fourie, J. 2008. A Note on Infrastructure Quality in South Africa. *Development Southern Africa*, 25(4):481-94.
- Friedman, J. & Siemiatycki, M. 2012. The Trade-offs of Transferring Demand Risk on Urban Transit Public-Private Partnerships. *Public Works Management Policy*, 2012(17):283-302.
- Gerrard, M.B. 2001. *Public-Private Partnerships*. 38:48.
- Glaser, B.G., & Strauss A. 1967. *The Discovery of Grounded Theory: strategies for qualitative research*, Aldine de Gruyter, New York in Serumaga-Zake. P.E.A. 2012. *Research Methodology: Guidelines for Master's and Doctoral Students. Unisa (Unpublished)*.
- Government of the Republic of South Africa (RSA). 1997. *Government Gazette: Water Services Act*. Available at: <http://www.dwaf.gov.za/Documents/Legislature/a108-97.pdf> Online [25/10/2014].
- Government of the Republic of South Africa (RSA). 1998. *National Water Act*. Available: [http://www.dwaf.gov.za/Documents/Legislature/nw\\_act/NWA.pdf](http://www.dwaf.gov.za/Documents/Legislature/nw_act/NWA.pdf) Online [25/10/2014].
- Government of the Republic of South Africa (RSA). 2008. *South African National Water Resources Infrastructure Agency Limited Bill*. Available: [http://us-cdn.creamermedia.co.za/assets/articles/attachments/14126\\_b36-08.pdf](http://us-cdn.creamermedia.co.za/assets/articles/attachments/14126_b36-08.pdf) Online [27/10/2014].
- Greer, R. 1997. What is an Asset Class Anyway? *Journal of Portfolio Management*, 23(1997): 83-91 in Sawant, R.J. 2010. Emerging Market Infrastructure Project Bonds: Their Risks and Returns. *Journal of Structured Finance*, 15(4):75-83.
- Heilman, J. and Johnson, G. 1992. *The Politics and Economics of Privatization. Tuscaloosa, AL and London: University of Alabama Press*. in Tan, J. 2011. Infrastructure Privatisation: Oversold, Misunderstood and Inappropriate.(Report). *Development Policy Review*, 29(1).
- Hungler, B.P. & Polit, D.F. 1983. *Nursing Research Methods*, Lippincott.
- Hunt, L.C. & Lynk, E.L. 1995. Privatisation and Efficiency in the Uk Water Industry: An Empirical Analysis. *Oxford Bulletin of Economics & Statistics*, 57(3).

- Keller, G. 2012. *Managerial Statistics*. 9<sup>th</sup> ed. Ontario: Canada; Wilfred Laurier University.
- Kessides, I.N. 2005. Infrastructure Privatization and Regulation: Promises and Perils. *The World Bank Research Observer*, 20(1).
- Kessides, I.N. 2004. *Reforming infrastructure: Privatization, regulation, and competition*. Washington, DC: New York, NY.: Washington, DC: New York, NY: World Bank; Oxford University Press.
- LeCompte, M.D. 2000. Analyzing Qualitative Data. *Theory into Practice*, 39(3).
- Lee, T.W. 1999. *Using Qualitative Methods in Organisational Research*, London, New Delhi: Sage publications.
- Leedy, P.D. and Ormrod, J.E. (2005). *Practical Research: Planning and Design (8<sup>th</sup> Edition)*, Late of American University, University of New Hampshire.
- Marin, P. 2009. *Public- private partnerships for urban water utilities*. The World Bank.
- Masango, D. 2004. North West's R530m water project. Available: <http://www.southafrica.info/business/economy/infrastructure/water-makapanstad.htm#.VEswcvmUfIU> Online [01/10/2014].
- Mattheus, C. 2013. *A Positive Development*. Available: <http://www.infrastructurene.ws/2013/08/08/a-positive-development/> Online [09/09/2014].
- McKinsey. 2013. Infrastructure Productivity: How to save a \$ 1 Trillion a year. Available at: [http://www.mckinsey.com/~media/McKinsey/dotcom/Insights%20and%20pubs/MGI/Research/Urbanization/Infrastructure%20productivity/MGI\\_Infrastructure\\_Full\\_report\\_Jan2013.ashx](http://www.mckinsey.com/~media/McKinsey/dotcom/Insights%20and%20pubs/MGI/Research/Urbanization/Infrastructure%20productivity/MGI_Infrastructure_Full_report_Jan2013.ashx) Online [14/06/2014].
- Medda, F. 2007. A game theory approach for the allocation of risks in transport public private partnerships. *International Journal of Project Management*, 25(2007):213-218.
- Meggison, W.L. & Netter, J.M. 2001. From State to Market: A Survey of Empirical Studies on Privatization. *Journal of Economic Literature*, 39(2).
- Mineta, N.Y. 2006. Public-Private Partnerships Strengthen Transport Investment. *Journal of Transportation Law, Logistics and Policy*: Fourth Quarter, 73(4): 401–409.
- Mouton, J. & Marais, H.C. 1990. Basic concepts in the methodology of the social sciences. *HSRC Series in Methodology*.
- Muller, R.L. & Brewer, J.D. (eds). 2003. *The A-Z of Social Research*. London, England. SAGE Publications, Ltd.

- National Planning Commission. 2011. National Development Plan: A Vision for 2030. 1-430.
- National Treasury, 2004a. *Modernising Financial Governance: Implementing the Municipal Finance Management Act. Updated Version*. Available:  
<http://mfma.treasury.gov.za/MFMA/Guidelines/Introductory%20guide%20Revised.pdf> Online [11/03/2015].
- National Treasury. 2004b. *MFMA*. Available: <http://mfma.treasury.gov.za/Pages/Default.aspx> Online [11/03/2015].
- Norton Rose . 2006. 'Infrastructure PPP in Asia', PFI/PPI sector report. London: Norton Rose. Available: [www.nortonrose.com/knowledge/publications/2006/pub8505.aspx?page=all&lang=en-gb](http://www.nortonrose.com/knowledge/publications/2006/pub8505.aspx?page=all&lang=en-gb) Online [14 March 2009] in Tan, J. 2011. Infrastructure Privatisation: Oversold, Misunderstood and Inappropriate.(Report). *Development Policy Review*, 29(1).
- OECD. 2009. *Private sector participation in water infrastructure : OECD checklist for public action*. 2009. Organisation for Economic Cooperation and Development OECD.
- Oxford Dictionary. 2014. Definition: Infrastructure. Available at:  
<http://www.oxforddictionaries.com/definition/english/infrastructure> Online [02/06/2014].
- Population Reference Bureau (PRB). 2013. 2013 World Population Data Sheet. Available at:  
[http://www.prb.org/pdf13/2013-population-data-sheet\\_eng.pdf](http://www.prb.org/pdf13/2013-population-data-sheet_eng.pdf) Online [15/06/2014].
- Rand Water. 2015. *About Us*. Available at:  
<http://www.randwater.co.za/AboutUs/Pages/Default.aspx> Online [02/07/2015].
- Reynaud, A. & Thomas, A. 2013. Firm's Profitability and Regulation in Water and Network Industries: An Empirical Analysis. *Utilities Policy*, 24(0).
- Rigby, P. Project Finance Debt Risk Analysis. In Henry A. Davis, ed., *Infrastructure Finance: Trends and Techniques*. London, U.K.: Euromoney Books, 2008. in Sawant, R.J. 2010. Emerging Market Infrastructure Project Bonds: Their Risks and Returns. *Journal of Structured Finance*, 15(4):75-83.
- Robbins, G. 2004. A water sector public-private partnership case study: Ilembe District Municipality (formerly Dolphin Coast) – Siza Water Company. Available at:  
<http://sds.ukzn.ac.za/files/RR63.pdf> Online [05/10/2014].
- Ruiters, C. 2013. Funding Models for Financing Water Infrastructure in South Africa: Framework and Critical Analysis of Alternatives. *Water SA*, 39(2).
- Sawant, R.J. 2010. Emerging Market Infrastructure Project Bonds: Their Risks and Returns. *Journal of Structured Finance*, 15(4):75-83.

- Seroa da Motta, R. & A.R.B, Moreira. 2004. Efficiency and regulation in the Sanitation Sector in Brazil", IPEA, Texto Para Discussao, No 1059 in Estache, A., Perelman, S. & Trujillo, L. 2005. *Infrastructure performance and reform in developing and transition economies: Evidence from a survey of productivity measures*. The World Bank.
- Serumaga-Zake. P.E.A. 2012. Research Methodology: Guidelines for Master's and Doctoral Students. *Unisa (Unpublished)*.
- Siemiatycki, M. 2007. What's the secret? The application of confidentiality in the planning of infrastructure using private-public partnerships. *Journal of the American Planning Association*, 73: 388-403.
- South African Institute of Civil Engineers (SAICE), 2011. *SAICE Infrastructure Report Card for South Africa*. Available: <http://www.saice.org.za/downloads/saice-reportcard.pdf> Online [20/10/2014].
- South African Local Government Association (SALGA). 2015. Welcome to SALGA. Available at: <http://www.salga.org.za/pages/About-SALGA/Welcome-to-SALGA> Online [02/07/2015].
- Shaoul, J., Stafford, A., & Stapleton, P. 2007. Partnerships and the role of financial advisors: Private control over public policy? *Policy & Politics*, 35, 479-495 in Friedman, J. & Siemiatycki, M. 2012. The Trade-offs of Transferring Demand Risk on Urban Transit Public-Private Partnerships. *Public Works Management Policy*, 2012(17):283-302
- Shen, L., Wu, Y. & Zhang, X. 2011. Key Assessment Indicators for the Sustainability of Infrastructure Projects. *Journal of Construction Engineering and Management*, 11(137):441-451
- Smoke, P. 1999. Improving Local Infrastructure Finance in Developing Countries through Grant-Loan Linkages: Ideas from Indonesia's Water Sector. *International Journal of Public Administration*, 22(11).
- Statistics SA. 2011. *Rustenburg*. Available at: [http://www.statssa.gov.za/?page\\_id=993&id=rustenburg-municipality](http://www.statssa.gov.za/?page_id=993&id=rustenburg-municipality) Online [04/07/2015].
- Stuckey, H. 2015. The Second Step in Data Analysis: Coding Qualitative Research Data.(Methodological Issues in Social Health and Diabetes Research)(Report). *Journal of Social Health and Diabetes*, 3(1).
- Tan, J. 2011. Infrastructure Privatisation: Oversold, Misunderstood and Inappropriate.(Report). *Development Policy Review*, 29(1).

- Terre Blanche, M., Durrheim, K. & Painter, D. 2006. *Research in practice (2<sup>nd</sup> Edition): Applied methods for the social sciences*. University of Cape Town Press. in Serumaga-Zake. P.E.A. 2012. *Research Methodology: Guidelines for Master's and Doctoral Students*. Unisa (Unpublished)
- United Nations. 2014. *Making Water a Human Right*. Available at: <http://www.unric.org/en/water/27360-making-water-a-human-right> Online [22/10/2014].
- World Bank. 2013. *2012 PPI Data Update: Water and Sewerage Sector*. Infrastructure Policy Unit: Private Participation in Infrastructure Research Group. The World Bank Group. Available: <http://ppi.worldbank.org/features/December-2013/Water-Note-2013.pdf> Online [20/10/2014].
- World Bank. 1994. *World Development Report 1994: Infrastructure for Development*. New York: Oxford University Press. in Tan, J. 2011. Available: <https://openknowledge.worldbank.org/bitstream/handle/10986/5977/WDR%201994%20-%20English.pdf?sequence=2> Online [25/05/2015].
- World Economic Forum (WEF). 2014. *Global Risks 2014: Ninth Edition*. Available at: [http://www3.weforum.org/docs/WEF\\_GlobalRisks\\_Report\\_2014.pdf](http://www3.weforum.org/docs/WEF_GlobalRisks_Report_2014.pdf) Online [22/10/2014].
- Yin, R.K. 1984. *Social Science*. SAGE Publications, Ltd.
- Yin, R.K. 1989. *Case Study Research Design and Methods*. SAGE, Newbury Park.

## **ANNEXURE A: INTERVIEW SCHEDULE**

## **ANNEXURE B: DETAILED RISK ANALYSIS**