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Camane, Cedric Themba

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A Framework

for

Financing Public Infrastructure

in

South Africa

Cedric Themba Camane

A research report submitted to the Faculty of Commerce, Law and Management, University of the Witwatersrand, Johannesburg, in partial fulfillment of the requirements for the degree of Master of Management in the field of Finance and Investments.

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ABSTRACT

The lack of a framework for selecting appropriate funding mechanisms results in costly and inefficient financing of public infrastructure projects in South Africa.

The purpose of this research was to determine the nature, the utilisation and the appropriateness of various public infrastructure financing mechanisms. Twenty major public infrastructure projects were used to conduct the exploratory study of public infrastructure financing practices in South Africa.

Although the research found that South African financing practices were similar to practices in developed economies, it was also found that the capacity of public institutions to manage infrastructure projects needed strengthening. The research further found that markets for other mechanisms had to be developed further to provide more financing options.

Finally, a conceptual framework that provides a consistent and systematic process in selecting appropriate and efficient public infrastructure financing decisions was proposed.

DECLARATION

I, **Cedric Themba Camane** declare that this research report is my own unaided work. It is submitted in partial fulfillment of the requirements for the degree of Master of Management in the University of Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other University.

_____

Themba Camane

Signed in Johannesburg on the 20 th day of May 2013

DEDICATION

I dedicate this work to my family and a special thanks to my wife, Nomampondo Camane for her understanding and support. I hope this work will also provide inspiration to my daughter Ntokozo and my sons Likhona and Kwande.

ACKNOWLEDGEMENTS

I wish to acknowledge my supervisor, Professor Kalu Ojah for providing insight and guidance in conducting this research.

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GLOSSARY

ACSA	Airports Company of South Africa
AfD	African Development Bank
BESA	Bond Exchange of South Africa
CAPM	Capital Asset Pricing Model
CDC	Coega Development Corporation
DBSA	Development Bank of Southern Africa
DoRA	Division of Revenue Act
DTPC	Dube Trade Port Corporation
ECA	Export Credit Agencies
ECFA	Economic Commission for Africa
FSB	Financial Services Board
GDP	Gross Domestic Product
IDC	Industrial Development Corporation
IDZ	Industrial Development Zone
IOSC	International Organisation of Securities Commissions
MDF	Municipal Development Fund
MFMA	Municipal Finance Management Act No.56 of 2003
MTEF	Medium Term Expenditure Framework
PFMA	Public Finance Management Act No.1 of 1999

PPP	Public Private Partnership
SAVCA	Southern African Venture Capital and Private Equity Association
SANRAL	South African National Roads Agency Limited
SPV	Special Purpose Vehicle
SSA	Securities Services Act No.36 of 2004

CHAPTER 1 : INTRODUCTION

1.1 Context of the study

A number of factors such as population growth, changing structure of an economy, technology developments and environmental protection requirements continue to create a need for infrastructure development across the world. Countries, particularly in developing economies, rely on the integrity of their public infrastructure such as roads, water and electricity to achieve sustainable growth of their economies whilst providing basic services such as water and sanitation to their populations.

The acute need for infrastructure investment to support economic growth and the importance of private sector funding to bridge the funding gap in African countries is emphasised by Briceño-Garmendia & Foster (2010) and Mafusire, Anyanwu, Brixiova & Mubila (2010). The importance of infrastructure and its impact on economic growth was also emphasized by Merrifield (2000). Perkins, Fedderke & Luiz (2005) found that, in South Africa growth in gross domestic product (GDP) influences the level of infrastructure investment and concluded that unless infrastructure projects take place in response to appropriate cost-benefit analyses, economic growth targets may not be realised.

A number of researchers such as Orr (2007), Briceño-Garmendia & Foster (2010), Sawant (2010a, 2010b) and Kingombe (2011) highlighted the need for private sector participation in the development of public infrastructure to supplement traditional sources of funding. The global economic slowdown and constraints in the financial markets during the late 2000s limited the traditional development finance inflows to most of the developing countries. As a result of this constraint, Mafusire *et al* (2010) noted that most of the African governments started to explore various private sector financing opportunities to fund their countries' public infrastructure.

Although South Africa, like most of developing countries, recognises the importance of infrastructure investment to the growth of its economy, it is unable to fund all of its

infrastructure requirements from traditional fiscal sources. Despite the economic slowdown of the late 2000s, South Africa increased its infrastructure budget allocations. Gordhan (2012) emphasised the importance of private sector involvement in the development and construction of public infrastructure to create jobs, reduce poverty and expand the South African economy.

Given the importance of infrastructure investment in South Africa, it is critical that the appropriateness, effectiveness and efficiency of the current public infrastructure financing mechanisms be reviewed against global best practices.

1.2 Problem statement

A lack of an appropriate infrastructure financing framework results in an inefficient investment of public funds in the development and management of public infrastructure in South Africa.

1.3 Research Questions

The following research questions will guide how the research is conducted :

a. What are the key financing mechanisms used to finance public infrastructure investments in South Africa?
b. How appropriate and efficient are the mechanisms used to finance public infrastructure in South Africa?
c. Is there a consistent framework used by public institutions to select appropriate and efficient mechanisms for the financing of different public infrastructure projects in South Africa?

1.4 Purpose of the study

The purpose of this research was to identify key mechanisms, evaluate their efficiencies and propose a conceptual framework for the selection of appropriate options for financing public infrastructure in South Africa.

1.5 Significance of the study

Since the late 1990s, public private partnerships (PPPs) have emerged as an important mechanism to fund decades of under-investment in public infrastructure in South Africa. Various types of infrastructure projects funded through PPPs ranged from social facilities such as prisons and hospitals to economic infrastructure such as national toll roads.

Although Fay & Morrison (2005) observed a significant growth in PPPs among many developing countries, they also noted a growing opposition by most of the communities to this financing mechanism. The authors noted that the communities generally believed that PPPs only benefited the private sector at the expense of the public.

Calitz & Fourie (2007) noted that a significant proportion of the South African public also expressed concern over a number of privately financed public services. An unprecedented rise in electricity tariffs and the introduction of toll fees on some of the public roads in the late 2000s helped to start a public debate on the efficiency and appropriateness of public infrastructure funding mechanisms in South Africa.

The need for an appropriate public infrastructure investment framework in South Africa was highlighted by Perkins *et al* (2005) when they emphasised a need for appropriate infrastructure investment that should be recognised in public-sector budgets.

Although a number of researchers such as Fay & Morrison (2005) and Mafusire *et al* (2010) have conducted research on the importance of infrastructure on the growth of the economy and provision of basic services, there is no available research conducted on the appropriateness and efficiency of public infrastructure financing mechanisms in South Africa.

This research involved a review of some of the major South African infrastructure projects with the aim of studying the nature and extent of public infrastructure financing practices.

The output of the research will provide guidance and assistance to public and private sector institutions when they make decisions related to the financing of public infrastructure projects. In addition, the study will provide a basis for further research into other specific areas of public infrastructure financing.

1.6 Delimitations of the study

The study was limited to South African public infrastructure projects initiated either by government (national, provincial, local and state owned companies) or private sector. As a result of insufficient publicly available data, the study did not focus on detailed comparisons of financing costs associated with various mechanisms used to finance public infrastructure projects. This, however did not affect the achievement of the objectives of the study.

1.7 Outline of the study

The report is structured as follows:

Chapter 1 provides an introduction to the research and includes the statement of the research problem, purpose, significance and delimitations of the study.

Chapter 2 contains the review of relevant literature to assist with the understanding of key concepts related to public infrastructure and related financing mechanisms.

Chapter 3 outlines a research methodology used to study the research questions posed in Chapter 1.

Chapter 4 contains the presentation of results of the analysis of a sample of twenty case studies. The analysis is aimed at responding to the research questions.

Chapter 5 contains the interpretation of results presented in Chapter 4.

Chapter 6 presents a proposed conceptual framework for the financing of public infrastructure.

Chapter 7 contains the conclusions and recommendations of the research.

CHAPTER 2 : LITERATURE REVIEW

2.1 Introduction

The chapter starts by providing a definition of public infrastructure, followed by an overview of infrastructure financing needs in Africa and South Africa. This is then followed by a discussion on the concept of infrastructure financing and associated risks. Corporate finance concepts (capital structure, pecking order and agency theories and risk & return) that are relevant to public infrastructure financing are then discussed. The concept of project finance is reviewed, followed by a discussion of global best practices in public infrastructure financing options. A discussion on the South African public infrastructure financing environment, including governing legislation and capital markets concludes the chapter.

2.2 Public Infrastructure

Sawant (2010b) defined public infrastructure assets as long-duration, capital-intensive assets, requiring massive up-front investments which are irreversible and sunk which have stable cash flows. Inderst (2010) defined infrastructure in the investment context and said it typically includes economic infrastructure, in particular transport (*e.g.* ports, airports, roads, bridges, tunnels, parking), utilities (*e.g.* energy distribution networks, storage, power generation, water, sewage, waste), communication (*e.g.* transmission, cable networks, towers, satellites) and renewable energy.

Inderst (2010) further defined social infrastructure to include schools and other education facilities, healthcare facilities, senior home, defence & judicial buildings, prisons and stadiums. The author however warned that there are substantial grey areas in the classification of infrastructure as it depends largely on the motive for which the classification is done.

2.3 Infrastructure Financing Needs

A number of researchers such as Fay & Morrison (2005), Briceño-Garmendia & Foster (2010), Mafusire *et al* (2010), Kingombe (2011), conducted a number of studies quantifying the backlog of public infrastructure investment in Africa. Briceño-Garmendia & Foster (2010) estimated the public infrastructure funding gap in Africa to be between US$25 billion to US$95 billion per annum of which approximately US$30 billon remained unfunded.

For developing countries, Kingombe (2011), Briceño-Garmendia & Foster (2010) and Fay & Morrison (2005) highlighted the importance of infrastructure investments to meet basic community needs whilst simultaneously promoting economic growth. Whilst these two critical objectives may be difficult to balance, the researchers emphasised the need for innovative private sector and non-governmental financing mechanisms to help developing countries meet these objectives.

As part of a long-term infrastructure investment plan for South Africa, Gordhan (2012) indicated that the value of prioritised infrastructure projects amounted to R3.2 trillion of which R845 billion was to be spent between 2011 and 2014 prioritising the energy, water and transport & logistics sectors. Gordhan (2012) also explained that most of the economic infrastructure projects implemented by various state owned companies, would be funded from internally generated surpluses, borrowing from the capital markets and through PPPs.

2.4 Public Infrastructure Financing

Chan, Forwood, Roper & Sayers (2009) defined infrastructure financing as activities related to the raising and allocation of finances for the implementation of infrastructure projects. The authors also defined investment as an act of forgoing current consumption by allocating economic resources such as labour and capital to create future production and income. Chan *et al* (2009:11) further stated that “for funding, the central issue is whether governments should depend on user charges or taxes over

time to pay for the ongoing costs of infrastructure operation, including interest payments and principal payments".

As a result of the global financial and economic crisis in 2008-2009, Uppenberg, Strauss & Wagenvoort (2011) emphasised the need for private sector involvement in public infrastructure investment when they noted that governments would be under pressure to find alternative sources to fund their infrastructure investments.

Wagenvoort *et al* (2010) noted the re-emergence of private sector financing of public infrastructure during the second half of the twentieth century driven largely by the political acceptance of the principles that users, rather than taxpayers pay for infrastructure. The authors also noted that private financing and operation of infrastructure have incentive effects that foster efficiency gains.

Chan *et al* (2009) stated that government finance consists predominantly of taxes and private finance which is made up of loans, bonds, and equity and that user fees can be used to reward investors once the infrastructure is up and running, but are not available during the construction phase.

2.5 Private Infrastructure Financing

The rise of private sector participation has been noted as an important development in public infrastructure financing by a number of researchers such as Dailami & Leipziger (1998), Orr (2007), Kennedy & Orr (2008), Inderst (2009) and Sawant (2010b).

Kennedy & Orr (2008) noted that, as a result of economic slowdown during the mid-2000s, cash-strapped governments in both developed and developing countries continued to seek ways to finance infrastructure investments with private sector participation and capital. Platz (2009) also noted a surge in the issuance of sub-sovereign bonds during the mid-2000s in developed countries which however was contrasted by a slow pace in developing countries.

Dalaimi & Leipziger (1998) noted that most private infrastructure projects in developing countries are financed with a sizable amount of foreign capital with a typical financing

mix consisting of equity (20% to 40%) and the balance raised in the form of debt in a combination of syndicated bank loans, bond issues, bridge and backup facilities, multilateral and export credit agency loans and guarantees. The authors also noted the importance of the capacity of international capital markets to supply long-term debt capital, which is critical for the financing of infrastructure projects with long-term assets whose costs may take up to 30 years to recoup.

Swärd (2009) noted that the 1990s also experienced a significant growth in private investment in both developed and emerging country infrastructure, accompanied by a rise of private infrastructure funds. Bothra (2009) discussed a number of infrastructure financing mechanisms in India which included among others, public-private partnerships (PPPs), special infrastructure bonds, development finance and the creation of special purpose infrastructure finance institutions.

Kennedy & Orr (2008) noted a rise in the use of project finance, based on the perception that infrastructure and project finance focus on essential long-term valued assets that provide stable cash flows. This attracted pension funds into public infrastructure financing market through private infrastructure funds and direct investments by public pension funds.

Esty (2003) also noted that project-financed investment grew from less than US$10 billion per year in the late 1980s to almost US$220 billion in 2001. Inderst (2009) stated that the idea of investing in infrastructure seemed to raise interest in many pension funds as infrastructure is more tangible than a lot of other complex products they are normally presented with, which is often difficult to detect their underlying value.

Platz (2009) highlighted the collective issuance of bonds as a successful financing mechanism used in the United States of America since the early 1970s. According to this concept, a credible intermediary, such as a national government can establishes a bond bank that collects all borrowing needs of municipalities and issues a single class of bond backed up by a diversified pool of loans to municipal utilities. Platz (2009) also proposed the establishment of municipal development funds (MDFs) as another mechanism which has been implemented successfully in developing economies. MDFs

are similar to pooled financing arrangements which access national bond markets for capital and then lend it on to local governments.

Leigland (1997) and Martell & Guess (2006) identified a range of supply-side factors that may contribute to the development of the sub-sovereign bonds markets. These factors include the demand for sub-sovereign financing, improved capacity of municipalities to manage and support debt, borrowing costs, regulatory and legal environments conducive to municipal borrowing and credit enhancements.

2.6 Public Infrastructure Financing Risks

Despite a generally monopolistic nature of public infrastructure assets, the variation of returns is determined by the risks inherent in the development and operation of infrastructure assets. It is therefore important to understand the nature of risks associated with the development and financing of public infrastructure projects.

Yescombe (2002), Inderst (2010) and Sawant (2010b) identified a number risks that need to be allocated and managed to ensure successful financing of the public infrastructure projects. Chan *et al* (2009) and Inderst (2010) however cautioned that these risks need to be allocated with the party that is best placed to manage them in a cost effective way.

The following is a brief overview of the key risks identified by the World Bank (2012).

2.6.1 Construction Risk

The cost of construction is fundamental to the financial viability of the project as the financial assumptions and ratios are all dependent on the assumed cost of the project. The project developer will also seek to lock in certain costs such as costs of commodities, as early as possible in the project so as to limit price escalation. Delay risks result from the late completion of the project (by the contractor) which in turn has a large impact on the financial viability of a project. Construction risk also has an impact on the performance of a completed project (or parts thereof). If a completed project is not in a condition sufficient and necessary to meet the objectives of the project, the

envisaged services and/or projected cash flows originally planned for may not be achieved.

2.6.2 Operating Risks

The financial model and assumptions to the viability of a project are dependent on the projected costs of operations. If the cost of operations increases more than originally estimated, investors and lenders would want to be protected to the extent that such increases will impact the revenue stream. Certain high impact costs can be locked in through hedging, futures contracts and input agreements. Where costs are not hedged, investors will want to be sure that these are limited.

2.6.3 Demand Risk

This risk refers to the probability of the demand for services provided through the infrastructure to be less than the projections. A lower demand implies less revenue resulting in a higher probability that the project is not financially viable.

2.6.4 Political and Regulatory Risk

As the market for project finance transactions has expanded into developing countries, concerns about political risk have grown. Key risks that arise in this regard include decisions by a government to cancel a project or to change the terms of the contract or not to fulfill its obligations. Some of these risks are managed in project agreements with the government taking some of the risks or making provision for compensating a project developer in case of default by government.

Since the commercial insurance market can only absorb a limited degree of true political risk, many project sponsors have turned to multilateral agencies or export credit agencies (ECAs) to shoulder some or all of this burden.

2.6.5 Environmental risk

Environmental and social laws impose liabilities and constraints on a project and the cost of compliance can be significant. In order to attract international lenders, a project

must meet minimum environmental and social requirements that may exceed those set out in applicable laws and regulations. Environmental due diligence in respect of projects and an appreciation of the environmental requirements are crucial if the project company and lenders are to make a proper assessment of the risks involved.

2.6.6 Social risk

Infrastructure projects generally have an important impact on local communities and quality of life, particularly in the delivery of essential services like water and electricity or land intensive projects like toll roads. The impact of a project on society, consumers and civil society may result in resistance from local interest groups that can delay project implementation, increase the cost of implementation and undermine the viability of a project.

2.6.7 Currency exchange risk

This risk occurs where project finance debt is sourced from foreign lenders, in foreign currencies and project revenues are denominated in local currency. The exchange rate between the currency of revenue and the currency of debt can increase, often dramatically particularly for projects in emerging economies.

Where revenues are to be earned in some currency other than that in which the debt is denominated, lenders will want to see the revenue stream adjusted to compensate for any relevant change in exchange rate or devaluation. If this is not available, the lenders will want to see appropriately robust hedging arrangements or some other mechanisms to manage currency exchange risk.

2.6.8 Interest rate risk

Interest may be charged at a fixed rate, at variable rates or a floating rate. Project finance debt tends to be at a fixed rate as this helps provide a predictable repayment profile over time to reduce fluctuations in the cost of infrastructure services. If lenders are unable to provide fixed rate debt and no project participant is willing to bear the risk, hedging or some other arrangements may need to be implemented to manage the risk

that interest rates increase to a point that debt service becomes unaffordable to the project. The tension between local and foreign currency debt is often a question of balancing fixed rate debt with foreign exchange rate risk or local currency debt subject to interest rate risk.

2.7 Key Corporate Finance Concepts

Chan *et al* (2009) stated that although many public institutions employ a variety of financing vehicles, these generally fall into two broad categories namely cash flow financing and capital market financing. Cash flow financing vehicles rely on the quality of cash flows from an asset being financed to repay the interest and capital. On the other hand, a capital market finance vehicle relies on the quality of the balance sheet (debt raising capability) of an institution to raise the required finance for a specific or number of projects. Firer, Ross, Westerfield & Jordan (2008) stated that corporate finance, amongst other considerations is concerned with decisions on long-term investments and sourcing of optimal long-term financing for the firm.

According to Myers & Majluf (1984), the pecking order theory suggests that firms have a particular preference order for capital used to finance their businesses. The selection of retained earnings (internally generated funds) and/or external funding (short and long-term debt) and/or equity are fundamental choices that decision makers consider in the selection of appropriate and efficient financing mechanisms for public infrastructure development.

Based on the Jensen & Meckling (1976) theory of agency cost of debt associated with the firm's or project's risk profile, it is important to understand the risk and return profile associated with the financing of public infrastructure assets. The following is a brief overview of the capital structure, pecking order & agency theories and the investment risk-return relationship.

2.7.1 Debt and Equity Financing (Capital Structure)

Firer *et al* (2008) defined a mixture of long-term debt and equity used to finance the operations as the capital structure of a firm. Therefore, the financing preference (mix of debt and equity) of firms has an impact on the firm's capital structure.

Modigliani & Miller (1958) pioneered the effect of capital structure on the firm's value when they stated that in the perfect capital market (absence of taxes and bankruptcy cots), the capital structure does not affect a firm's value and therefore is irrelevant. The theory suggests that the firm's value depends on the ability of its assets to create value and it is irrelevant whether assets are financed using internal or external capital.

Modigliani & Miller (1963) took taxation under consideration and proposed that the firms should employ as much debt as possible rather than using internal capital, as they can benefit from debt tax shields. For tax paying entities, a tax shield allows firms to pay lower tax than they would if they used their own capital instead of debt capital. The theory therefore argues that the more the debt, the more a firm's value is created.

2.7.2 Pecking Order and Agency Theories

Myers and Majluf (1984) argued that, owing to information asymmetries between a firm and potential investors, a firm will prefer retained earnings to debt, short-term debt over long-term debt and debt over equity. The theory argues that if firms issue no new security but only use retained earnings to support their investment opportunities, information asymmetry can be resolved and that firms for which information asymmetry is large should issue debt to avoid selling underpriced securities.

Jensen & Meckling (1976) argued that the agency problem results from a conflict of interest and information asymmetry between managers and shareholders and between shareholders and debt-holders. The authors stated that usually managers are interested in accomplishing their own targets which may differ from the firm's value. As a result, the owners try to monitor and control the behavior of managers which then results in agency costs of equity.

On the other hand, when a lender provides finance to a firm, the lender charges the firm an interest rate that takes into account the risk of the firm. The theory suggests that managers, in the pursuit of shareholders' interests may attempt to transfer value from creditors to shareholders. As a result of the asymmetry of information, the lenders implement monitoring and control actions which in turn result in agency cost of debt.

2.7.3 Risk and Return

Inderst (2010) argued that, with the establishment of and growth in a number of specialist infrastructure funds in the mid-1990s, there was a need to classify infrastructure investment as a new asset class. This development put the risk-return evaluation of infrastructure investments in the same level of scrutiny and evaluation as any portfolio asset.

Despite the attractive characteristics of infrastructure assets such as low sensitivity to swings in the economy and markets, low correlation of returns with other asset classes, long-term stable and predictable cash flows, Platz (2009) warned against unrealistic expected returns by prospective investors.

The capital asset pricing model (CAPM) developed by Sharpe (1964), Lintner (1965) and Black (1972) is used to determine a theoretically appropriate required rate of return of an asset, if that asset is to be added to an already well-diversified portfolio, given that asset's non-diversifiable risk.

The model takes into account the asset's sensitivity to non-diversifiable risk (also known as systematic risk or market risk), often represented by the quantity beta (β), as well as the expected return of the market (R_m) and the expected return of a risk-free asset (R_f).

Risk is defined as the variance of the price of an asset from its mean over a given period and the higher the observed variance, the higher is the risk. Investors will always seek a portfolio of assets that collectively reduce the overall variation with a corresponding improved total return. Figure 2.1 illustrates the relationship in a graphical form.

For individual assets, the security market line (SML) determines the relationship between the expected return E(R) and the asset's systematic risk (β) to show how the market must price individual assets in relation to their risk class. The SML enables the calculation of the return-to-risk ratio for any asset in relation to that of the overall market.

The return-to-risk ratio for any individual security in the market is equal to the market reward-to-risk ratio.

$$\frac{E(R)- R_f}{\beta} = \frac{E(R_m) - R_f}{\beta_m}$$

The above formula is expressed as the Capital Asset Pricing Model (CAPM) equation

$$E(R) = R_f + \beta((E(R_m)-R_f))$$

E(R)	=	Expected rate of return of the asset
R_f	=	Risk free rate (e.g. short-term treasury bill rate)
R_m	=	Expected market return
β	=	(the beta) is the sensitivity of the expected excess asset returns to the expected excess market returns
β_m	=	is the sensitivity of the expected excess market return to itself therefore $\beta_m = 1$

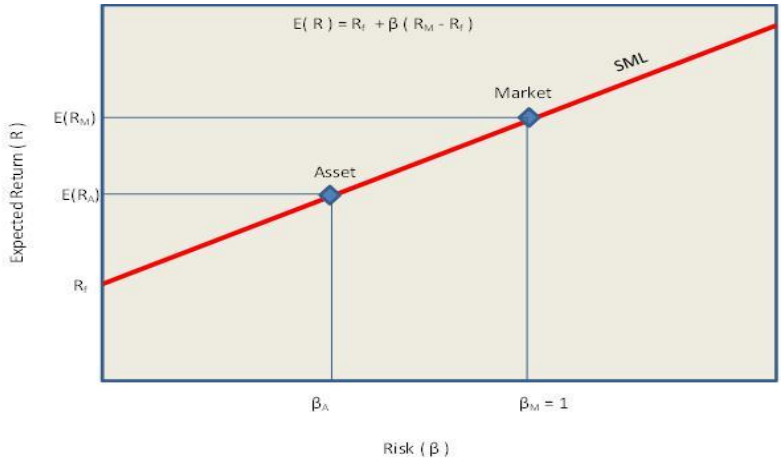

Figure 2.1 : Capital Asset Pricing Model Diagram

Inderst (2010) stated that since infrastructure investment is a relatively new asset class, longer term it is still unclear what the appropriate risk-return profile of infrastructure assets is and there are not sufficient financial theories developed in this regard. Based on limited history, Inderst (2010) developed a typical risk-return profile of some of key public infrastructure project investments. This profile is illustrated in Figure 2.2.

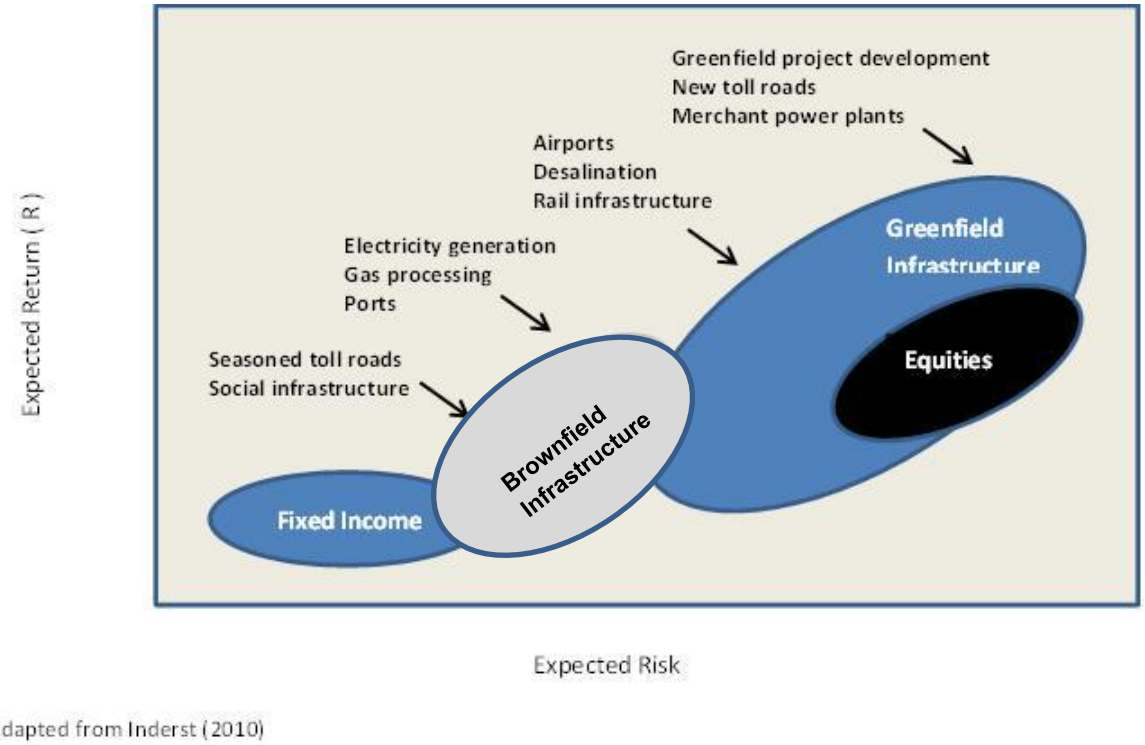

Figure 2.2 : Risk Return Profile of Infrastructure Investments

2.7.4 Project Finance

Sawant (2010b) stated that a project-financed transaction requires the creation of an independent rigid structure that is off-balance-sheet and bankruptcy remote from the sponsoring firm. In a corporate-financed transaction, the author explained, a firm invests in new assets using its balance sheet which is made available to repay capital providers.

Brealey, Cooper & Habib (1996), Yescombe (2002) and Kim & Yoo (2008) identified a number of key characteristics associated with project finance arrangements. Some of these characteristics include a legally constituted special purpose vehicle, finite life, reliance on future cash flows to repay debt and investor returns, limited or no guarantees (non-recourse) from debt and high ratio of debt to equity (between 70% and 90%). In structuring appropriate and efficient project finance mechanisms the authors highlighted the following key considerations:

2.7.4.1 Off-Balance Sheet Financing

Project financing allows shareholders not to reflect the financing and project liabilities on the balance sheet of the sponsoring firm. The project debt is generally held in a minority subsidiary as this reduces the impact of the project cost on shareholder's existing debt.

Government can also use project finance to keep project debt and liabilities off-balance sheet but this may reduce the effectiveness of government debt monitoring mechanisms. As a result, the use of off-balance sheet debt by government should be considered carefully and protective mechanisms should be implemented accordingly.

2.7.4.2 Limited Recourse

Recourse financing gives lenders full recourse to the assets or cash flows of the shareholders for the repayment of a loan in the case of default by the project company. Project financing, by contrast is limited or non-recourse to the shareholders since the project company is generally a limited liability special purpose vehicle (SPV). The recourse of lenders is limited primarily or entirely to the project assets (including completion and performance guarantees and bonds) in the case of default of the project company.

2.7.4.3 Certainty of Revenue Stream

It is important to lenders and other investors that the revenue stream is certain and that forecasts of revenues are accurate. For example, lenders may wish to review the

demand profile for project off-take to ascertain the extent to which the project company will bear project risk and will be able to influence demand;

2.7.4.4 Financial Covenants

Given the priority of lenders to secure project revenue stream, a number of financial ratios become key to the analysis of a project financed transactions. If these ratios are consistently breached, eventually such breaches may amount to events of default, permitting the lenders to accelerate, cancel outstanding loan amounts or suspend existing loans. The following are some of the main ratios of interest to lenders:

2.7.4.4.1 Debt-Equity Ratio

The lenders will prefer a lower debt-to-equity ratio in order to ensure a greater investment from the shareholders and commitment to the project. Shareholders, on the other hand, will want a higher debt-to-equity ratio, decreasing the amount of investment they will need to supply. The agreed debt-to-equity ratio will be the result of a compromise between the project company and the lenders, based on the overall risk to be borne by the lenders.

2.7.4.4.2 Loan Life Cover Ratio (LLCR)

The LLCR is the present value of available cash for debt service up to the maturity of the loan, divided by the principal outstanding. It is expressed as a ratio representing the number of times the cash flow (over the scheduled life of the loan) can repay the outstanding debt balance.

To verify that the total outstanding debt is not at risk from a shortfall, lenders will apply a minimum LLCR to ensure that the total revenue available to the project company over the life of the loan is adequate to repay and service the total amount of debt outstanding.

2.7.4.4.3 Debt Service Cover Ratio (DSCR)

The lenders will want to be sure that as and when each payment obligation of the borrower arises, the borrower will have the money available to pay that amount. The DSCR measures the amount of cash flow available to meet periodic interest and principal payments on debt. It examines the project company's ability to meet its debt payments with reference to a particular period of time such as annually or semi-annually, rather than over the life of the loan.

2.7.4.4.4 Rates of Return (RoR)

Lenders would also specify minimum returns on investment (RoI), equity (RoE) and assets (RoA) before financing is committed to the SPV.

2.7.4.4.5 Weighted Average Cost of Capital (WACC)

WACC measures the average cost of capital determined by the capital structure of the project company. Assuming that the interest charged on debt is much lower than the required returns on invested equity, a project company is encouraged to take on more debt thereby relieving is equity reserves for other project investments or for distribution to its shareholders.

2.7.4.4.6 Lender Protection

In a project financed transaction lenders want to ensure that the revenue stream is protected and that the project performs to expectations so that the lenders recover their loan from the project company does not default on its loan. Lenders will therefore require a number of practical control mechanisms of the company, such as limitations on what the project company can do without lender approval and the ability to step into management of the project company in the event the project is not performing, and that they take security over project assets.

2.8 Financing Mechanisms

Chan *et al* (2009) stated that the provision of public infrastructure involves the interrelated activities of investment, funding and financing. The authors argued that an efficient investment delivers the highest ratio of benefits to costs compared to other alternatives.

Calitz & Fourie (2007) stated that an efficient public funding model makes up the shortfall between user charges and the overall costs of the infrastructure. Chan *et al* (2009) stated further that financing should minimise the lifetime financing costs of a project and that financing vehicles that assign risk to the partner best placed to manage each type of risk are more efficient and reduce the overall cost of a project.

2.8.1 Financing Efficiency Factors

Chan *et al* (2009) stated that each financing mechanism has three main aspects, namely project risk management, transaction costs and information asymmetry that contribute to the efficiency of an investment decision.

2.8.1.1 Project Risk

Project risk is related to the financing, construction and operation of a project. This risk can be reduced by good management and a choice of an appropriate financing mechanism. An efficient mechanism can better align the incentives to the responsibility for managing a range of project risks. For example, public-private partnerships (PPPs) may assist in transferring construction and operational risks to private partners, while government retains regulatory and demand risk with a commitment to underwrite minimum revenue from user charges.

2.8.1.2 Transaction costs

Transaction costs typically include negotiation, arranging, contracting, managing and administration costs. Whilst the negotiations and contracting to bind risk exposures can be time consuming and costly, the outcomes may not always be as expected. Having

adequate finance available when it is required is important for timely delivery of design, construction and operation of infrastructure. Delay can impose costs in forgone services, although it can bring better information to guide the investment decision.

2.8.1.3 Information Asymmetry

As stated by Jensen & Meckling (1976), information asymmetry affects how well risks are ultimately allocated to the contracting parties. A lack of information can add substantially to transactions costs. Project uncertainties are generally reflected in higher premiums required by investors and higher hurdle rates for public investment.

Information asymmetry can also lead to adverse selection, where good projects face a higher required rate of return than would be the case if information was disclosed. A chosen financing mechanism can influence the incentives for parties to share their information and hence affect the allocation of resources.

2.8.1.4 The total cost of finance

The total cost of financing is made up of a return paid to investors, the cost of contingent liabilities to government arising from exposure to project risk, transactions costs of the financing arrangement and any costs of delay that might be associated with a particular financing mechanism.

Financing from fiscal revenue has an opportunity cost as these funds cannot be used to support other programmes or paid back to the taxpayer. For projects financed using tax exempt bonds, the cost of the forgone tax revenue must also be included in the cost of financing.

Chan *et al* (2009) suggested that a particular financing mechanism can therefore reduce the total cost of financing to the extent that it can better align the incentives for managing diversifiable project risk to those who have the capability to better manage the risk.

2.9 Financing Options

The following is a brief description of various financing mechanisms identified by authors such as Leigland (1997), Dailami & Liepziger (1998), Allan, Schoombee & Theron (2005)), Calitz & Fourie (2007), Kennedy & Orr (2008), Bothra (2009), Chan *et al* (2009), Inderst (2009), Peterson (2009), Estache (2010), Inderst (2010), Masifure *et al* (2010), Sawant (2010b) and Kingombe (2011).

Chan *et al* (2009), summarised the number of financing mechanisms into government budget appropriations, specific purpose bonds, financing of state owned companies, development contributions, public private partnerships and franchising agreements. Attah-Mensah (2005) and Kingombe (2011) noted the importance of donor funding and multi-lateral development finance institutions in developing economies.

The following is a brief description of the characteristics of the key financing mechanisms.

2.9.1 Budget Appropriations

Calitz & Fourie (2007) and Chan *et al* (2009) stated that budget appropriations remain a major source of finance for public infrastructure investment in many countries.

Whilst this mechanism avoids a direct liability on future project revenues, it comes at the opportunity cost of the alternative use of the funds, including returning them to taxpayers who may themselves have invested at market related returns. Other expenditure needs of government may delay major projects, particularly those that have to be completed in phases as determined by the availability of funds.

Other than taxes, public debt is another source of funds for budget appropriations. The total cost of debt finance includes the rate of return on government bonds, administration costs associated with debt issue and the contingent liabilities of the project, which with financing by budget appropriation remain fully with the government.

As noted by Kingombe (2011), funding sourced from donors and/or development finance institutions are generally channeled to projects through budget appropriation processes by the host government. The authors also stated some of the financing institutions make equity investments in private sector companies in developing countries.

Chan *et al* (2009) stated that the main strength of the budget appropriation process, regardless of the method of raising funds, is the parliamentary scrutiny of appropriations and that the transactions costs are low compared to most other financing vehicles.

Claitz & Fourie (2007) however pointed out that the main weakness of this mechanism is the almost automatic preference of government to use budget instead of other appropriate mechanisms. Chan *et al* (2009) also pointed out that budget appropriations could reduce the incentives and scope to allocate project risks to those best able to manage them.

2.9.2 Specific Purpose Bonds

Chan *et al* (2009) defined specific-purpose securitised borrowing as the issuance of debt instruments such as bonds, debentures and inscribed stocks for the purpose of financing specific infrastructure projects. These borrowings are usually secured on the asset or against the revenue stream arising from the asset. Although this mechanism is one of the main sources of funding in many countries, the inability of governments to avoid contingent liability resulted in its phasing out of many developed economies.

However, Jackson (2007) and Peterson (2000) had observed an increased use of this mechanism, particularly the municipal bond market. El Daher (2000) observed an increased use of tax exempt municipal bonds but also noted that whilst these bonds lower the interest cost, evidence suggests that they do not fully offset the forgone tax revenue and fairly high transaction costs.

2.9.3 Financing State Owned Companies

Chan *et al* (2009) stated that the experience of developed countries with the financing of state owned companies (SOCs) is that new infrastructure investments are predominantly debt financed, although a mix of instruments is often used. Government dividend requirements and regulations that affect user charges, largely determine the capacity of SOCs to finance through retained earnings. The SoCs may also face limits on borrowing in the legislation that established them which may leave capital injections by the shareholder government as the only source of finance.

Further, Chan *et al* (2009) observed that where SOCs raise finance from the capital markets, their financial performance and the viability of the investment is subject to market scrutiny. Where SoCs operate in a regulated market, regulators can impose discipline on investment decisions where price rises are not justified solely on a cost basis.

2.9.4 Development Contributions

Chan *et al* (2009) stated that urban expansion and the higher expectations of more affluent societies have increased the demand for the quantity and quality of urban infrastructure. With greater acceptance of the user pays principle and limits on revenue raising capacity of local governments, development contributions have grown as an alternative source of funding urban infrastructure.

In this mechanism, sometimes referred to as "land value capture", Chan *et al* (2009) added that public sector institutions apply the principles of reasonableness and accountability to the determination of development charges. The contribution liability to the user is proportionate to the share of the total benefit from financed infrastructure that is received by the development.

2.9.5 Public Private Partnerships

Chan *et al* (2009) observed that from the early 1990s there was a significant growth in the use of public-private partnerships (PPPs) in many countries largely due the incentive to bring in private sector management skills. The bundling of design, construction and operation of infrastructure improves the efficiency and the ability to bring forward the provision of the infrastructure service. The authors also stated that project design and management are important to ensure that only risks that can be better managed by the private sector partner are allocated to them.

Authors such as Calitz & Fourie (2007) and Sawant (2010) however warned that while PPPs may assist in improving productive efficiency they are no guarantee that the investments are optimal. Chan *et al* (2009) mentioned that whilst the main advantage of PPPs comes from the scope for lowering the total cost of the project through improving project risk management, the costs of tendering, negotiating and managing contracts can be considerable.

Esty (2003) sated that whilst PPPs provide a more flexible and potentially more timely source of finance and that risks may be transferred to private partners, the cost of risk will be factored into the cost of finance.

2.9.6 Franchise Agreements

Chan *et al* (2009) stated that government franchising involves a government or public sector agency granting an exclusive right to a private or other independent entity to occupy, operate and maintain publicly owned infrastructure facilities to deliver services over a predetermined period of time. Through this mechanism, infrastructure services are often characterised by significant economies of scale and network integration which reduces the scope for competition in the market.

Franchise arrangements can introduce competition for the market through franchise bidding over the franchise period. The incumbent franchisee faces incentives to be efficient in order to receive favourable consideration upon franchise renewal or retendering.

Chan *et al* (2009) however warned that while government franchises aim to achieve higher operational efficiencies and lower maintenance costs, they have not always worked as well as envisaged.

2.10 Infrastructure Financing in South Africa

Chan *et al* (2009) mentioned that whilst public institutions are concerned with an optimal allocation of limited funding resources to deliver public infrastructure, efficient financing is concerned with the optimal use of financing mechanisms to minimise costs associated with such available financing vehicles.

The authors noted that decades of immunity of governments and public institutions from market forces has resulted in a lack of innovation and sub-optimal investments in the public sector. Key to the availability of various financing options and mechanisms is the regulatory environment and the conditions of the financial and capital markets.

Below is a brief overview of the regulatory and capital market environment in South Africa.

2.10.1 Capital Markets

The main sources of infrastructure financing in South Africa consist of lending from banks, private equity investments, PPPs and bonds.

2.10.1.1 Bank Loan Financing

In order to successfully implement the long-term infrastructure plan, Gordhan (2012) indicated that the Development Bank of Southern Africa (DBSA) will play a coordinating role in raising finance, in partnership with multilateral finance institutions, foreign investors and other investment funds. The Industrial Development Corporation (IDC) will invest directly in income generating projects, in partnership with other investors.

Allan *et al* (2005) noted that since 1996, the most active and biggest funder of municipal infrastructure requirements has remained the Development Bank of Southern Africa

(DBSA) with a limited involvement of privately owned infrastructure funding companies such as the Infrastructure Finance Corporation (INCA). The lack of diversity in the borrowing market has remained a cause for concern for government. This is despite government's policy goal of increasing private sector investment in infrastructure investment.

2.10.1.2 Equity Markets

Although South Africa has had a limited participation of private sector in public infrastructure financing, Gordhan (2012) indicated government is willing to create a conducive environment for private sector participation in the construction of public infrastructure. The mid 2000s experienced an emergence of focused infrastructure funds through private equity holdings by large institutional investors and public sector pension funds.

According to KPMG & SAVCA (2011), South Africa has one of the most sophisticated private equity industries among emerging and developed markets, with different funds at all stages of business development, from start-up venture capital funds through to late-stage and buy-out funds. KPMG & SAVCA (2011) estimated that the private equity (PE) funds under management grew from approximately R36 billion in 2001 to R116 billion in 2011 of which 47% were raised from South African sources. Approximately 75% of funds (R8.1 billion) raised in 2011 were from South African sources indicating a substantial interest among a number of South African investors in the market.

Although the South African PE industry is small in comparison to the developed economies, KPMG & SAVCA (2011) recorded a local investment activity of 0.17% of the gross domestic product (GDP) which was higher than China (0.14%), Brazil (0.10%) and Russia (0.08%), but lower than India (0.33%) and some way off that of the United States (0.98%), the United Kingdom (0.75%) and Israel (2.05%).

KPMG & SAVCA (2011) stated the South African PE industry benefited from the global trend towards recognising public infrastructure asset class as an attractive investment vehicle for investors, combined with its growing reputation as an effective means of

economic development for governments and development agencies. In 2011, a total of R24.1 billion (21%) of total funds was classified as government investment directed towards infrastructure development.

2.10.1.3 Bond Markets

The International Organisation of Securities Commissions (2002) stated that a well-functioning bond market has many advantages which include an alternative source of domestic debt finance, lower cost of capital, broadening of capital markets, efficient pricing of credit risks and promotion of financial stability.

The Economic Commission for Africa (1999) stated that, because of the experience of the Asian crisis in the late 1990s there was a strong case for developing domestic bond markets as an alternative source of debt financing in most of cash strapped countries in emerging economies.

Hove (2008) stated that for many emerging-market countries, the financial sector and capital market development start with the development of a government bond market. This is a logical path, not only because governments are usually the largest domestic borrowers and have one of the best domestic credit ratings, but also because governments, by their actions or inaction, affect the scope and potential for market development throughout the economy.

Although well developed, the South African bond market is relatively small compared to developed economies. The market trades through an independent financial exchange, Bond Exchange of South Africa (BESA) which is licensed in terms of the Securities Services Act No.36 of 2004 (SSA). BESA, a self-regulated organisation operates under an annual license granted by the country's securities market regulator, the Financial Services Board (FSB).

Allan *et al* (2005) noted that prior to 1994, South Africa partly financed its economic infrastructure such as bulk water supply, electricity and roads through bonds issued by state owned companies such as the Water Boards (e.g. Rand Water) and the electricity utility, ESKOM. Allan *et al* (2005) further noted that, prior to 1994 there was an active

municipal bond market which was underpinned by a system of prescribed asset requirement. The system required financial institutions to invest a prescribed percentage of their portfolios in government debt.

Moody's (2011) noted that South Africa's municipal bond market grew almost five-fold since 2004 bringing the size of the municipal bond market to R12.3 billion by the end of first quarter of 2011. Notwithstanding these good growth prospects Moody's (2011) noted that traditional bank lending would remain a major source of debt funding for municipalities.

2.10.2 Regulatory Environment

The financing of public assets in South Africa is regulated by legislation such as the Public Finance Management Act No.1 of 1999 (PFMA), the Municipal Finance Management Act No.56 of 2003 (MFMA) and the Division of Revenue Act (DoRA).

The involvement of private sector in the financing of public infrastructure through public-private-partnerships (PPP) is regulated by Treasury Regulations issued in terms of the PFMA and MFMA. The PFMA and MFMA define a PPP as an agreement between a public institution and a private party in terms of which the private party undertakes to perform an institutional function on behalf of the public institution for a specified or indefinite time.

In a PPP arrangement, the private party receives a benefit for performing the function by way of compensation from a revenue fund or fees collected by the private party from users of a service provided to them. It is further expected that the private party takes substantial risks arising from the performance of the function. The regulation states that where a private party performs an institutional function without accepting significant risks, such an agreement is not a PPP agreement and must be dealt with as a normal borrowing transaction in terms of an appropriate legislation.

2.11 Conclusion of the Literature Review

A number of authors have highlighted the need for public infrastructure development to satisfy social and economic development needs of the public sector. Since the late 2000s, public infrastructure investment has been considered by long-term investment institutions such as the pension funds as an asset class on its own.

The financial crisis of the late 2000s compelled many governments to consider other mechanisms to finance their infrastructure developments over and above traditional sources such as budget appropriations and donations. As a result of a decline in the availability of traditional sources, Fay & Morrison (2005), Briceño-Garmendia & Foster (2010) and Kingombe (2011) emphasised the importance of private sector involvement in the financing of public infrastructure.

In order to attract private sector involvement in financing public infrastructure, Inderst (2010) emphasised the need to develop a risk-return profile to assist investors to make appropriate decisions. Calitz & Fourie (2007) stated that project design, regulatory environment and risk management are among the key success factors necessary to attract the private sector to invest in the public infrastructure.

Chan *et al* (2009) described an efficient financing mechanism as that which best allocates the risk to the parties best capable of managing the risk thereby reducing the cost of financing the infrastructure. The authors stated that the reduction of project risk, transaction cost factors and information asymmetry between the public and investors contribute to more efficient investment decisions.

Calitz & Fourie (2007) identified four key financing mechanisms that are practiced in South Africa, namely budget appropriations, debt (loan finance), equity (internal reserves) and private equity (PPP finance). In their study of public infrastructure financing trends in developed economies, Chan *et al* (2009) provided an analysis of various mechanisms such as budget appropriations, specific-purpose borrowings, off-budget financing (state owned companies), development contributions, public-private partnerships (PPPs) and franchising arrangements.

The South African public infrastructure investment environment is supported by active capital and financial markets. In addition, the regulatory environment provides guidance to both the public and private sector to enable an objective assessment of the nature and extent of their involvement in public infrastructure financing.

Since private sector investment decisions are predominantly based on an expected return from a project, the understanding of a risk-return profile of public infrastructure is critical in selecting an appropriate and efficient financing mechanism. Based on the observation by Inderst (2010), there is currently no established risk-return benchmark for infrastructure investments. This research therefore becomes appropriate, particularly for South Africa in ensuring the efficient financing of major infrastructure investments in future.

CHAPTER 3 : RESEARCH METHODOLOGY

3.1 Introduction

The objectives of the research were firstly to determine key financing mechanisms, secondly whether these mechanisms are appropriate and efficient to finance public infrastructure investments. Lastly, the research had to determine whether there exists a consistent framework used by public institutions to select appropriate and efficient mechanisms to finance various public infrastructure projects.

In order to gain an in-depth understanding of the research objectives, a case study approach was adopted as a methodology of analysis. The results from the analysis of the case studies enabled the researcher to achieve the objectives of the research.

Yin (2009) defined case study research as an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context and that it explains, describes, illustrates and enlightens. Farquhar (2009) stated that the value of case study research is that it allows the researcher to examine a problem or question in a practical, real-life situation and is particularly suitable for description, explanation and exploratory research.

Stake (1995) stated that an instrumental case study provides a general understanding of a phenomenon using a particular case and a collective case study is done to provide a general understanding using a number of instrumental case studies that either occur on the same site or come from multiple sites. Farquhar (2009) stated that in the case study methodology, the area of a study is restricted to a small number of units thus enabling the researcher to look in depth at a topic of interest or phenomenon.

Yin (2009) stated that the advantages of case study research are that the methodology fosters the use of multiple sources of data which facilitates validation, entails a detailed and particular focus on the subjects of the study and that the researcher has no control over events within the researched organisations and/or projects.

Sarantakos (2005) however warned that the limitations of the case study methodology is that it is vulnerable to criticisms in relation to credibility of generalisations. In addition, the author stated that the metohodolgy is perceived to be suitable only for qualitative research and focusses on processes rather than end products and access to case study settings can be demanding which in turn can seriously affect the study.

Other critics of case research such as Miles (1979) also suggested that the usefulness of case study methodology is limited to an exploratory phase in a hierarchically arranged research programme. Yin (2009) however highlighted that the purpose of a case study methodology is to expand and generate theory or 'analytical generalisation' as opposed to proving theory or 'statistical generalisation'.

Given the exploratory nature of the research, a multiple-case study methodology was adopted as an appropriate instrument to gain an in-depth understanding of the key financing mechanisms and their appropriatenes/efficiency in developing public infrastructure projects in South Africa.

3.2 Population

The target population for the research consisted of all public infrastructure projects funded through various financing mechanisms by national, provincial departments, municipalities and state owned companies.

3.3 Sample

Farquhar (2009) stated that the aim of case study research is not to make statements about the cases to a larger population but to explore in depth a particular phenomenon in a contemporary context. Hamel, Dufour & Fortin (1993) argued that the relative size of the sample does not transform a multiple case into a macroscopic study.

Hamel *et al* (1993) further stated that the goal of the study should be to establish the parameters that can be applied to all research and therefore argued that even a single case could be considered acceptable, provided it met the established objective.

Where a multiple case study approach is adopted, Umit (2005) suggested that the design must follow a replication logic where each case consists of a whole study in which facts are gathered from various sources and conclusions drawn on those facts. The author further argued that multiple cases strengthen the results by replicating the pattern-matching, thus increasing confidence in the robustness of the theory.

Harling (2002) stated that when using multiple cases, the question of how many arises and warns that when the case studies are too few, generalisation becomes difficult and if too many, depth of understanding becomes difficult to achieve.

For the purposes of this research, a sample of twenty public infrastructure projects that were financed through various mechanisms by national, provincial, local and state owned companies were selected. Although a convenient sample was selected using non-probabilistic means, the sample is a balanced representation of public infrastructure projects and financing mechanisms practiced in South Africa. Table 4.1 provides a summary of the sample profile.

3.4 Data Collection

Yin (2009) recommended the use of any of the six sources of evidence for data collection namely, documentation, archival records, interviews, direct observation, participant observation and physical artifacts in case study approach. Direct observation, participant observation and physical artifacts are used predominantly in sociological research and were therefore not relevant in this research.

Umit (2005) explained that documents could be letters, agendas, administrative documents, newspaper articles or any document that is related to the investigation as the documents serve to strengthen the evidence from other sources while they are also useful for making inferences about events. The author further explained that the interviews are one of the most important sources of case study information which can be open-ended, focused and structured.

Stake (1995) identified triangulation as a quality assurance tactic to ensure that case study research is based on a disciplined approach and not simply a matter of intuition, good intention and common sense. Triangulation in case study research refers to a process in which the researcher uses multiple sources of data to establish and verify meaning. In this way the researcher actively seeks different perspectives on the case study topic to check interpretation and to reveal alternative meanings.

In the research, information was gathered from a number of publicly available sources such as annual reports, technical reports, government reports and database managed by the Public-Private Partnership (PPP) unit of the National Treasury. In certain cases, key public and private sector personnel involved in public infrastructure financing and implementation were interviewed to verify and validate information obtained from public sources.

3.5 Framework of Analysis

Harling (2002) stated that when multiple cases are used, a typical format is to provide a detailed description of each case and then present the themes within the case (within case analysis) followed by thematic analysis across cases (cross-case analysis). The author further stated that in the final interpretative phase, the researcher reports the lessons learnt from the analysis. The following is a brief description of the framework adopted to analyse the sample of case studies.

3.5.1 Financing Mechanism

For each case study considered the financing mechanism used was identified followed by a discussion of its unique features and their impact of the project. In order to identify the appropriateness of the mechanism, the total risk associated with each case study was analysed against a number of criteria obtained from the literature review. The criteria included the ability of the mechanism to diversify project risks, minimise transaction costs and minimise information asymmetry factors. Appendix B provides a detailed description of the risk analysis framework.

3.5.2 Financing Option Framework

A number of authors such as Esty (2003), Calitz & Fourie (2007), Chan *et al* (2009) and Sawant (2010b) confirm that public infrastructure is financed either through project finance (cash flow) or corporate finance (debt and equity) and that all financing mechanisms fall in either of the options.

In order to determine whether public institutions utilise a common framework to select a financing (project finance or corporate finance) option appropriate for the financing of public infrastructure project, an assumtion was made that there exists a relationship bewteen the financing option and key risk factors such as project risks, transaction costs and information asymmetry. This relationship is represented by the following multiple regression model :

$$P_i = \propto + \beta_1 \, PRS_i + \beta_2 \, TCRS_i + \beta_3 \, IARS_i + \varepsilon$$

P_i represents a probability that a project finance option is chosen by a public institution to finance a project (i), given the corresponding amounts of assessed project risk (PRS_i), transaction cost risk (TCRS_i) and risk associated with information asymmetry (IARS_i) between the public sector institution and prospective investors. $P_i = 1$ when a project finance option is chosen and 0 if not chosen (or corporate finance option is chosen).

The existence of a relationship between the choice of a financing option (dependent variable) and its independent variables (project, transaction cost and information asymmetry risk sores) is tested by checking whether the coeficients of the independent variables in the multiple regression model are statistically significantly greater than zero at a 5% significance level.

Gujarati (2003) recommends that the above equation be expressed in the form of a cumulative logistic distribution function (LOGIT model) as indicated below :

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

where

P_i	=	Probability that a Project Finance Option is chosen given the values of independent variables for project i
1- Pi	=	Probability that a Project Finance Option is not chosen given the values of independent variables for project i
Y	=	1 (Project Finannce Option Chosen)
ln	=	Natural logarithm
PRS_i	=	Project Risk Score for a particular project i
TCRS_i	=	Transaction Cost Risk Score for a particular project
IARS_i	=	Information Asymmetry Risk Score
βj	=	for j=1,2,3; coefficient of variable (PRS, TCRS, IARS) which measures the change in *L (log of odds)* for a unit change in the independent variable score,
α	=	y intercept (constant) = value of L (l*og of odds*) when the value of all risk scores are equal to zero.
ε	=	the error term of the regression model

Risk Score	=	Average Rating / 5
Rating	=	1 (very low); 2 (low); 3 (average); 4 (high); 5(very high)

Since the coefficient of variable i measures the change in L (log of odds) for a unit change in the independent variable, if the coeficient is not significantly greater than zero, it is concluded that the variable i does not explain a change (choice of the project finance option).

CHAPTER 4 : PRESENTATION OF RESULTS

In order to achieve a high and consistent quality in the analysis of case studies, Yin (2009) recommended four principles to be adhered to namely, showing that the analysis relied on all the relevant evidence, inclusion of all major rival interpretations in the analysis, addressing the most significant aspect of the case study and the use of the researcher's prior, expert knowledge to further the analysis. Harling (2002) stated that although case study research case is formal, it includes the researcher's opinions and judgments and is structured to persuade the reader to accept the researcher's conclusions.

This section is therefore aimed at summarising the results based on the analysis of the case studies in relation to the research questions highlighted in Chapter 1 of this research report namely ;

a. What are the key financing mechanisms used to finance public infrastructure investments in South Africa?
b. How appropriate and efficient are the mechanisms used to finance public infrastructure in South Africa?
c. Is there a consistent framework used by public institutions to select appropriate and efficient mechanisms for the financing of different public infrastructure projects in South Africa?

The following is a presentation of key observations extracted from the analysis of the case studies. Table 4.1 provides a summary of key information extracted from the case studies in Appendix A.

	Type	Project Name	Financing Mechanism	Infrastructure Type	Project Cost (million)	Concession Period (years)	Completion Year
1	National Toll Road	Maputo Corridor (N4)	PPP	Economic	R 3 000	30	**1996**
2	National Toll Road	Bela-Bela - Rustenburg Corridor (N4)	PPP	Economic	R 3 000	30	**2003**
3	National Toll Road	Durban - Johannesburg Corridor (N3)	PPP	Economic	R 10 000	30	**2001**
4	Government Office Accommodatio	Department of Trade and Industry	PPP	Social	R 500	25	**2004**
5	Government Office Accommodatio	Department of Education	PPP	Social	R 403	25	**2010**
6	Prisons	Bloemfontein and Louis Trichardt	PPP	Social	R 3 500	25	**2002**
7	Water and Sanitation	Ilembe District Municipality	PPP	Economic	R 16	30	**1999**
8	Hospital	Inkosi Chief Albert Luthuli	PPP	Social	R 1 200	15	**2001**
9	Hospital	Humansdorp	PPP	Social	R 13	20	**2004**
10	Hospital	Pelonomi - Universitas	PPP	Social	R 20	20	**2004**
11	Energy Generation	Eskom	SoC Financing	Economic	R 340 000	n/a	**2020**
12	Energy Generation	Renewable Energy Independent Power Producer Programme	PPP	Economic	R 100 000	15	**2015**
13	Road Upgrade	Gauteng Freeway Improvement Project	PPP	Economic	R 22 000	15	**2011**
14	Airports	ACSA	SoC Financing	Economic	R 50 000	n/a	**2011**
15	Freight Logistics	Transnet	SoC Financing	Economic	R 300 000	n/a	**2020**
16	Passenger Rail	Gautrain High Speed Rail	PPP	Economic	R 26 000	20	**2011**
17	Industrial Development Zone	Coega IDZ	Budget Appropriations	Economic	R 25 000	50	**2020**
18	Industrial Development Zone	Dube Trade Port	Budget Appropriations	Economic	R 10 000	n/a	**2010**
19	Public Transport	Rapid Public Transport System : City of Johannesbu	Franchising	Economic	R 4 600	12	**2010**
20	Land Value Capture	Durban Point Waterfront Development	Development Contribution	Economic	R 150	n/a	**2006**

Table 4.1 : Summary of Case Studies

4.1 Sample Characteristics

Figure 4.1 shows the proportion of projects in the sample that were implemented by different spheres of government (national, provincial and municipalities) and SoCs. The sample consisted of 35% of projects implemented by the SoCs, followed by Provinces (30%), National (20%) and Municipalities at 15%.

Figure 4.2 illustrates the range of project values for the sample case studies. The sample had 30% of projects with values less than a R1 billion, 25% between R1 billion and R5 billion, 15% between R5 billion and R20 billion, 15% between R20 billion and R50 billion and 15% in excess of R50 billion.

Figure 4.3 illustrates that 70% of case study projects were classified as economic infrastructure and 30% as social public infrastructure.

Figure 4.4 illustrates that only 10% of the case study projects were completed before 2000, 35% between 2000 and 2005, 35% between 2005 and 2012 (35%). A total of 20% of projects would be completed after 2012.

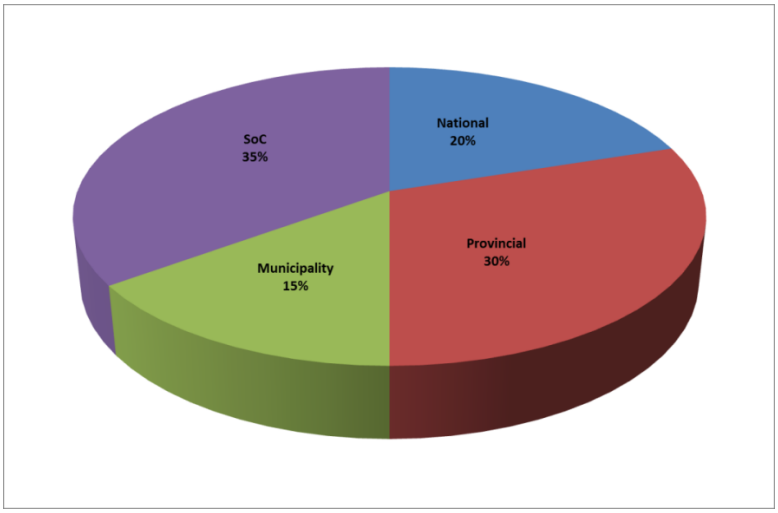

Figure 4.1 : Profile of Sample Projects

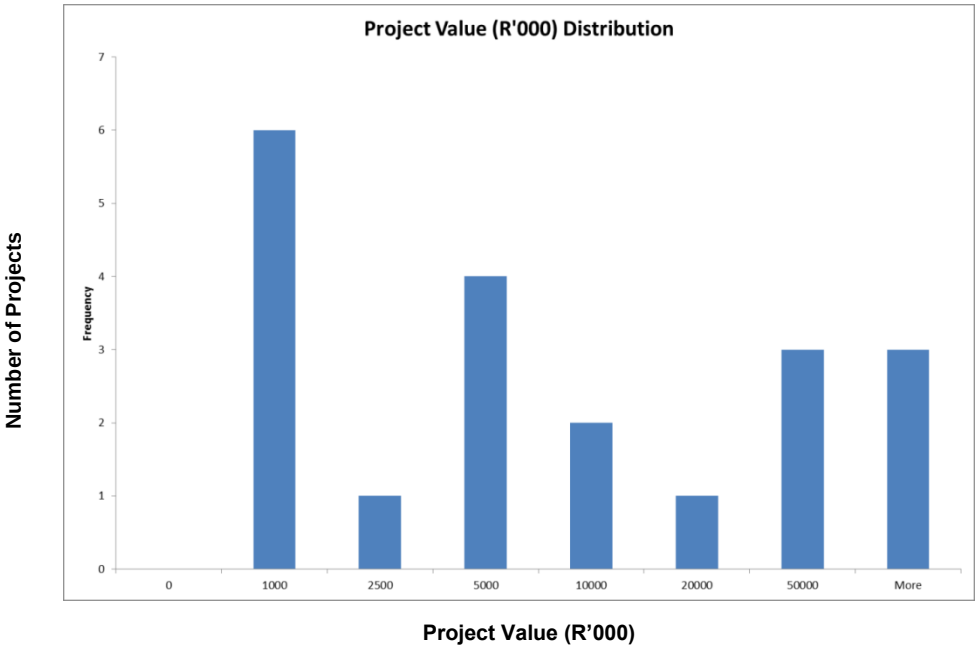

Figure 4.2 : Sample Project Values

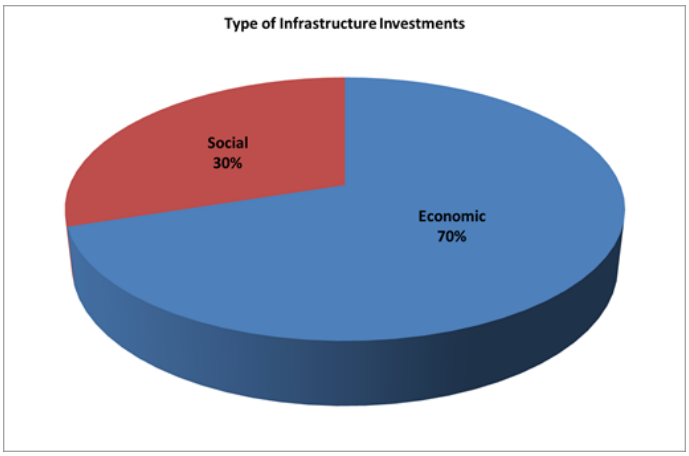

Figure 4.3 : Infrastructure Type

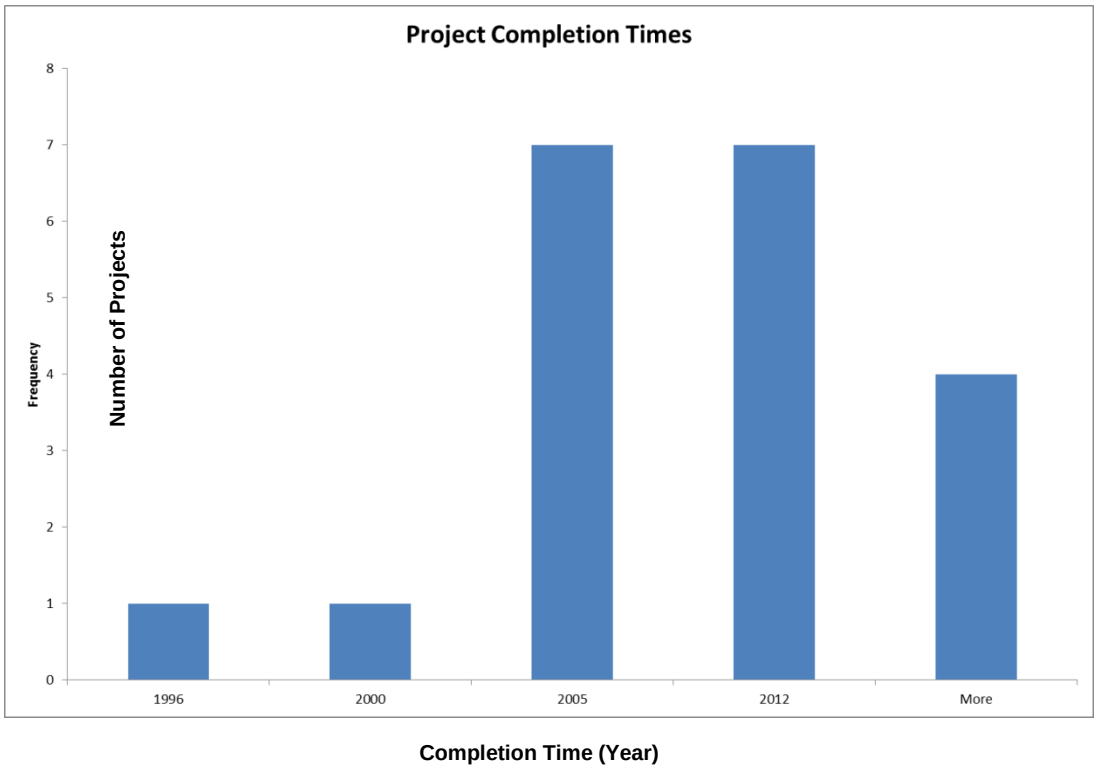

Figure 4.4 : Project Completion Profile

4.2 Key Financing Mechanisms

Figure 4.5 and Table 4.2 indicate that approximately 65% of infrastructure projects were financed through public private partnerships (PPPs). The balance was financed through SoC balance sheets (15%), budget appropriations (10%), Franchising (5%) and Development Contributions (5%). No projects were financed through specific purpose bonds. The use of PPPs was evenly spread across the national, provincial departments and SoCs.

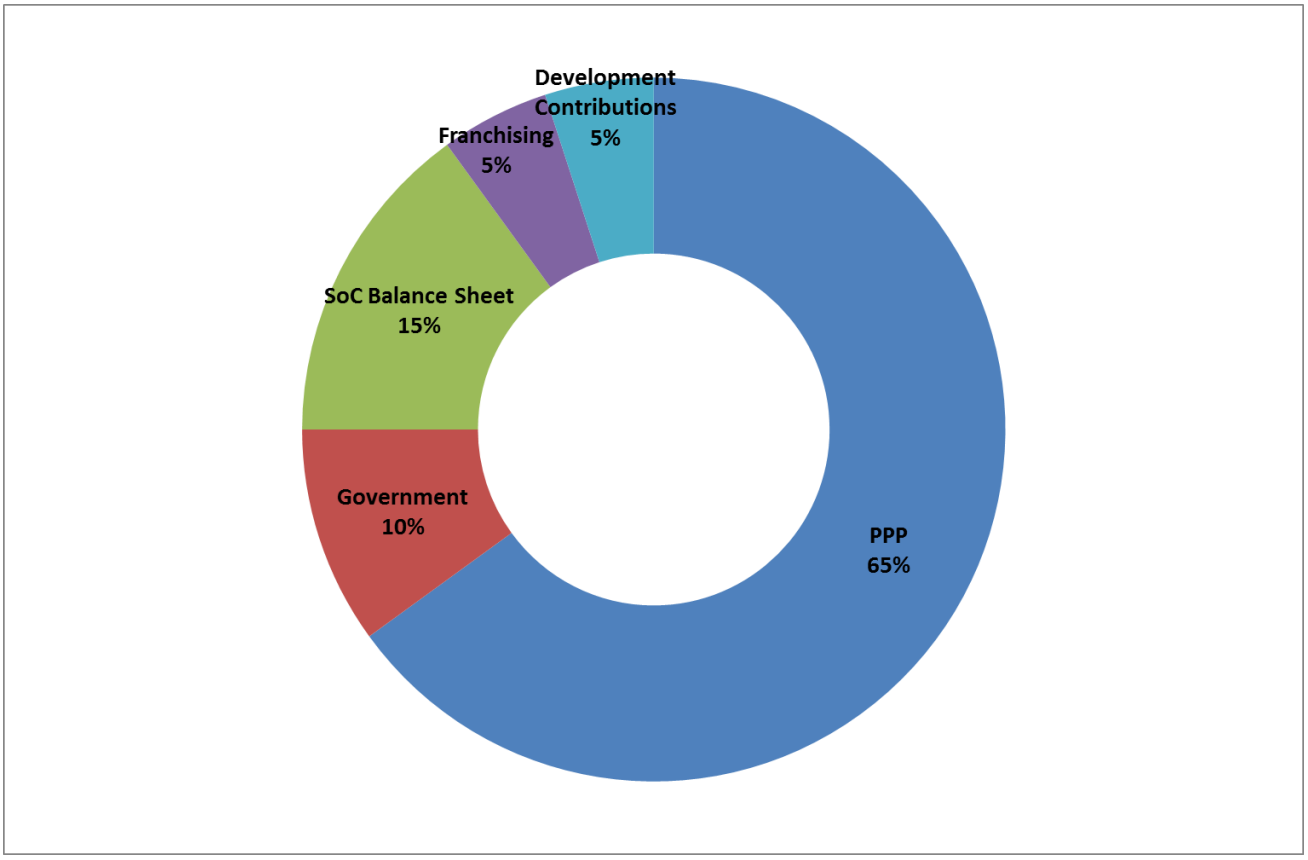

Figure 4.5 : Proportion of Financing Mechanisms

	Budget Appropriations	Specific Borrowing	SoC Balance Sheet	Development Contributions	PPP	Franchising	Total
National	0%	0%	0%	0%	20%	0%	20%
Provincial	10%	0%	0%	0%	20%	0%	30%
Municipality	0%	0%	0%	5%	5%	5%	15%
SoC	0%	0%	15%	0%	20%	0%	35%
Total	10%	0%	15%	5%	65%	5%	

Table 4.2 : Proportion of Financing Mechanisms

4.3 Appropriateness of Financing Mechanisms

4.3.1 Utilisation of Financing Mechanisms

Figure 4.6 indicates that all social infrastructure projects were financed through PPP mechanisms. Economic infrastructure was financed through various financing mechanisms with PPP constituting the highest frequency (35%), followed by SoC (15%) and the least is Franchising and Development Contributions at 5% each.

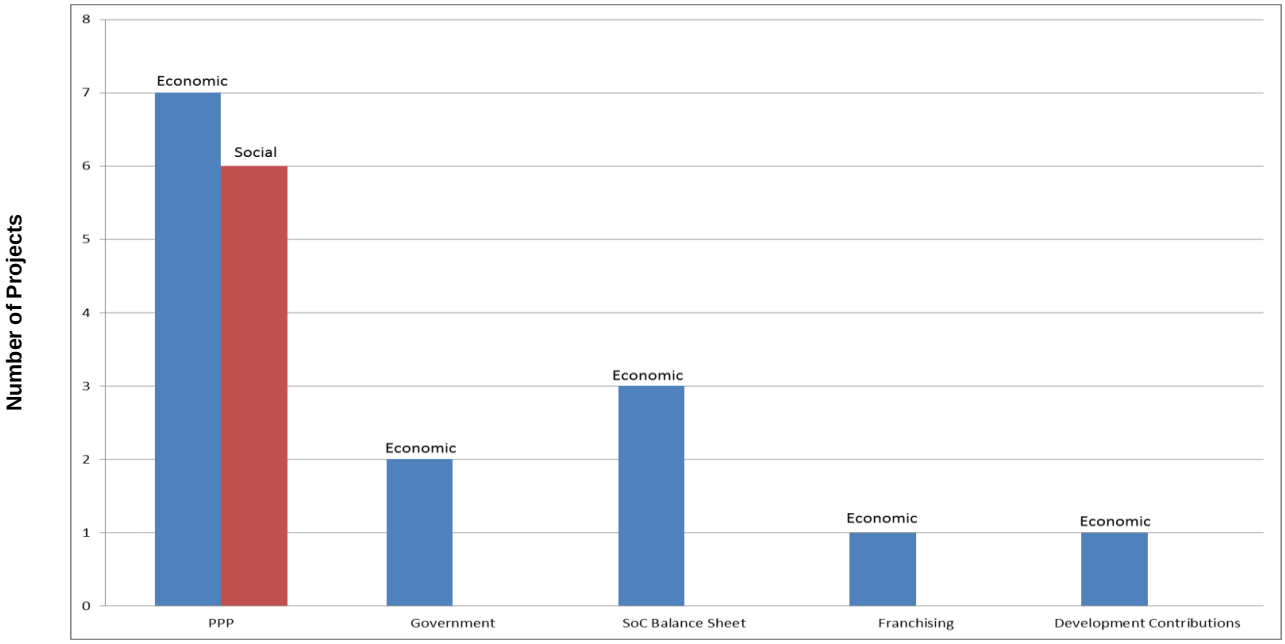

Figure 4.6 : Financing Mechanism and Infrastructure Type

Figure 4.7 shows a breakdown of the total value of public infrastructure projects financed through various mechanisms across the case study projects. A total of 82% was financed through the balance sheets of SoCs followed by PPPs (14%) and Government Appropriations (4%). The value of projects financed through Development Contributions and Franchising were insignificant at 0.02% and 0.55% respectively.

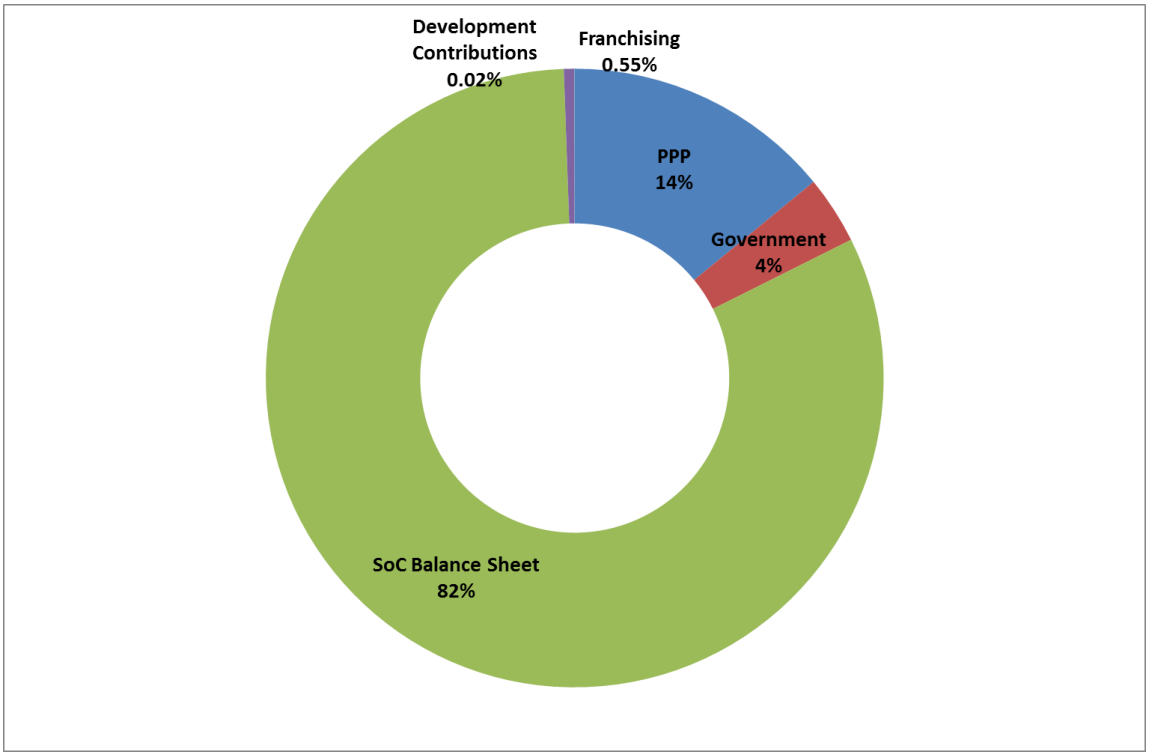

Figure 4.7 : Project Value and Financing Mechanisms

4.3.2 Project Risk and Implied Financing Cost

Inderst (2010) and Chan *et al* (2009) demonstrated that the total cost (efficiency) of a financing mechanism is largely determined by the risk-return profile of a public infrastructure project. Therefore, in order to understand the efficiency of a financing mechanism, it is important to first understand the risk profile of the project which in turn will indicate a return expected by potential investors.

Using the assessment framework in Annexure B, a Total Risk Score (TRS) associated with the financing mechanism of each project case study was calculated. The TRS is a weighted average of the Project Risk Score (PRS), Transaction Cost Risk Score (TCRS) and Information Asymmetry Risk Score (IARS). Appendix C contains a detailed computation of individual case study scores.

Figure 4.8 illustrates the Project Risk Score for each case study. A total of 45% of case study projects scored between the minimum (0.2) and average (0.6) risk level and the balance of 55% of projects scored higher than the average but less than the maximum risk level.

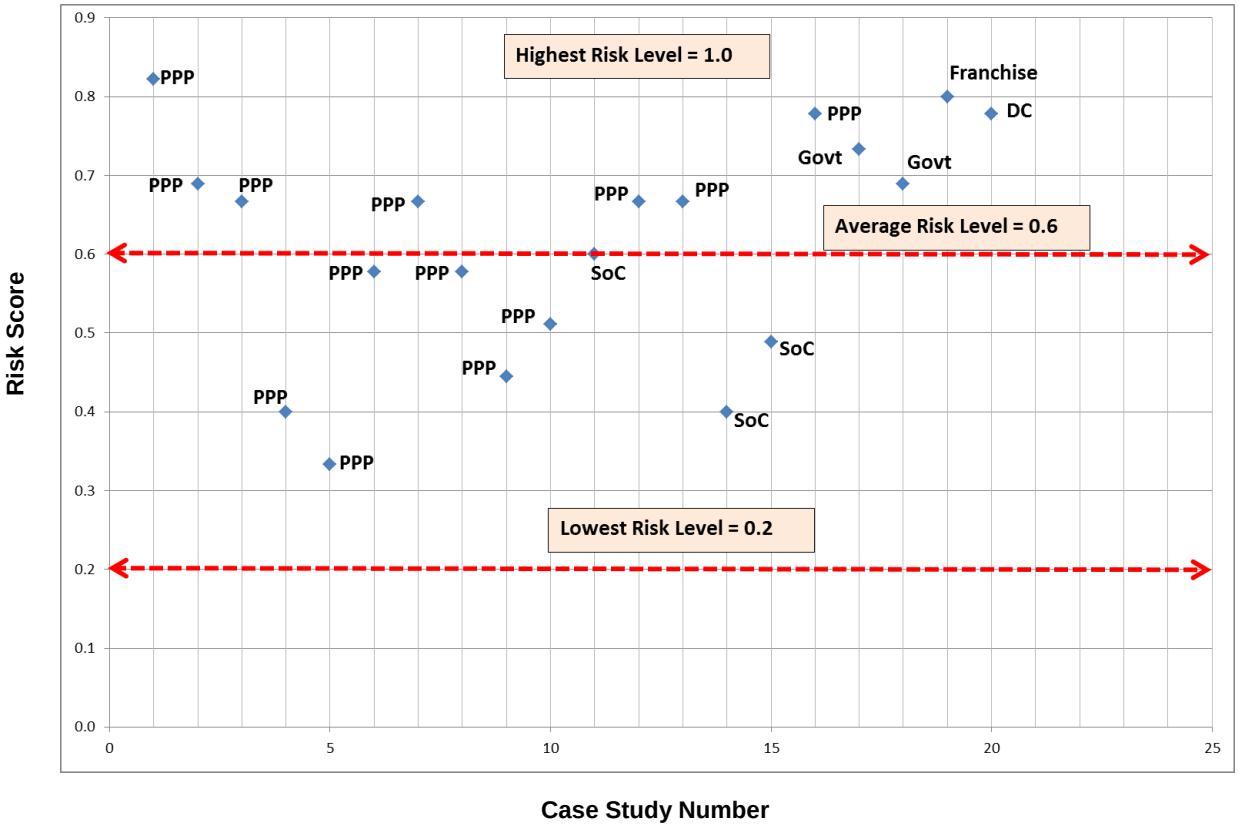

Figure 4.8 : Project Risk Scores

Figure 4.9 illustrates Transaction Cost Risk Scores for each of the case study projects. The diagram indicates that 60% of the projects cases had transaction cost risks between the minimum (0.2) and average (0.6) risk levels. The Development

Contribution (Land Value Capture) financed project had the highest (0.87) above the average risk level.

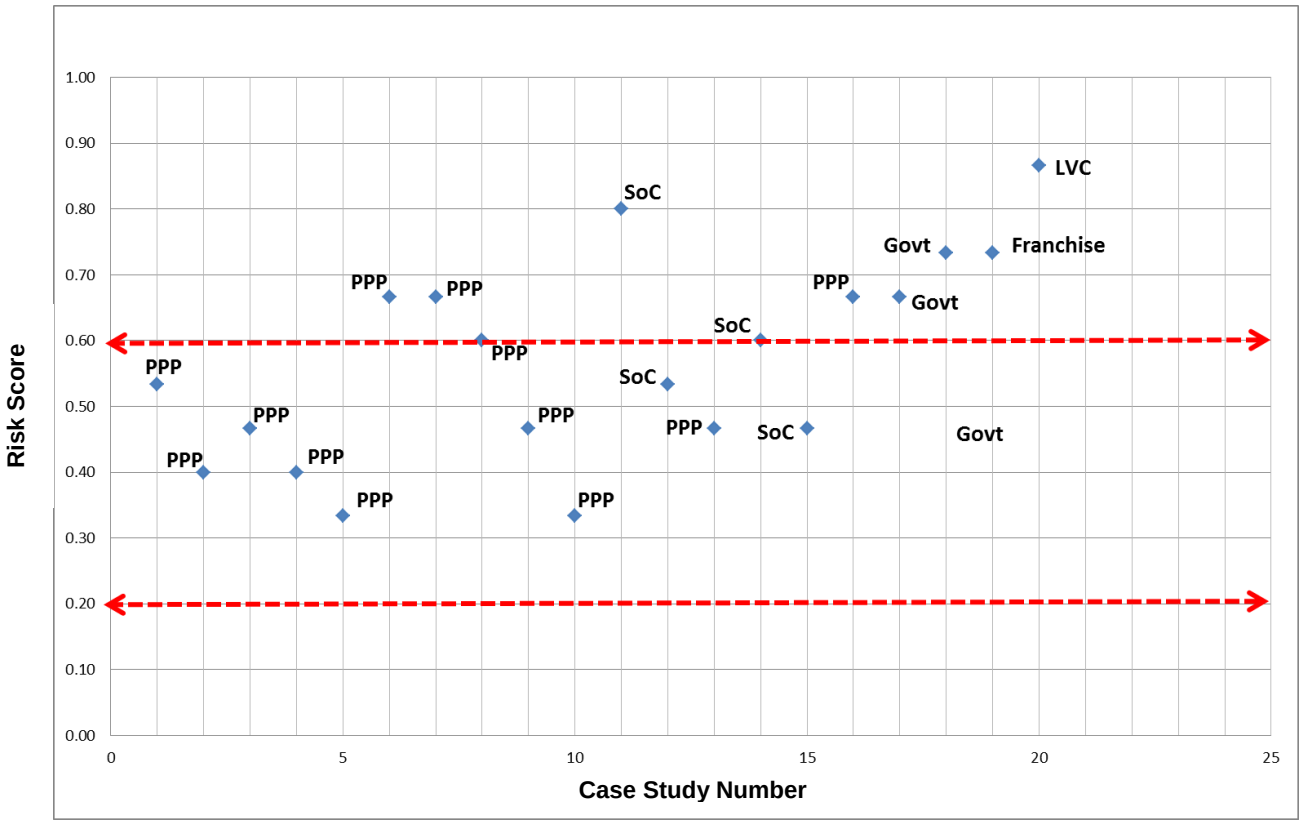

Figure 4.9 : Transaction Cost Risk Scores

Figure 4.10 illustrates the risk scores related to Information Asymmetry for each of the twenty project case studies. The diagram indicates that 80% of the project cases had information asymmetry risk between the minimum (0.2) and average (0.6) risk levels. Two PPP, Franchising and Development Contribution (Land Value Capture) financed projects had the highest (0.80) risk levels.

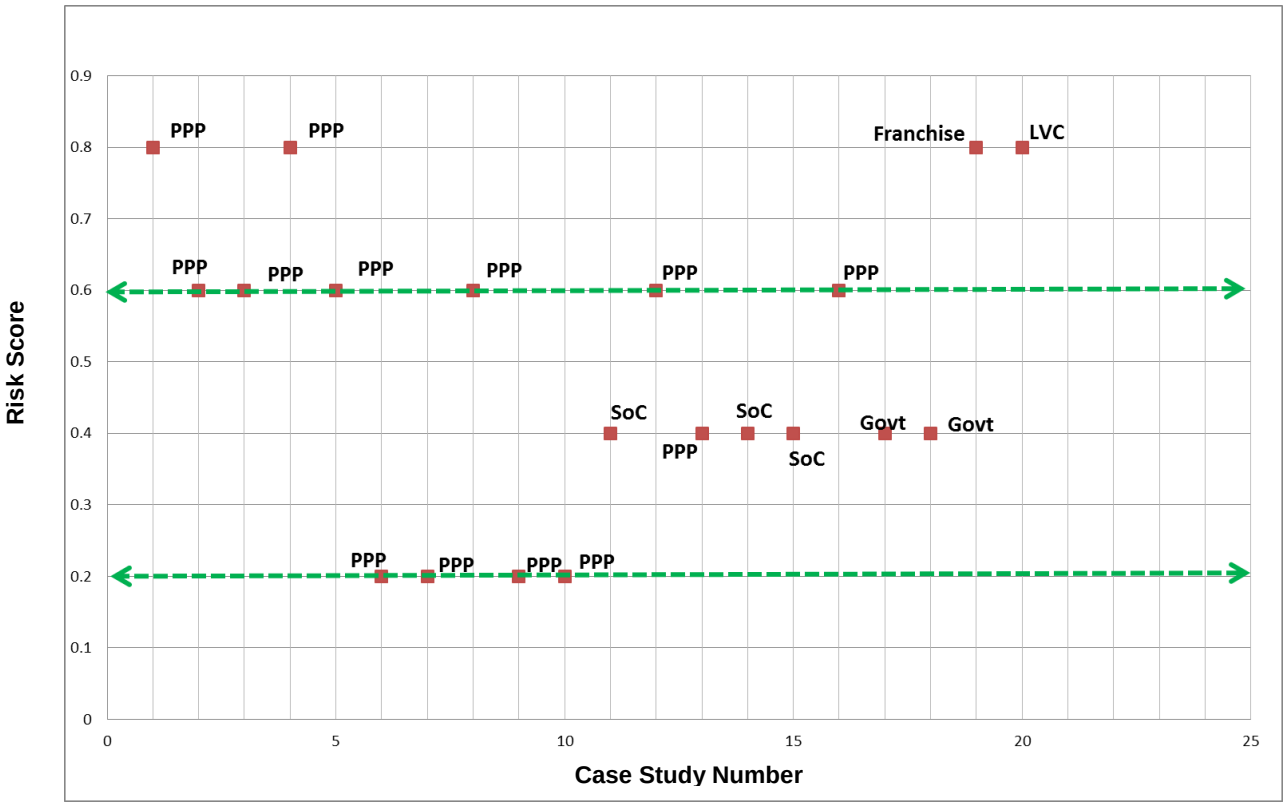

Figure 4.10 : Information Asymmetry Risk Scores

Figure 4.11 illustrates the Total Risk Score (TRS) for each case study. The diagram is based on an equal weighting assigned to each of the risk areas namely project risk, transaction costs and information asymmetry. The diagram indicates that 75% of the projects had a TRS ranging within the minimum (0.2) and average (0.6) risk levels. Notably, the Franchising and Development Contributions (Land Value Capture) financed projects had the highest TRS at 0.78 and 0.81 respectively.

Figure 4.12 shows that a total of 70% of all projects fell within a TRS range between 0.4 and 0.6, 20% between 0.6 and 0.8 and 10% above 0.8.

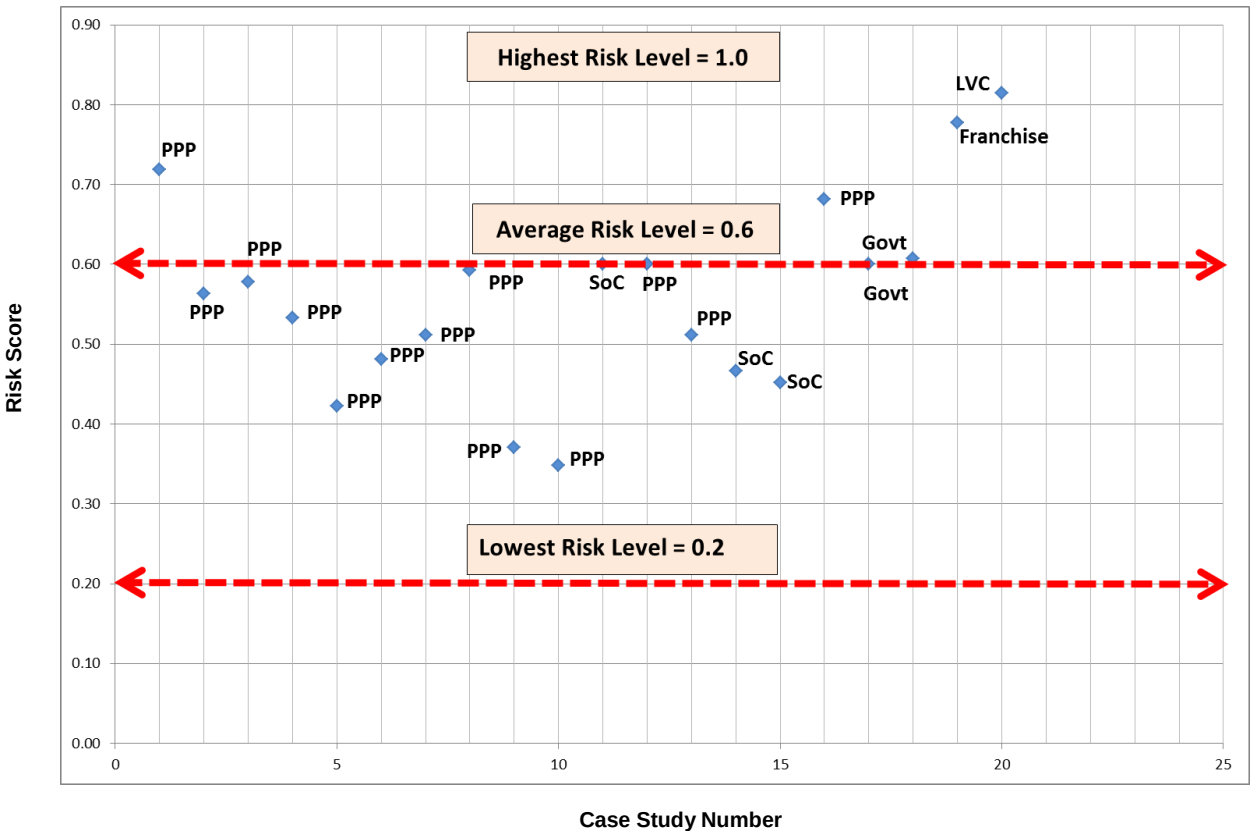

Figure 4.11 : Total Risk Scores

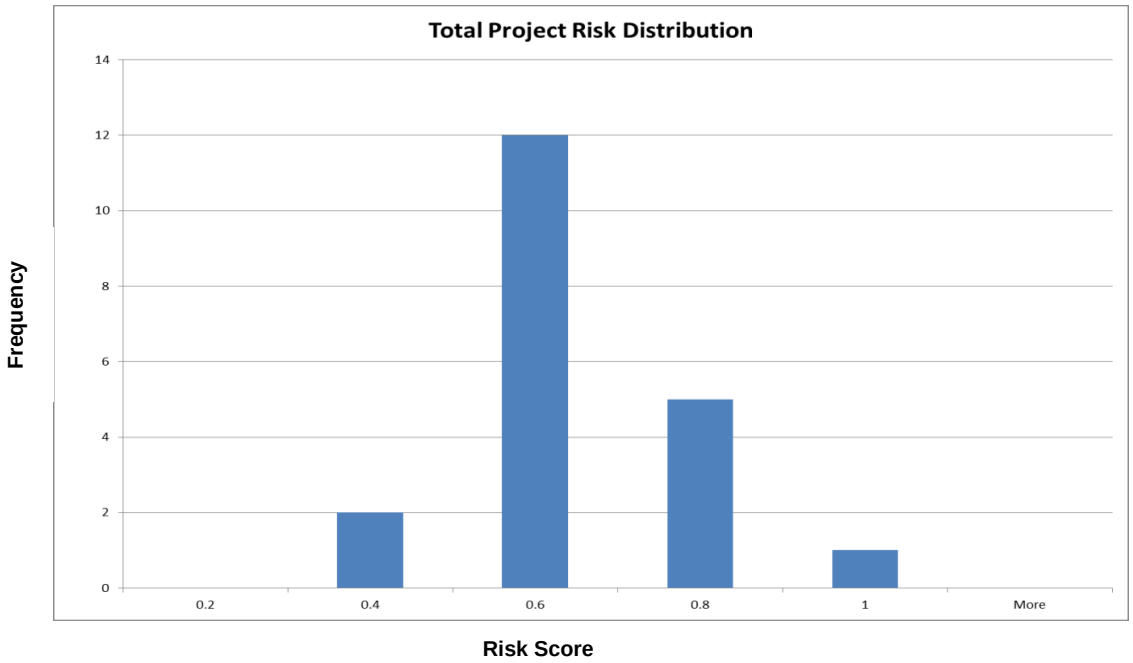

Figure 4.12 : Total Project Risk Score Distribution

4.4 Framework for Financing Mechanisms

For each of the twenty case studies, the financing mechanism was classified either as project finance or corporate finance.

In order to determine whether public institutions use a uniform framework in choosing a financing option (project or corporate finance), the observed financing options were regressed against the project risk score (PRS), transaction cost risk score (TRS) and information asymmetry risk score (IARS).

As determined in section 3.5.2 of the report, the relationship between the financing option and risk factor scores is given by the following equation :

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

where :

P_i	=	Probability that a Project Finance Option is chosen given the values of independent variables for project i
$1- P_i$	=	Probability that a Project Finance Option is not chosen given the values of independent variables for project i
ln	=	Natural logarithm
PRS_i	=	Project Risk Score for a particular project i
TCRS_i	=	Transaction Cost Risk Score for a particular project
IARS_i	=	Information Asymmetry Risk Score
βj	=	for j=1,2,3; the coefficient of variable (PRS, TCRS, IARS) which measures the change in *L (log of odds)* for a unit change in the independent variable score,
α	=	y intercept (constant) = value of L (l*og of odds*) when the value of all risk scores are equal to zero.
ε	=	the error term of the regression model

Risk Score	=	Average Rating / 5
Rating	=	1 (very low); 2 (low); 3 (average); 4 (high); 5(very high)

Table 4.3 summarises the results of the regression model from the Eviews software package.

Dependent Variable: FINANCING_MECHANISM
Method: ML - Binary Logit (Quadratic hill climbing)
Date: 12/17/12 Time: 11:51
Sample: 1 20
Included observations: 20
Convergence achieved after 4 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
INFORMATION_ASSYMETRY	0.616083	2.922787	0.210786	0.8331
PROJECT_RISK	6.096310	5.873653	1.037908	0.2993
TRANSACTION_COSTS_RISK	-10.70669	5.630053	-1.901704	0.0572
C	3.209219	2.918344	1.099671	0.2715

McFadden R-squared	0.223824	Mean dependent var	0.700000
S.D. dependent var	0.470162	S.E. of regression	0.451284
Akaike info criterion	1.348277	Sum squared resid	3.258518
Schwarz criterion	1.547423	Log likelihood	-9.482767
Hannan-Quinn criter.	1.387152	Deviance	18.96553
Restr. deviance	24.43457	Restr. log likelihood	-12.21729
LR statistic	5.469038	Avg. log likelihood	-0.474138
Prob(LR statistic)	0.140502		

Obs with Dep=0	6	Total obs	20
Obs with Dep=1	14		

Table 4.3 : Multiple Regression Output

Based on the output, it can be concluded that at a 5% significance level all the coefficients of independent variables are statistically insignificant. This means that, based on the sample of case studies, none of the variables (risk factors) have an influence in the selection of a financing option (project finance or corporate finance) for the development of public infrastructure.

CHAPTER 5 : INTERPRETATION OF RESULTS

This chapter interprets the results presented in Chapter 4. The interpretation is done in line with the research questions posed in Chapter 1 namely:

a. What are the key financing mechanisms used to finance public infrastructure investments in South Africa?
b. How appropriate and efficient are the mechanisms used to finance public infrastructure in South Africa?
c. Is there a consistent framework used by public institutions to select appropriate and efficient mechanisms for the financing of different public infrastructure projects in South Africa?

5.1 Introduction

Since 1996, the growing trend in public infrastructure investment in South Africa necessitated the use of other financing mechanisms in addition to the traditional sources. Although Chan *et al* (2009) noted that government appropriations remain the largest mechanism to finance public infrastructure, other options are gaining popularity at different spheres of government in South Africa.

Whilst the delivery of social infrastructure remains the mandate of government, since the early 2000s a significant portion of economic infrastructure such as road, rail, energy and water has been delivered by state owned companies (SoCs). As noted by Inderst (2009), since the late 2000s there was a growing recognition of infrastructure as an asset class of its own by many South African pension funds and public infrastructure investment institutions.

Based on the case study observations, other than the growth in the number of infrastructure projects, the value of individual projects is showing a substantial growth since the first large PPP project in 1996. The pressure to fund other social needs and

related infrastructure has encouraged government to seek alternative financing mechanisms, particularly for economic infrastructure.

Although the current experience seems to indicate that privately funded infrastructure, e.g. through PPPs, is more costly than traditional sources government has committed itself to creating a conducive environment for private sector participation in public infrastructure development.

5.2 Key Financing Mechanisms

Except for specific purpose bonds, the case studies have confirmed that key public infrastructure financing mechanisms observed in the literature review, namely budget appropriations, state owned company balance sheet financing, development contributions, public private partnerships and franchising arrangements are also applicable in the South African environment.

5.2.1 Budget Appropriations

As noted by Calitz & Fourie (2007) and Chan *et al* (2009), budget appropriations remain the most important source of financing infrastructure investment in South Africa. Since the late 1990s, government has made significant contributions towards public infrastructure investment. The contributions have largely been in the form of equity contributions in PPP projects or shareholder loans to SoCs. These contributions are however dispensed through normal budget appropriation processes.

5.2.2 Specific Purpose Bonds

Although South Africa has one of the most active organised bond markets in the world, the issuing of specific purpose bonds has not gained momentum. For the successful utilisation of this mechanism, there is a requirement to develop complex technical and legal structures for the provision of security against revenue streams and assets. This demands, particularly from the public sector, high levels of skill and capacity to structure and manage projects financed through this mechanism.

5.2.3 SoC Balance Sheet Financing

Most of the economic infrastructure in South Africa is delivered through SoCs who have more flexibility than other public institutions to source external funding to complement their internal sources of revenues. SoCs are better able to raise debt from local and international markets using their balance sheets and political support from government.

During the financial crisis of the late 2000s, the close association of SoCs with government however had a negative impact on their credit ratings as a result of the downgrading of sovereign debt. In certain instances, the refusal to by some regulators to approve higher tariffs and/or government's reluctance to make shareholder contributions resulted in the downgrading of some SoC debt.

Despite these challenges, the SoC financing mechanism is and continues to be the most popular alternative to the budget appropriation mechanism to finance economic infrastructure in South Africa. The independence, regulatory flexibility and skill base associated with the SoCs are some of the major factors that contribute to their ability to leverage own funding to finance infrastructure development.

5.2.4 Development Contributions

Whilst this mechanism is important for raising finance, it has not been fully utilised by many public sector institutions for the development of their infrastructure or for revenue generation purposes. The restricted use of this mechanism can largely be attributed to the capacity and ability of many public institutions to structure and implement projects for the optimal benefit of the public.

Project structuring and development processes associated with this mechanism generally take long and benefits such as urban regeneration, investor confidence, job creation and increased rates and tax revenue become realisable in the long term. Most public institutions become reluctant to use this mechanism because it generally requires the disposal of underutilised public assets.

5.2.5 Public Private Partnerships

Despite the negative perceptions of this mechanism in developing economies, it has gained popularity and continues to be a preferred public infrastructure financing option in South Africa. The preference for the mechanism can be attributed to its ability to transfer risk from the public to the private sector and the provision of critical skills to deliver complex and high value projects.

However, the high transaction costs and information asymmetry associated with this mechanism results in high financing costs. The public sector skill and capacity to initiate, negotiate, close and manage PPP contracts is the single most important factor that contributes significantly towards the reduction of costs resulting from transaction and information asymmetry risk factors.

5.2.6 Franchise Arrangements

This is a relatively new mechanism of delivering services through existing public infrastructure assets. The lack of capacity within the public sector to initiate, negotiate and manage franchise arrangement projects is a major constraint limiting the use of this mechanism.

The type and amount of risk assumed by the public sector in this mechanism can be substantial resulting in using alternative mechanisms such as budget appropriations or PPPs. The mechanism can however be used in combination with other mechanisms to ensure the optimal utilisation of public assets.

5.3 Appropriateness of Financing Mechanisms

5.3.1 Budget Appropriations

The budget appropriations mechanism is efficient when the public sector assumes a lead role in the implementation of public infrastructure, particularly in the early stages of the project where the commercial viability is still uncertain. For the development of

social infrastructure, this mechanism is the most appropriate as it provides certainty to the investor in respect to the commitment of the public sector to the project.

The mechanism has also been successfully utilised to provide equity and guarantees in social infrastructure and other PPP projects. It has also been successfully utilised as a guarantee to minimise demand risk on capital intensive economic public infrastructure projects and to finance franchising arrangements projects.

5.3.2 Specific Purpose Bonds

Although this mechanism is not generally used, there is a wide and varied use of general purpose bonds to finance public infrastructure investments in South Africa. Except for budget appropriations, this mechanism is generally associated with lower financing costs and encourages good corporate governance and discipline to the issuing institution. Where general purpose bonds have been used, particularly by municipalities, they are subjected to very strict financial covenants which only a few municipalities can meet. This mechanism has been used successfully by the SoCs to leverage their balance sheet capabilities.

Attah-Mensah (2005), Mafusire *et al* (2010) and Kingombe (2011) have expressed a need, particularly for African economies, for the establishment of infrastructure institutions that will focus on the development of project specific bonds relevant and appropriate for the continent. These instruments, the authors argued that they could particularly be important in facilitating cross country infrastructure projects such as rail, road and energy or water regional distribution schemes.

5.3.3 SoC Balance Sheet Financing

This mechanism has been the most utilised towards the development of economic infrastructure in South Africa. The strategic nature of the SoCs enables government to leverage limited budget appropriations by raising debt from the financial and capital markets. The SoCs generally possess the requisite skills and capacity to manage the implementation of complex infrastructure projects.

As a result of the long history of the SoCs in raising debt finance, their participation in the development of economic infrastructure is the most appropriate and efficient for South Africa. The cost of debt raised by the SoCs compares well or even better than that raised by most corporates and in certain cases even better than that raised by government.

Since the SoC infrastructure programmes are generally medium to long term, their projects are generally exposed to a number of project risks such as demand, foreign exchange, interest rates and regulated tariff structures. In response to these risks, SoCs have developed robust risk management processes and capacities.

5.3.4 Development Contributions

Although the use of this mechanism has been limited to a few known cases in South Africa, a number of institutions have questioned the appropriateness and efficiency of the mechanism. Some of the skepticism includes the disposal of public assets, sometimes at the expense of social objectives, and the disproportionate benefit by the private sector in this mechanism. The capacity and ability of public institutions to initiate, negotiate and manage projects financed through this mechanism is also a major obstacle in the utilisation of this mechanism.

Despite its limited use and criticisms leveled against it, the mechanism is still important for the generation of long term sustainable revenues from surplus underutilised assets usually associated with public institutions.

5.3.5 Public Private Partnerships

The use of this mechanism has become the most preferred alternative to supplement budget appropriations for most of spheres of government. There has however been a limited use of the mechanism within the SoCs since they are able to access various sources of finance and have capacity to implement such projects. As a result of financial constraints, government has been calling for more private sector involvement in the development of infrastructure in the telecommunications, energy and transport sectors.

In instances where users have to pay directly for public infrastructure services, the mechanism is always criticised for its inefficiency and disproportionate benefit accruing to the private sector. A classical example in South Africa was the resistance to the tolling of a highway improvement project. Some users believed that the project could have been better financed through other mechanisms where the burden of infrastructure investment was not on a user pays principle.

The growing number of PPP financed projects since the early 2000s has enabled the South African public sector to gain a substantial amount of skill and knowledge to manage these complex projects. This trend will result in a substantial reduction in financing costs as both the public and private parties begin to understand each other's role in the assumption and management of various project risks.

5.3.6 Franchise Arrangements

As noted by Chan *et al* (2009), this mechanism is appropriate where the public sector does not possess the skill to operate the infrastructure and where the existing infrastructure is operated inefficiently. For new infrastructure, the authors argued that other mechanisms such as PPP are more appropriate.

Whilst this mechanism offers substantial savings on financing costs, the public sector assumes a substantial amount of risk which could be better appropriated to the private sector. Since the public sector takes leadership in the design, implementation and initiating the management contract with the private sector, delays resulting from inadequate skill and capacity of the public sector can have a substantial negative impact on the overall financing costs.

Based on the case study observations, the public sector has generally preferred to use PPPs for new infrastructure and franchising arrangements to improve operational efficiencies on existing infrastructure, particularly for social facilities.

5.4 Consistency of Financing Framework

The results from the multiple regression model showed that there is no relationship between the choice of a financing option (project finance or corporate finance) and any of the risk factors related to the implementation of the project, transaction costs or information asymmetry between the public sector and private investors/lenders.

This finding suggests that there is no common framework that public sector institutions use to make decisions on the choice of an appropriate infrastructure financing mechanism, given an understanding of project risks, transaction cost risks and information asymmetry risks.

An observation on the choice of the project finance mechanism (PPPs) also indicates no relationship between the choice and the risk factors. This also implies that even with the use of the PPPs, the framework is not consistent across the case studies reviewed. It is however acknowledged that when a number of PPP case studies were initiated, there was no common framework that was available to guide the selection and use of this mechanism. The implementing institutions largely relied on their discretion in the absence of uniform standards.

Although some consistency has been observed, particularly with the implementation of office accommodation PPP projects, a lack of a framework still exists in the choice of other financing mechanisms. The lack of a common financing mechanism framework and inconsistencies across the public sector result in risks which are ultimately factored in the financing costs of infrastructure by the private sector. This results in costly and therefore inefficient financing of infrastructure development in South Africa.

CHAPTER 6 : FINANCING MECHANISM FRAMEWORK

This chapter presents a proposed conceptual framework for the selection of an appropriate and efficient mechanism for financing public infrastructure investments in South Africa. Calitz & Fourie (2007) stated that in financing public infrastructure, it is important that government does not assume an inappropriate role nor expects an inappropriate involvement of private business. Inderst (2010) demonstrated that, like any asset, infrastructure investment decision is determined primarily by risk-return profile of a portfolio held by an investor.

Griffith-Jones & de Lima (2004) stated that infrastructure finance subjects private investors to major risks and that the main concerns when structuring financing mechanisms is the way risk is perceived. The authors defined risks as all the possibilities of delays or differences in returns to that which investors would receive if everything went according to plan.

The conceptual framework proposed is founded on concepts extracted from the literature review and the assessment of South African public infrastructure projects studied and reported in Chapter 4 and Chapter 5. The framework recommends a systematic and structured approach in the assessment of overall project risks.

The assessed overall risk of a project implies a certain level and/or category of expected returns. An efficient financing model, as stated by Chan *et al* (2009), is that which firstly acknowledges the risks associated with a project and then optimally allocates such risks to the parties that are best able to do so. Having assessed the implied risk level/category, the model helps with the selection of a financing mechanism that is appropriate and efficient (i.e. reduces overall project financing costs).

In summary, the conceptual framework starts with the understanding of the assessed infrastructure needs which determine whether the infrastructure is of a social or economic nature or a combination of both. This is followed by a process of classifying risks into categories related to project implementation, information asymmetry between public and private sectors, transaction cost factors and capacity of the public sector to facilitate and manage the implementation of the project.

The classification is then followed by a detailed quantification of the identified risks using a qualitative but objective assessment tool. The risk quantification yields a measure of the overall project risk, giving a qualitative indication of the expected return by potential investors of the project. Based on the theory underpinning the capital asset pricing model (CAPM), the expected return is positively correlated to the overall project risk measure (score).

In addition to the quantification of the overall project risk, the model recommends that factors such as legislative or policy restrictions, that may have an impact on the choice of a financing mechanism need to be considered. Such considerations may take precedence over the mechanism recommended through the project risk score alone.

Figure 6.1 shows a schematic representation of the proposed conceptual framework and Appendix D shows the framework as used for the quantification of a project risk score.

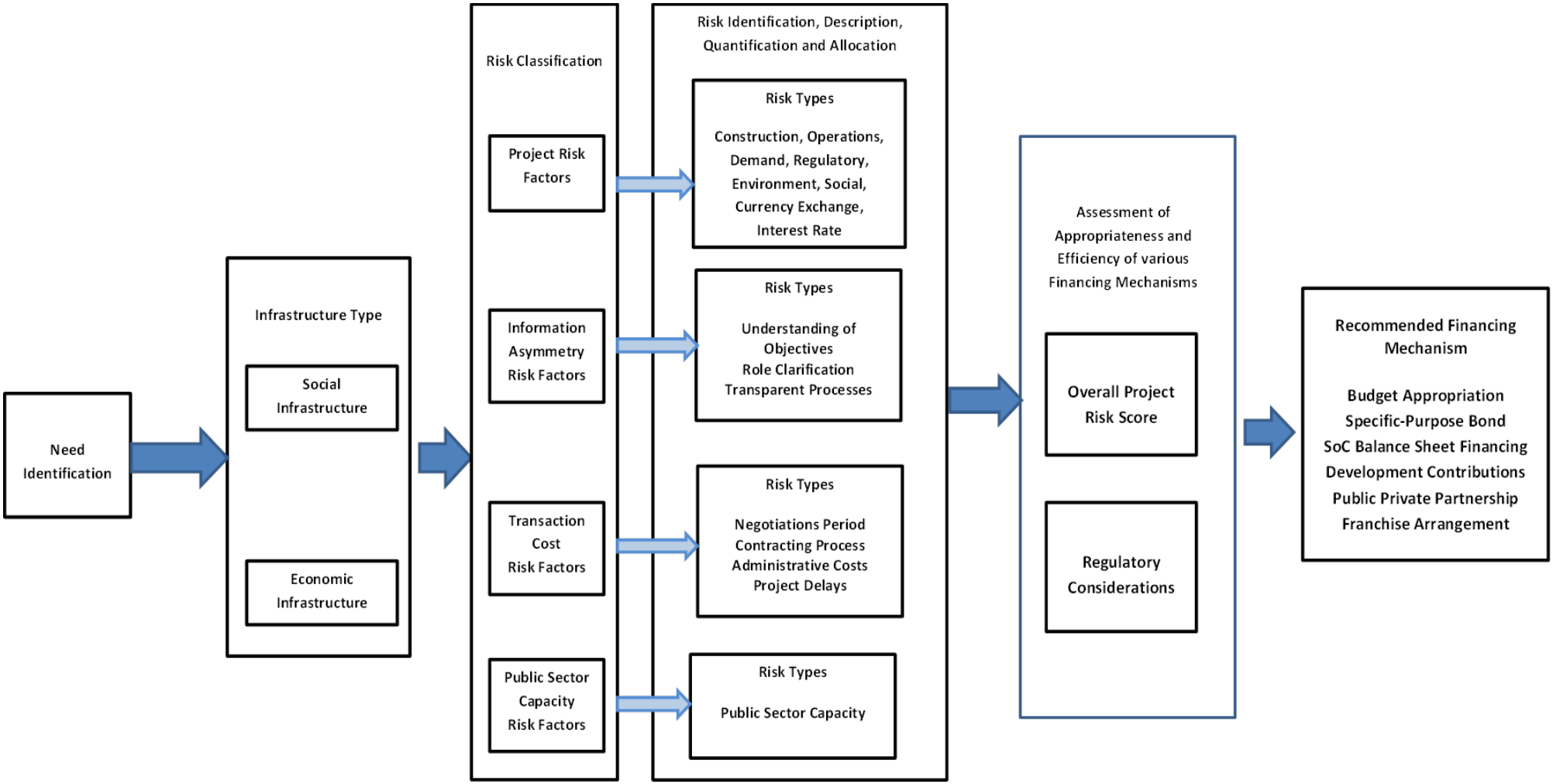

Figure 6.1 : Infrastructure Financing Conceptual Framework as conceptualised by the author

The following is a brief description of the key parameters of the framework.

6.1 Needs Assessment

The need for infrastructure will be determined from a project feasibility study conducted by an institution responsible for the development of the infrastructure and the delivery of the public good or service. It is assumed that the feasibility study, its stages and outputs are conducted through industry best practices, prescribed guidelines or regulations.

6.2 Infrastructure Type

The identification of the need and the output of the feasibility study will indicate the type (i.e. social or economic infrastructure) that is required for the satisfaction of the identified need. It is however acknowledged that for certain needs, it may not be immediately obvious under which category the infrastructure project will be classified.

A typical example where this may require a closer analysis is on the provision of public transport infrastructure to poor communities. Whilst this infrastructure may initially provide mobility to the targeted communities, the project may also open up new economic opportunities to the recipients and potential business investors. However, in the provision of social services such as health and education, the infrastructure is easily categorised under the social infrastructure category.

6.3 Risk Classification

The framework, in line with the literature review, proposes that the overall risk of a public infrastructure investment project is critical in determining an appropriate financing mechanism. The determination of a risk category of a project enables the estimation of a likely/expected investment return by potential investors and/or funders of the project.

The framework proposes the classification of risk into project related risks, information asymmetry risk, transaction cost factor risks and the ability/capability of the public sector institution to manage the implementation of the project. Each of the risk classes is

allocated a weighting which is based on the unique circumstances of the project and other factors.

6.4 Risk Identification and description

In order to identify manageable risks, each of the risk classes identified above is subdivided into sub-classes. The nature of each risk is described as comprehensive as possible so as to develop an objective and accurate measurement and management strategy. The proposed sub-classes can be customised to suit projects implemented by different institutions and/ or investors or lenders.

6.5 Risk Quantification

The framework proposes the use of a Likert scale (1 to 5) to quantify the level of risk to be allocated to a sub-class. The scale is generically designed to quantify the risk level as follows : 1 = very low; 2 = low; 3 = average; 4 = high and 5 = very high. Each of the risk sub-classes is allocated a weighting within its class to take into account unique project related factors.

Although the scale is subjective and qualitative in nature, it allows for a uniform rating of risk across different projects and also allows for a rating of the same project by different assessors using a common instrument. This allows for objective risk assessment which is often difficult to obtain, particularly when a project is assessed by people from different backgrounds or with diverse interests on the project.

6.6 Risk Allocation

Based on the literature review, the most efficient financing mechanism is the one that diversifies and allocates the risks of a project to the parties that are best able to carry. Once the project risks have been identified and quantified, it is important that the public and private sector institutions understand clearly the nature and level of risks the other party is prepared to assume in the implementation of the project throughout its life-cycle.

The framework therefore allows for a transparent process where each party is clear on the nature and level of risk each party is carrying on the project. This framework could also be used to facilitate negotiations among parties and thereby reduces unnecessary delays on the implementation of the project. Most importantly, it allows for a more transparent costing of the financing costs based on the allocation of risk carried by each party.

6.7 Total Risk Score

On completion of the detailed assessment of the risks, the framework calculates an overall risk score which can then be used to categorise the project risk on a similar Likert Scale level i.e. very low, low, average, high or very high risk level.

6.8 Regulatory Considerations

Provisions of a number of legislations and regulations such as the PFMA, MFMA and PPP Guidelines need to be considered before a final decision is made on the choice of a financing mechanism. The provisions will determine and/or guide the final choice of the mechanism and the administrative and legal processes to be followed to implement such a choice.

6.9 Recommended Financing Mechanism

The framework recommends different financing mechanisms for different overall project risk categories. The framework proposes a 'pecking order' ranking of financing mechanism in this order: the lowest risk project (category 1) is financed through government appropriations or SoC balance sheet, followed by category 2 financed through franchising, category 3 financed through specific borrowing bonds, category 4 through development contributions and the highest risk projects (category 5) financed through PPP mechanisms.

Acknowledging that the proposed order may not always be appropriate, the framework allows institutions to develop their financing order based on their portfolio of projects and risk appetite. In addition, the framework allows for the other qualitative

considerations such as legislative/regulatory constraints that may restrict the use of certain financing mechanisms for certain projects. Combining the calculated overall project risk score with other qualitative considerations, an institution or private investor/funder can make an overall recommendation on the appropriate and efficient financing mechanism.

6.10 General

This proposed framework provides the public and private sector an objective platform for an effective and transparent assessment of critical risks associated with the implementation of public infrastructure projects. Acknowledging that this research is the first of its kind in South Africa, it therefore provides an informed platform for further research in various areas of infrastructure financing to improve on the proposed framework.

CHAPTER 7 : CONCLUSIONS

7.1 Introduction

The purpose of this research was to determine key financing mechanisms, their appropriateness and efficiency in financing public infrastructure investments in South Africa. A further objective of the research was to propose a conceptual framework to be used by public sector institutions to select appropriate financing mechanisms for various public infrastructure projects.

Since the research is conceptual in nature, a multiple case study methodology was adopted to find responses to the research questions. A number of public infrastructure projects implemented by various public sector institutions were analysed to determine the key financing mechanisms and their appropriateness for different infrastructure projects. The case studies were also used to determine whether public sector institutions used a consistent framework to select appropriate financing mechanisms for the development of their infrastructure.

Based on the literature review concepts and the analysis of case studies, a conceptual framework was proposed for use by public (and private) sector institutions to select appropriate and efficient financing mechanisms for the development of public infrastructure.

7.2 Conclusions of the study

The review of literature and the analysis of case studies provided insight to the questions raised at the beginning of the research. The following is a summary of the findings of the research.

7.2.1 Financing Mechanisms

The research found that, in line with the literature review, public infrastructure in South Africa is financed through budget appropriations, state-owned companies, development contributions, public private partnerships and franchising arrangements

The research also found that budget appropriations remained the main source of financing, particularly for social infrastructure projects. This mechanism is also used as equity contribution (shareholder loans) in cases where the balance sheet of an SoC is used to raise external loan finance and issuing of bonds. In certain instances, budget appropriations were used to guarantee minimum project cash flows in complex PPP arrangements to either ensure financial viability of a project or reduce funding risk to private sector investors.

The research further found that a significant proportion of investment in economic infrastructure is financed through SoC infrastructure programmes. This results from a reality that all key economic infrastructure such as electricity, ports, freight rail, national toll roads, telecommunications, and bulk water infrastructure are under the custodianship of SoCs.

Despite the evident importance of the development contribution (land value capture) mechanism for financing urban infrastructure and its capacity to generate additional revenue from under-utilised public sector assets, it seems to play an insignificant role in the development of public infrastructure. The reluctance of some public sector institutions to utilise this mechanisms stems from the requirement for public sector to make long-term commitments which have delayed benefits.

The skill set required to initiate and manage projects financed through this mechanism also pose a major constraint to its utilisation by many public sector institutions.

The research found that the use of PPPs gained popularity since the late 1990s. Although the mechanism has been criticised for its high financing costs and disproportionately benefiting the private sector, there is a significant number social and economic infrastructure projects financed through this mechanism. This growth in the

number of PPP projects has benefited the development of specialist project finance and management skill and capacity of the public sector. There is still no significant utilisation of PPPs by SoCs in the delivery their economic infrastructure programmes.

The franchising arrangement is a relatively new mechanism in the financing of public infrastructure in South Africa. Where it has been utilised, the mechanism has been a variation of a PPP model where the private sector assumes operational risks of an existing infrastructure asset. The development of public transport infrastructure projects and hospital operation projects are some examples that utilised this mechanism.

Although the literature review highlighted the importance of specific purpose bonds, this mechanism is not generally used in South Africa. There is however a significant use of general purpose bonds by a number of public institutions such as municipalities and state-owned companies.

For developing economies, the literature review also highlighted the importance of funding provided by donor agencies and financial development institutions. Although the research found a significant role financial development institutions (DFI) play in the financing of public infrastructure, there is an insignificant reliance on this funding source by the South African public sector and its institutions. Where DFI funding is utilised, it is generally considered either as loan financing (by SoCs and municipalities) or part of government appropriations if the DFI is sourced directly by government.

Although the utilisation of public infrastructure financing mechanisms in South Africa compares well with international benchmarks, there still exists opportunities in the use of specific purpose bonds.

7.2.2 Appropriateness of Financing Mechanisms

The research found that budget appropriations have been used to either finance social public infrastructure, provide equity contribution to SoC balance sheets and to facilitate project viability in order to attract private sector investment. Given that the mechanism offers the lowest financing costs, the above-mentioned applications indicate that budget

appropriations have generally be used appropriately to finance public infrastructure investments.

Since the mechanism is generally used at the sole discretion of government, it is not always the most appropriate and efficient in the absence of independent scrutiny of the financial market processes.

Financing infrastructure development through SoC balance sheets has proved to be the most appropriate given the SoC skill base and ability to source financing from local and international markets. Although the mechanism can be expensive during unfavorable credit ratings, the SoCs have succeeded in raising funding even during economic downturns.

Although used in very limited cases, the development contributions mechanism considered in the research proved to be a critical source of urban infrastructure finance. The benefits of the mechanisms extend beyond the infrastructure financing to include benefits such as increase in investor confidence, sustainable job creation and regeneration of depressed areas,

Although the PPP mechanism has been applied in appropriate projects, there is still a great need to improve on the capacity of the public sector to minimise potentially high financing costs associated with this mechanism. As observed in the research the significant growth in the knowledge in managing the PPP processes will have a positive impact on the reduction of the total life-cycle financing costs.

Based on the research findings, the use of the franchising arrangement mechanism has not been appropriate given the disproportionate assumption of risk by the public sector despite the participation of the private sector in the project. Where the mechanism seemed appropriate and efficient is where the private sector was involved in the operational improvements on an existing infrastructure.

7.2.3 Financing Mechanism Framework

The research found that there was a lack of a common framework used by public sector institutions to select appropriate and efficient financing mechanisms for the development of public infrastructure.

Based on the analysis of case studies and literature review, a conceptual infrastructure financing framework was proposed. The conceptual framework proposes that, in addition to a structured approach to the assessment of project risks, factors external to the project such as the regulatory constraints, should be taken into account in choosing an appropriate financing mechanism.

7.3 Recommendations

Although the research has confirmed that South African public infrastructure financing mechanisms are comparable to international best practices, there is a need to develop public sector capacity to improve efficiencies in the mechanisms already in use. Furthermore, there is a need to focus on developing a conducive environment for the utilisation of specific purpose bonds and franchising arrangements.

Although the proposed conceptual framework is based on exploratory research, it provides a useful basis to be used by public and private sector institutions as a common project financing assessment platform. The framework will have a significant impact towards optimising project risk allocation, reducing information asymmetry, reducing transaction costs and strengthening public sector capacity thereby minimising costs of appropriate financing options.

7.4 Suggestions for further research

This exploratory research lays ground for further research into the following areas of public infrastructure financing :

- A critique of the proposed conceptual public infrastructure financing framework

- Key determinants of private sector involvement in public infrastructure investments
- Developing a risk-return relationship of public infrastructure assets
- Risk allocation and its impact on the reduction of public infrastructure financing costs
- Critical success factors for the development of a specific-purpose bond market in Africa
- Quantitative comparison of project life cycle costs of various financing mechanisms

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APPENDIX A : FINANCING MECHANISM CASE STUDIES

The following is a brief discussion of the twenty public infrastructure case studies considered in the research.

The summary provided on each case is based on information obtained from a number of sources including technical reports, newspaper articles, journal articles, latest annual financial statements, informal interviews with industry experts and in a few instances discussions with personnel that were involved in the implementation of the projects. The aim of using various information sources was to ensure that the information gathered was as complete and accurate as possible.

The economic and social infrastructure projects reviewed span across a number of sectors such as social facilities, transport, energy and water. For each case, a brief background to the project is provided followed by an overview of the financing mechanism adopted by the relevant implementing public or private sector institution. Lastly, an overview of important features of the project is highlighted.

Although each case presents its unique characteristics, there are a few common themes that underlie the cases considered. These themes are analysed in detail in the body of the research report.

8.1 National Toll Road – Maputo Corridor (N4)

8.1.1 Project Background

During the mid-1990s, the governments of Mozambique and South Africa agreed on the development of a road linking the economic hubs of the two countries namely Maputo and Gauteng. The N4 toll route runs over a distance of almost 600km between Gauteng (east of Pretoria) and the Port of Maputo in Mozambique, and operates six toll plazas along the route.

Farlam (2005) noted that as a result of major road maintenance backlog in South Africa and war ravaged infrastructure in Mozambique, both governments faced fiscal constraints and did not have sufficient funding to finance the proposed toll road and related infrastructure projects. The two governments therefore found the public private partnership (PPP) approach appealing.

8.1.2 Financing Mechanism

In 1996 the two governments entered into a 30-year concession with a private sector consortium to build, operate and transfer the infrastructure to governments. The total estimated contract cost of approximately R3 billion (at 1996 prices) was financed from 20% equity and 80% debt. The equity investors included three construction firms, a South African Infrastructure Fund and a commercial bank. Debt was raised from four South African Banks, the Development Bank of Southern Africa (DBSA) and a Pension Fund.

8.1.3 Key Issues

In order to minimise funding risks, both governments provided joint and several guarantees for the debt and under certain conditions also guaranteed equity. Other than project specific risks, the project faced major demand risks as this was the first

major toll road project for both countries. There was uncertainty as to whether the targeted users would be prepared to pay the toll fees or would rather use some of the then available alternative routes. Farlam (2005) stated that there was also considerable user payment risk in Mozambique as the poor communities were unable and unwilling to pay high toll fee. This resulted in the cross-subsidisation of the Mozambican portion of the road with higher revenues from the South African side. Substantial discounts were also offered to regular and local users of public transport on both sides of the border.

8.2 National Toll Road – Bakwena Platinum Corridor (N4)

8.2.1 Project Background

The concession contract to design, build, finance, operate and maintain the Bakwena N1/N4 toll road was finalised in August 2001. The toll road consists of a 95 kilometer section of the N1 running from Pretoria northwards to the town of Bela Bela [Warmbaths] and a 290 kilometer section of the N4 running from Pretoria westwards to the Botswana border. During the first four years of the concession, the concessionaire was required to undertake a series of initial construction works that included the upgrading of the existing roads and the construction of two new sections of the N4.

8.2.2 Financing Mechanism

The cost of the initial construction works was approximately R 3 billion funded by the South African Infrastructure Fund and COFIDES (Spain) as the major non-sponsor shareholders. The funding for the project was initially raised from the private sector. The shareholders committed R700 million and 5 South African and international banking institutions arranged the R 2.3 billion structured lending facilities.

The project was refinanced in June 2009 and this resulted in a change of shareholding with the foreign and local contractors divesting their shareholding to the remaining financial institutional shareholders.

8.2.3 Key Issues

After the initial construction works were completed and traffic patterns established, the construction shareholders divested and sold their shareholding to the remaining financial institutional shareholders. The toll road is being operated and maintained by a special purpose company comprising South African and international toll operators.

8.3 National Toll Road – Cedara to Heidelburg (N3)

8.3.1 Project Background

The National Route (N3) is one of the most important commercial roads in South Africa, carrying freight and acting as a tourism conduit between the two most important provinces in South Africa, namely Gauteng and Kwa-Zulu Natal. In November 1999, the South African National Roads Agency Limited (SANRAL) awarded a 30-year concession to a private sector consortium to design, construct, operate, maintain and finance the 420 km section of the N3 route between Cedara in KwaZulu-Natal and Heidelberg in Gauteng.

8.3.2 Financing Mechanism

The concessionaire was to finance, upgrade existing sections of the route, construct new sections and repair & maintain the route over the concession period. This commitment, amounting to approximately R10 billion over the concession period was financed through a combination of equity funding, debt finance and cash generated internally from the concessionaire's operations. The financing strategy seeks an optimum solution for the concessionaire while providing the equity investors and lenders with acceptable returns.

8.3.3 Key Issues

The main project risks included potential delays in obtaining necessary environmental permits, additional construction costs incurred through the realignment of existing sections and mitigation works. The risk related to potential delay in obtaining environmental permits for the initial construction works was however considered to be low as the concessionaire had addressed all the relevant issues supported by detailed specialist studies and associated design changes.

8.4 Government Office Accommodation – Trade and Industry

8.4.1 Project Background

This was the first government office accommodation project to be approved by the National Treasury as a PPP project under the Public Finance Management Act (PFMA).

The Department of Trade and Industry entered into a 25 year concession contract with a private sector consortium to provide a campus that would be a fully-serviced, world-class facility to contribute significantly to the efficiency and efficacy of the department. The campus houses the departmental officials as well as many of the agencies that report to the department. The project involved the construction of seven 3-storey buildings with a total floor area of approximately 44 000m^2. In addition, the concessionaire was to provide a comprehensive range of facilities management (FM) services including, among others cleaning, maintenance, security and the installation of commercial tenants. The R500 million project commenced in February 2003 and was completed in August 2004.

8.4.2 Financing Mechanism

In terms of the PPP agreement, the concessionaire was contracted to design, build, finance and operate the campus over a period of 25 years from August 2003. In return, the department makes monthly unitary payments to the concessionaire to cover the costs of providing the facilities management service and service debt.

The project was financed through 80% debt and 20% equity of which 12% was the contribution by government. It is estimated that the present value (as at 2003) of the unitary payment over the period of the concession will be R870 million. The major benefit to government is that at the end of the concession period, the ownership of the land and improvements revert back to government.

8.4.3 Key Issues

The benefit of the PPP is that it allowed the government department to transfer its property ownership and management responsibilities to a private sector party enabling the department to focus on its core functions. Another significant value-for-money consideration to the department was the immediate construction of additional office space as an integral part of the campus to meet future expansions.

The contract was concluded at a fixed price that was escalated on an index linked to the national inflation rate. The facilities management (FM) service delivery was set to meet stringent standards that included penalties in cases where the minimum standards were not met by the FM company.

8.5 Government Office Accommodation – Basic Education

8.5.1 Project Background

The Department of Basic Education (DoBE) entered into a PPP agreement with a private sector concessionaire for the design, construction, finance, operation and maintenance of its head office in 2007. In summary, the project involved the construction of a 30 000m² office space to accommodate approximately 1 200 employees of the department.

The project was based on a 27-year contract period that included two years of construction period and 25 years of operations. The operations included the provision of a comprehensive facilities management (FM) services which are provided at pre-determined service levels. The construction of the facility was completed at the end of February 2010 and operations commenced in March 2010.

8.5.2 Financing Mechanism

The R403 million project was funded through 90% debt and 10% equity by the concessionaire. The debt portion was arranged and underwritten by a local commercial bank. According to the PPP concession agreement, the department pays a unitary fee, which escalates annually in line with CPI. The fee is used to pay for the operating costs, debt and the return to investors.

8.5.3 Key Issues

The advantage of the PPP arrangement is that the department focusses its attention on its core business and all property management issues are taken care of by the concessionaire. Whilst the concessionaire makes a return on its investment during the contract, government benefits when it assumes ownership of the asset at the end of the end of the concession period.

8.6 Bloemfontein and Louis Trichardt Prisons

8.6.1 Project Background

During the late 1990s, when government faced a significant shortage of prison facilities, the departments of Correctional Services (DCS) and Public Works (DPW) developed a model, Asset Procurement and Operating Partnership Systems (APOPS), wherein the private sector designs, finances, builds and operates a prison facility over a long-term concession period.

In 2000, the DPW signed a two separate 25 year concession contracts with the private sector operators of the prisons located in Bloemfontein and Louis Trichardt. The facilities hold approximately 3,000 inmates each and were fully operational in 2002. A review conducted a year after the commencement of operations found that the prisons provided significantly higher quality facilities and levels of service than the public prisons and that the operating costs per prisoner per day were comparable with those of the public sector prisons.

8.6.2 Financing Mechanism

The total construction costs were approximately R1.7 billion (Bloemfontein) and R1.8 billion (Louis Trichardt) respectively in (2000 prices). Each facility was financed through equity from concessionaire shareholders and debt raised from both foreign and local financial institutions.

8.6.3 Key Issues

The high interest rates, high expected returns, high perceived project risks and high sovereign risks at the time the concession contracts were concluded resulted in high project financing costs. A review done by the National Treasury on these projects highlighted a number of critical factors that have to be taken into account in the implementation of such major projects. Among others, the lessons included public sector capacity and skill to negotiate PPP projects, timing of the implementation of such major projects and capital and financial market conditions.

As a result of these experiences, government subsequently adopted a step-by-step process to PPPs, rigorously regulated by the National Treasury setting guidelines on project inception, feasibility study, procurement and contract management process with the main purpose of ensuring project value-for-money and appropriate risk transfer.

8.7 Water and Sanitation : ILembe District Municipality

8.7.1 Project Background

The substantial growth in the demand for water and sanitation services and a simultaneous deterioration of bulk infrastructure, presented the ILembe municipality with infrastructure investment and management challenges. The municipality did not have adequate funding to upgrade and expand services and lacked the experience to provide comprehensive services. In 1999, the municipality signed a 30-year concession contract with a private sector company.

The contract required the private sector company to oversee, manage and implement the provision of water and sanitation services within the municipal boundary which had a population of approximately 45 000 people with a mix of extremes of wealth and poverty. As a result of South Africa's local government demarcation and municipal restructuring process in the early 2000s, the population of the municipality increased to approximately 600 000 people.

8.7.2 Financing Mechanisms

The concessionaire was responsible for the upgrade and investment of water and sanitation infrastructure to higher levels of service. In return the concessionaire was responsible for collecting revenue from the households to cover the investment and required returns over the period of the concession.

8.7.3 Key Issues

Partly as a result of a 20% increase in the cost of bulk water in 2001, the concessionaire found itself unable to sustain the quality of services without a substantial adjustment of the tariff to the consumers. A performance review of the concession conducted in 2005 found that, whilst the service quality targets had been achieved in the wealthier areas, those in poor areas were not met.

The poorer communities were expressing considerable frustration at receiving a lower level of service than they expected. The review had revealed that although initially the concessionaire had focused on improving the quality of service in poorer areas, non-payment by many households in these areas led to cut-offs and a reversion to lower quality service levels.

On average, tariffs for higher service level customers had increased by 119% from pre-concession levels and 80% for poorer customers. Despite these challenges, the other areas of infrastructure upgrade such as the reduction of water losses, water purity, leakages and the number of faulty meters had improved substantially.

Notwithstanding the improvements in infrastructure and service delivery, there were many criticisms leveled at both the concessionaire and the municipality. For example, in the first year after the concessionaire took over, there were cases of cholera resulting from people drawing unhygienic water from streams rather than paying for treated water as the poor people in the area were not cushioned from the impact of tariff increases.

Although in 2001, national government approved a policy to give each family 6 000 litres of free water, the policy had not been applied to those on lower service levels using prepaid meters, arguably the most needy customers and poor. To the contrary, the wealthier customers, were benefiting from the free basic water policy as a result of poor administrative processes by the municipality and the concessionaire

The contract did not anticipate changes to municipal boundaries or high non-payment rates. As a result the deal would have collapsed if the municipality had not cushioned the concessionaire from failure.

8.8 Inkosi Chief Albert Luthuli Hospital

8.8.1 Project Background

The Inkosi Albert Luthuli Central Hospital (IALCH) is an 850-bed hospital built in 1996 on behalf of the KwaZulu Natal Department of Health (KZN DoH) to provide central hospital services to approximately 12 million referred patients.

In 2001, the KZN DoH entered into a 15 year concession agreement with a private party to supply, maintain, repair and upgrade of medical equipment, information management & technology and facilities management to support the operations of the hospital.

8.8.2 Financing Mechanisms

The concessionaire invested approximately R1.2 billion and the KZN DoH contracted to pay a unitary fee of approximately R305 million per annum (adjusted for inflation) over the concession period.

8.8.3 Key Issues

The private party was concerned about the shortage of certain critical skills required for the commissioning and operation of specialist equipment and provision of certain services for the hospital. In order to minimise this risk, the parties agreed that urgent efforts should be made to increase the supply of critical skilled workers to overcome potential staffing deficits.

The project created and retained approximately 3 000 jobs and resulted in R360 million cost savings whilst delivering a state-of-the art hospital facility.

8.9 Humansdorp Hospital

8.9.1 Project Background

The need for the project arose from a rapid population growth in the area surrounding the existing Humansdorp hospital resulting in a shortage of hospital beds. There was also an urgent need to upgrade the existing hospital facility and improving the collection of revenue.

In 1999, the Eastern Cape Department of Health (ECDoH) initiated a PPP process to identify a private company to partner with the department to implement the necessary upgrades and introduce operational efficiencies to the hospital. The process was finally concluded in 2003 with the appointment of a private partner that would refurbish and establish a private health facility within the existing hospital, provide general facilities management services, share revenue generated from the operations with the ECDoH and achieve socio-economic benefits to local communities.

8.9.2 Financing Mechanisms

The ECDoH invested R1.5 million to the project and the private party contributed approximately R13 million.

8.9.3 Key Issues

Since the project was initiated before the promulgation of the Treasury Regulations on PPPs, the process of selecting a private party experienced a number of challenges. Despite these challenges, the PPP became a catalyst for further private sector participation in the provision of high quality health services in the Eastern Cape. The development contributed to the growth in local economic development and the creation of more employment opportunities.

As a result of a lack of guidelines in the implementation of PPPs, the private party took over some of the risks that it was not adequately compensated for.

8.10 Pelonomi – Universitas Hospital

8.10.1 Project Background

In 2000, the Free State Department of Health (FS DoH) embarked on a process to identify private parties that would partner with the department to improve the condition and quality of health services at the two underutilised hospitals namely Pelonomi and Universitas in Bloemfontein.

Shuping & Kabane (2007) stated that the hospitals were suitable for the establishment of independent private hospitals using their surplus infrastructure through a co-location model of public-private partnerships. The authors defined co-location as a type of PPP which occurs when the public and private sectors operate a similar service and collaborate rather than compete, resulting in the receipt of revenue by the public sector and the generation of profit by the private sector in a win-win enterprise. It occurs where the public sector has redundant assets and the private sector has sound commercial reasons for the utilisation of the excess government assets.

Prior to the initiation of the PPP process, the FSDoH had three hospitals namely Universitas, Pelonomi and National which, prior to 1994 served communities on the basis of the patients' racial classification. As part of transforming and de-racialising the provision of health care services, the department had to address the challenges of duplication, inefficiency and inequity inherited from the apartheid period. The transformation process resulted in National Hospital becoming a district level hospital, Pelonomi Hospital becoming a regional level hospital and Universitas Hospital becoming a tertiary level hospital for the province.

The transformation process resulted in the reduction in the number of beds from 2 100 to 1 600 and some public hospitals were left with excess infrastructure that was grossly underutilised. This excess capacity presented the public sector with an opportunity and a basis for contracting with the private sector.

8.10.2 Financing Mechanisms

In November 2003, the FSDoH entered into a 20 year concession agreement with a private party to operate an unused ward at the Universitas Hospital as a private hospital. In terms of the concession agreement, the private party was expected to invest capital towards the upgrading of the ward and related infrastructure. In addition to retaining the ownership of upgraded infrastructure, the FSDoH would receive a percentage of the turnover generated by the private hospital.

Shuping & Kabane (2007) noted that at end 2006, the private party had invested a total of R70.9 million and the FSDoH a total of R11 million. In 2007, the FS DoH had received a total of R9.58 million in revenue since the start of the concession.

8.10.3 Key Issues

Beyond the financial benefits to the public and private sector partners, the project had significant socio-economic benefits which would not have been possible given the limited annual budgetary allocations in the public sector. The partnership also resulted in the creation of temporary and permanent jobs by the hospital and sub-contracted services.

Shuping & Kabane (2007:157) concluded that "In this co-location project, the public sector has been able to maximise the utilisation of its assets for the highest returns with the private sector gaining ‘additional’ beds and income".

8.11 Electricity Capacity Expansion Programme

8.11.1 Project Background

Eskom is a wholly State Owned Company (SoC) primary electricity supplier which generates, transmits and distributes electricity to industrial, mining, commercial, agricultural, businesses, residential and municipalities. Eskom's business covers the entire electricity value chain from the construction of infrastructure, operation and maintenance of facilities and the sale of the electricity.

Since 2005, Eskom has been implementing its major capital expansion programme to increase the country's generation and transmission capacity to meet the growing demand for energy. When completed, two of the deliverables, Kusile and Medupi power stations, will be the third and fourth largest coal-fired power plants respectively in the world.

8.11.2 Financing Mechanisms

The total cost of the capacity expansion programme from 2012/13 to 2018/19 is estimated to be R340 billion. In order to fund the 2010/17 expansion programme, Eskom raised 77% of the R300 billion requirement from a number of external sources such as bonds (30%), commercial paper (23%), development finance institutions (21%), export credit agencies (11%), government loans (7%) and other sources (8%).

8.11.3 Key Issues

Eskom (2012) stated that the negative sovereign rating outlook by major ratings agencies on South Africa during 2011/12 resulted in the revision of Eskom's outlook to negative. Although this did not have an immediate impact, it was likely to affect Eskom's borrowing costs in future. In order to minimise its borrowing costs, Eskom explored other sources of funding, including Islamic bond finance, preference shares and retail bonds.

8.12 Renewable Energy Independent Power Producer Programme

8.12.1 Project Background

The Department of Energy (2011) stated that the significant expansion of the South African economy during the past few decades resulted in a substantial increase in the demand for electricity without the necessary growth in the supply side. Given that more than 90% of electricity in South Africa is generated from burning fossil fuel, the Department of Energy (DoE) promulgated an Integrated Resource Plan (IRP) which proposes the implementation of an 18GW renewable energy programme over the next 20 years.

In line with the IRP, government initiated the first phase of the programme where the independent power producers (IPPs) are expected to fund 3 725 megawatts (MW) of infrastructure on a long term concession basis. The programme is aimed at implementing various renewable energy technologies including onshore wind (1 850 MW), concentrated solar thermal (200 MW), solar photovoltaic (1 450 MW), biomass (12.5 MW), biogas (12.5 MW), landfill gas (25 MW), small hydropower (75 MW) and small projects (100 MW).

8.12.2 Financing Mechanisms

In terms of this IPP Procurement Programme, the bidders are required to bid on tariff and the identified socio-economic development objectives. The tariff will be payable by Eskom on conclusion of a power purchase agreement (PPA) with successful independent power producers.

As at the end of May 2012, a total of 2 460 MW representing 66% of the total allocation had been awarded to 47 projects. It is estimated that the investment on the projects will be in excess of R70 billion when each of the projects achieve the commercial operation stage. The average concession period for each project is in excess of 15 years. For each technology, the bidders were not allowed to bid a tariff in excess of a stipulated maximum amount.

8.12.3 Key Issues

In addition to building additional green energy to the country's power pool, it is estimated that the first phase will create in excess of 25 000 temporary jobs during the development of projects and more than a thousand direct operational jobs. Further to these, indirect jobs in other sectors e.g. manufacturing, building & construction, hotel accommodation will have long term benefits to local economies where these projects are implemented.

Furthermore, it is the intention of government to utilise alternative funding sources such as carbon credits to support to the implementation of the renewable energy programme.

8.13 Gauteng Freeway Improvement Project

8.13.1 Project Background

During the early 2000s, the economic activity of Gauteng was developing beyond its road infrastructural capabilities. This was evidenced by a substantial increase in increased congestion, and overloading of road infrastructure.

In order to reduce the congestion and provide a road network that would further stimulate and support the economic development potential in the province, the South African National Roads Agency (Pty) Limited (SANRAL) proposed an improvement to the Gauteng freeway network. The objective of the project was to upgrade and expand the existing network providing an interconnected network of inner and outer ring roads.

Once completed, the initiative resulted in approximately 560 kilometers of upgraded and widened freeways connecting the key development nodes and previously neglected areas of the three metropolitan areas of Gauteng.

8.13.2 Financing Mechanisms

In accordance with the SANRAL Act (1998), the agency is responsible for two separate funding portfolios, namely toll and non-toll roads. These operations are funded separately without any cross-subsidisation between the two portfolios. Non-toll roads are funded through government appropriations and toll operations are funded either directly by SANRAL with outsourced operations or by private parties under PPP arrangements.

SANRAL (2012:7) states that "according to its legislation and government policy, SANRAL promotes the user-pay principle through selective tolling to ensure the sustainability of the national road network. Using future revenue streams to build and maintain infrastructure is an effective project funding tool."

Since the Gauteng Freeway Improvement Project (GFIP) was implemented on a PPP basis, the network will operate on an open-road tolling system with revenue collected and utilised in order to improve the road infrastructure and service the debt and returns expected by the concessionaire.

8.13.3 Key Issues

It is estimated that, on completion, the GFIP contributed R29 billion to the country's GDP and created approximately 30 000 direct jobs during construction. Nearly R4 billion (41% of the total contract expenditure), was allocated to small, emerging and black-owned enterprises.

Since the promulgation of the tariffs in April 2012, the project was faced with resistance and legal challenges from a number of civic and business organisations. This led to the overall downgrading of SANRAL by a number of rating agencies such as Moody's. This led to government delaying the implementation of the tolling system, re-opening the public consultation process and providing bridging finance and guarantees to ensure that the contracted repayments to the concessionaire were honoured by SANRAL.

8.14 Airports Capacity Expansion Programme

8.14.1 Project Background

The Airports Company of South Africa (ACSA) is an independent company which is majority owned by the South African Government. ACSA completed most of its infrastructure capacity development and improvement programme in 2010, largely to ensure the readiness of South Africa to host the 2010 Soccer World Cup competition.

8.14.2 Financing Mechanisms

ACSA (2012) stated that the capital expenditure since 2006 was financed largely through debt of R16.6 billion consisting of long term bonds (60%), commercial loans (20%), development finance institutions (17%) and commercial paper (9%),

ACSA has two sources of revenue namely, aeronautical and non-aeronautical. The former is derived from regulated income such as passenger service, aircraft landing and parking charges and the latter is from commercial activities.

In line with the considerable increase in investments, ACSA applied for a 40.7% increase in tariffs to enable the business to finance the substantial increase in financing and operational costs associated with the completed infrastructure. Unfortunately, the promulgated increase was limited to 33%, much lower than expected, resulting in a significant shortfall in earnings to offset the increase in costs. Despite this, the company experienced solid revenue streams from both aeronautical and non-aeronautical activities coupled with a better air traffic movement mix during the World Cup period.

8.14.3 Key Issues

ACSA (2012) stated that its infrastructure investment programme was appropriate, leading to significant socio-economic benefits. ACSA further estimated that the three major international airports sustain about 300 000 jobs (direct and indirect) and that planned future developments, as a result of passenger and cargo growth, will result in

the creation of some 150 000 new jobs over the next 10 years, provided the envisaged infrastructure development plans are realised.

8.15 Freight Logistics Infrastructure Expansion Programme

8.15.1 Project Background

Transnet (2012) stated that over a number of decades, the company faced substantial underinvestment in its freight logistics infrastructure including rail, ports and liquid product pipelines. This led to a breakdown in service delivery which resulted in a shift of the overall logistics from rail to road resulting in poor financial position of Transnet. This shift also caused significant overloading of the national road infrastructure resulting in damage estimated at R2 billion per annum.

Transnet (2012) stated that in order to address the historical underinvestment and shift the substantial portion of the logistics chain from road to rail, the company implemented a turnaround and growth strategy which included the establishment of specialized divisions, namely freight rail (freight transportation), rail engineering (rolling stock maintenance), ports authority (landlord for the port system), port terminals (managing port and cargo terminal operations) and pipelines (pumps and manages the storage of petroleum and gas products).

Critical to the growth strategy, was the development of a 30-year infrastructure investment plan which provides a framework for the planning and development of the company's infrastructure to ensure that adequate capacity is created ahead of demand. The plan is broken down into five-year capital investment plans (CIP) which are reviewed annually to ensure alignment to long term requirements and the strategic objectives of the company.

8.15.2 Financing Mechanisms

It is estimated that Transnet required in excess of R300 billion over a period of 8 years from 2012, to eradicate its infrastructure backlog and also position the company with the projected growth in demand for its services. Between 2006 and 2012, Transnet invested approximately R116 billion. Approximately 52% of the investment of R22.3

billion in 2012 was targeted at expansion programmes and the balance towards reducing the maintenance backlog.

Transnet (2012) stated that since the first CIP of approximately R117 billion covering the period from 2012 to 2016 will not be sufficient to meet the needs of customers and the economy, private sector participation was therefore critical to bridge the investment gap. The planned capital investment for 2012/13 amounted to R21,5 billion which was the most significant investment in a financial year reflecting the company's commitment to providing a responsive infrastructure to satisfy the demands of a growing economy. As at 31 March 2012, the company's borrowings amounted to R58 billion down from R60 billion in 2011.

8.15.3 Key Issues

Transnet raises its capital investment sources from a number of sources including bond issues & commercial paper (66%), commercial loans (33%) from local and financial institutions and 1% from other sources.

The capital investment programme has a substantial portion of plant and equipment sourced from foreign suppliers which causes a substantial risk exposure to interest rate and foreign currency fluctuations.

8.16 Gautrain High-Speed Rail Project

8.16.1 Project Background

The Gautrain Project is a state-of-the-art rapid rail network in Gauteng comprising of a link between Pretoria and Johannesburg and between OR Tambo International Airport and Sandton. In addition to the three anchor stations on these two links, seven other stations are linked by approximately 80 kilometers of rail along the route.

A private company holds a 15-year concession to design, build, part-finance and operates the Gautrain Rapid Rail Link project. The concessionaire manages the client (Gauteng Provincial Government) interface and provides an integrated solutions approach for the PPP project.

8.16.2 Financing Mechanisms

The estimated project cost of R26 billion was funded through private sector equity of approximately 20% and 80% debt which consisted of 71% bank syndication and 9% of a floating rate mezzanine funding facility. The financial transactions for the project were underpinned by a number of security mechanisms which guaranteed the performance of the concessionaire covering retentions, performance bonds and collateral agreements.

8.16.3 Key Issues

The careful structuring of responsibilities and the allocation of risk to parties in the PPP were aimed at ensuring that the project would be developed within the originally negotiated cost and avoid a threat of huge financial over-runs. The project was also structured to ensure that government and the concessionaire operate within a strict set of financial parameters which were designed to take account of the risk associated with the country's fluctuating macro-economic environment.

The concessionaire therefore had to fix its costs by making use of currency and interest rate hedging in local and international markets to ensure the integrity and

profitability of the project. However, in terms of the contract, adjustments of the base price for local expenditure at CPIX were allowed to mitigate the impact of increases in the local costs of wages, materials and other factors during the term of the contract.

In order to ease the financial burden to the commuter and simultaneously make the project financially viable, government decided to make an equity contribution (funding balance) towards the required capital investment. Given the uncertainty of the commuter ridership on the system, government committed to providing a bridging fund in case the revenue stream fell below a predetermined minimum level. This guarantee increased the certainty of revenue generation probability of the project.

8.17 Coega Industrial Development Zone

8.17.1 Project Background

In order to advance economic growth, skills development and creation of sustainable jobs in South Africa, particularly the Eastern Cape, the Coega Development Corporation (CDC) was established as a wholly owned State Owned Company (SoC) subsidiary of government. CDC is tasked with promoting investment in the Industrial Development Zone (IDZ) located north east of Port Elizabeth by providing enabling economic infrastructure which includes bulk infrastructure and investor driven commercial developments within the IDZ.

In 2001, government pronounced the 50 to 75 year development of the IDZ covering 11 500 hectares of land and the deep-water Port of Ngqurha. The development commenced in 2002 with the construction of basic infrastructure and the US$250 million deep-water port. The CDC started to attract local and international investors to the IDZ. Despite the slowdown of investment as a result of the effects of the global financial crisis of 2007/08, the IDZ has been able to attract investment in excess of R50 billion.

8.17.2 Financing Mechanisms

The CDC is fully funded by government and relies in part on its revenue generating capacity to implement some of its mandatory objectives. This reliance on government without external borrowing from other sources has proved to be a major constraint to the growth of CDC and consequently the development of the IDZ. In 2012, government funding amounted to R336 million, a substantial reduction compared to R626 million in the previous year. Excluding the government subsidy, revenue has increased substantially from R10 million in 2004 to R220 million in 2012.

8.17.3 Key Issues

Although the CDC has experienced financial constraints, it has been able to attract critical industries to invest in the IDZ. At end of 2012, the total value of operating investments within the IDZ amounted to R15 billion, consisting of alternative energy, downstream metals and auto manufacturing & components.

Since it commenced with its investment promotion activities, the CDC has entered into various lease agreements with investors and estimates the total value of projects in the pipeline at R140 billion.

8.18 Dube Trade Port

8.18.1 Project Background

Established in 2001 as a public entity of the KwaZulu Natal (KZN) province, the Dube Trade Port Corporation (DTPC) is mandated to develop the Dube Trade Port, undertake or invest in projects associated with the port in order to facilitate economic growth in the province, attract long term investment and facilitate exports and imports.

The Dube Trade Port (DTP) is an inland port strategically located between the two largest sea-harbours namely Richards Bay on the north and Durban on the south. The development combines an international airport, a dedicated cargo terminal, warehousing, offices, a retail sector, hotels and an agricultural area.

8.18.2 Financing Mechanisms

The total development of the first phase of the 60-year master plan is estimated to be R10 billion including the new airport estimated at R7 billion. The airport infrastructure was financed by ACSA and completed in May 2010 in time for the start of the FIFA Soccer World Cup competition. The infrastructure was financed through equity contributions from the KZN province and loans (raised by ACSA).

8.18.3 Key Issues

DTPC (2012) estimated that construction activities between 2007 and 2012 created more than 16 500 direct employment opportunities and contributed approximately R11 billion to the GDP of the country's economy. Of this amount, an estimated R2,4 billion was as a direct consequence of construction activity at Dube Trade Port.

8.19 Rapid Public Transport System : City of Johannesburg

8.19.1 Project Background

In 2007, the National Department of Transport (DoT) developed a strategy for the implementation of integrated rapid public transport networks (IRPTN) within major metropolitan areas of Johannesburg, Cape Town, eThekwini, Tshwane, Ekurhuleni and Nelson Mandela Bay.

The objective of the project is to introduce a road-based mass transit public transportation system that is accessible, safe, convenient and affordable to communities that have no access to quality public transport services. Where a planned IRPTN route coincides with services offered by other public transport operators such a municipality is obliged to negotiate a partnership with those operators. In terms of the project guidelines, a municipality is responsible for the design and construction of the infrastructure required for the successful implementation of the project.

The municipality is also responsible for the establishment of operating companies (e.g. vehicle and/or depot and/or station management and/or facilities management and/or fare management entities) in consultation with the affected public transport operators.

In line with the DoT strategy objectives, the City of Johannesburg was the first municipality to implement the project for completion of the first phase in June 2009 to coincide with the hosting of the FIFA Confederations Cup tournament. The first phase of the project involved the construction of approximately 26 kilometers of dedicated bus routes, 30 stations, 2 depots, a control centre and a purchase of more than 200 buses.

The municipality established a vehicle operating company (VOC) initially co-owned by the municipality and public transport operators. The VOC is responsible for the operations of the buses and the municipality is responsible for the maintenance of the infrastructure and the collection of commuter fares.

8.19.2 Financing Mechanisms

The cost (approximately R4.6 billion) of the first phase of the project, including the purchase of the buses was financed from a government grant. Through a service level agreement, the municipality contracts the VOC to provide the public transport service on its behalf. The VOC charges the municipality a fee based on an agreed time schedule and distance travelled. The fee charged by the VOC takes into account that the infrastructure is made available by the municipality 'free of charge'. The municipality also determines the fares to be charged to the VOC and subsidises any shortfall between the fee charged by the VOC and the fares collected from the commuters.

8.19.3 Key Issues

Since the project was the first of its kind and implemented under very strict deadlines, a number of lessons have emerged. Whilst the project enabled a number of communities to access a safe and predictable public transport service, the municipality was burdened with a substantial number of risks including construction, financial and operational. Also, despite the initial pre-feasibility projections, the project cannot be operated on a sustainable basis without a substantial subsidy from government.

During the negotiation process, the municipality assumed substantial risks related to the purchase of buses and providing a guarantee for minimum revenue to the private sector owned VOC.

Mokonyama (2012) reported that the construction of the first of the project created in excess of 14 000 jobs and 870 during the operations of the system. The author mentioned that the maximum number of passenger trips exceeded 1 million per day including approximately 10% of previous private vehicle users.

8.20 Durban Point Waterfront Development

8.20.1 Project Background

Over a number of years, the central business district (CBD) of Durban within the eThekwini Municipality experienced a decline in the quality of urban infrastructure as a result of the relocation of business enterprises to the north of Durban. Despite the Port of Durban being the busiest in the country, its immediate environment declined in line with the degeneration of the CBD.

During the late 1990s, an Asian international property developer approached the eThekwini municipality and other public sector institutions with a proposal to purchase and regenerate land around the Durban port precinct by investing in mixed-use developments such as residential apartments, hotels, office space, retail shops and a small craft harbour. As a result of the Asian financial crisis in the late 1990s, the development was delayed until the early 2000s.

Although the development of bulk infrastructure such as water, sanitation and electricity and few a private sector developments were completed by mid-2000s, the economic meltdown of the late 2000s delayed the commencement and/or completion of a number of developments. These delayed developments were financed largely from international finance institutions which were affected by the 2007/08 economic meltdown.

8.20.2 Financing Mechanisms

In order to consolidate all land parcels and redevelop the port precinct, a PPP was formed between the international property development company and a Municipal Owned Entity (MoE). The PPP was structured as an equal equity SPV (called the Durban Point Development Company (DPDC)) between the MoE and the private developer. All land owned by the municipality within the precinct was then transferred to the DPDC to initiate the urban regeneration project.

It was estimated that, on completion, the regeneration project would be in excess of R4 billion of private sector investment. The investment in bulk infrastructure and the development of the entertainment theme park (uShaka Marine World) by the DPDC in the early 2000s, raised a substantial interest in the private sector property development market.

8.20.3 Key Issues

At the end of 2006, DPDC had invested approximately R120 million in the upgrading of the infrastructure and had sold R190 million of development land to private sector investors. On its own, the private sector had invested approximately R1 billion in development projects creating more than 5 000 construction jobs. Some real estate values adjacent to the port precinct more than doubled and investor confidence increased, attracting both local and international investors.

Although the project took long to materialise, with a substantial risk taken by both the municipality and the private sector, the project succeeded in boosting investor confidence and reviving tourism in the CBD.

APPENDIX B : FRAMEWORK OF RISK ANALYSIS

For each case study, a risk factor namely; Project Risk, Transaction Cost and Information Asymmetry is sub-divided into sub-criteria. Each sub-criterion is evaluated qualitatively as and assigned a Likert Scale rating of 1 (very low risk) or 2 (low risk) or 3 (average risk) or 4 (high risk) or 5 (very high risk). A simple average rating is then calculated for each Risk Factor, assuming that all sub-criteria carry the same weight. A risk score is then calculated by dividing the average rating by the maximum possible score (5). i.e. $\text{Risk Score} = \frac{\text{Average Rating}}{5}$

A Total Risk Score (TRS) for each project is then calculated assuming individual weights of the Risk Factors.

$$\mathrm{TRS_i} = \mathrm{w_1}.\mathrm{PRS_i} + \mathrm{w_2}.\mathrm{TCRS_i} + \mathrm{w_3}.\mathrm{IARS_i}$$

where

TRS_i = Total Risk Score for Project i

PRS_i = Project Risk Score for Project i

$TCRS_i$ = Project Risk Score for Project i

$IARS_i$ = Project Risk Score for Project i

w_1 = 0 < weight of Project Risk Score < 1

w_2 = 0 < weight of Transaction Cost Risk Score < 1

w_3 = 0 < weight of Information Asymmetry Risk Score < 1

$w_1 + w_2 + w_3 = 1$

For the purposes of the research, it was assumed that $w_1 = w_2 = w_3 = 1/3$

The table below illustrates a typical evaluation for projects ranging from a very low risk to very high risk category.

Project Risk			Very Low Risk Project	Low Risk Project	Average Risk Project	High Risk Project	Very High Risk Project
1	Construction	Rating	Very Low	Low	Average	High	Very High
		Score	1	2	3	4	5
2	Operations	Rating	Very Low	Low	Average	High	Very High
		Score	1	2	3	4	5
3	Demand	Rating	Very Low	Low	Average	High	Very High
		Score	1	2	3	4	5
4	Political and Regulatory	Rating	Very Low	Low	Average	High	Very High
		Score	1	2	3	4	5
5	Environmental	Rating	Very Low	Low	Average	High	Very High
		Score	1	2	3	4	5
6	Social	Rating	Very Low	Low	Average	High	Very High
		Score	1	2	3	4	5
7	Currency Exchange	Rating	Very Low	Low	Average	High	Very High
		Score	1	2	3	4	5
8	Interest Rate	Rating	Very Low	Low	Average	High	Very High
		Score	1	2	3	4	5
		Average Rating	1.4	2.2	3.2	4.0	4.9
		Risk Score	0.3	0.4	0.6	0.8	1.0

Transaction Cost Risks							
1	Time taken to contract	Rating	Very Short	Short	Average	Long	Very Long
		Score	1	2	3	4	5
2	Adequacy of funding	Rating	Very Low	High	Average	Low	Very Low
		Score	5	2	3	4	5
3	Project delays	Rating	Very Short	Short	Average	Long	Very Long
		Score	1	2	3	4	5
		Average Rating	2.33	2.00	3.00	4.00	5.00
		Risk Score	0.47	0.40	0.60	0.80	1.00

Information Assymetry							
1	Level of (mis)understanding of risks	Rating	Very Low	Low	Average	High	Very High
		Score	1	2	3	4	5
		Risk Score	0.2	0.4	0.6	0.8	1.00

Weights

Project Risk	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%
Transaction Costs	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%
Information Assymetry	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%
Total Risk Score		**0.32**	**0.41**	**0.61**	**0.80**	**0.99**

APPENDIX C : CASE STUDY RISK SCORES

			1	2	3	4	5	6	7	8	9	10
Project Risk			Maputo N4	Rustnbrg N4	Durban N3	DTI	DoE	Prisons	Ilembe DM	IALCH	Humansdorp	Pelonomi
1	Construction	Rating	High	Average	Very High	Average	Low	High	High	Very Low	Low	Low
		Score	4	3	5	3	2	4	4	1	2	2
2	Operations	Rating	High	High	High	Average	Low	High	Very High	High	Low	Low
		Score	4	4	4	3	2	4	5	4	2	2
3	Demand	Rating	Very High	High	Low	Very Low	Very Low	Very Low	High	High	Very Low	High
		Score	5	4	2	1	1	1	4	4	1	4
4	Political and Regulatory	Rating	High	Low	Low	Low	Very Low	Average	High	High	High	Low
		Score	4	2	2	2	1	3	4	4	4	2
5	Environmental	Rating	High	High	Very High	Average	Average	Low	Low	Very Low	Low	Very Low
		Score	4	4	5	3	3	2	2	1	2	1
6	Social	Rating	Very High	High	Average	Low	Low	Low	Very High	High	Average	High
		Score	5	4	3	2	2	2	5	4	3	4
7	Currency Exchange	Rating	Low	Average	Average	Very Low	Very Low	Low	Very Low	Low	Very Low	Low
		Score	2	3	3	1	1	2	1	2	1	2
8	Interest Rate	Rating	High	Average	Average	Very Low	Very Low	Average	Very Low	Low	Very Low	Low
		Score	4	3	3	1	1	3	1	2	1	2
		Average Rating	4.1	3.4	3.3	2.0	1.7	2.9	3.3	2.9	2.2	2.6
		Risk Score	0.8	0.7	0.7	0.4	0.3	0.6	0.7	0.6	0.4	0.5
Transaction Costs												
1	Time taken to contract	Rating	Long	Short	Average	Average	Average	Long	Average	Average	Average	Short
		Score	4	2	3	3	3	4	3	3	3	2
2	Adequacy of funding	Rating	Very High	Very High	Very High	Very High	Very High	Average	Low	Average	High	High
		Score	1	1	1	1	1	3	4	3	2	2
3	Project delays	Rating	Average	Average	Average	Short	Very Short	Average	Average	Average	Short	Very Short
		Score	3	3	3	2	1	3	3	3	2	1
		Average Rating	2.67	2.00	2.33	2.00	1.67	3.33	3.33	3.00	2.33	1.67
		Risk Score	0.53	0.40	0.47	0.40	0.33	0.67	0.67	0.60	0.47	0.33
Information Assymetry												
1	Level of (mis)understanding of risks	Rating	High	Average	Average	High	Average	Very Low	Very Low	Average	Very Low	Very Low
		Score	4	3	3	4	3	1	1	3	1	1
		Risk Score	0.8	0.6	0.6	0.8	0.6	0.2	0.2	0.6	0.2	0.2
Total Risk Score			**0.72**	**0.56**	**0.58**	**0.53**	**0.42**	**0.48**	**0.51**	**0.59**	**0.37**	**0.35**

APPENDIX C : CASE STUDY RISK SCORES

			11	12	13	14	15	16	17	18	19	20
Project Risk			Eskom	REIPP	GFIP	ACSA	Transnet	Gautrain	COEGA	Dube	CoJ IRPTN	DBN Point
1	Construction	Rating	High	High	Average	Low	Average	High	High	High	High	High
		Score	4	4	3	2	3	4	4	4	4	4
2	Operations	Rating	Average	High	Low	Low	Low	High	High	High	High	High
		Score	3	4	2	2	2	4	4	4	4	4
3	Demand	Rating	Very Low	Very Low	Low	Very Low	Very Low	High	Very High	High	Very High	Very High
		Score	1	1	2	1	1	4	5	4	5	5
4	Political and Regulatory	Rating	Very Low	Low	High	Low	Low	Average	Low	Low	High	High
		Score	1	2	4	2	2	3	2	2	4	4
5	Environmental	Rating	Very High	High	Average	Low	Average	Very High	Very High	High	Average	Very High
		Score	5	4	3	2	3	5	5	4	3	5
6	Social	Rating	High	Average	Very High	Very Low	Low	Low	High	Low	High	Low
		Score	4	3	5	1	2	2	4	2	4	2
7	Currency Exchange	Rating	Low	High	Average	Low	Low	High	Low	Average	High	High
		Score	2	4	3	2	2	4	2	3	4	4
8	Interest Rate	Rating	Low	High	Average	Low	Average	High	Low	Average	Average	High
		Score	2	4	3	2	3	4	2	3	3	4
		Average Rating	3.0	3.3	3.3	2.0	2.4	3.9	3.7	3.4	4.0	3.9
		Risk Score	0.6	0.7	0.7	0.4	0.5	0.8	0.7	0.7	0.8	0.8
Transaction Costs												
1	Time taken to contract	Rating	Long	Long	Average	Average	Average	Very Long	Average	Long	Average	Very Long
		Score	4	4	3	3	3	5	3	4	3	5
2	Adequacy of funding	Rating	Low	High	Very High	Average	Very High	High	Low	Low	Low	Low
		Score	4	2	1	3	1	2	4	4	4	4
3	Project delays	Rating	Long	Short	Average	Average	Average	Average	Average	Average	Long	Long
		Score	4	2	3	3	3	3	3	3	4	4
		Average Rating	4.00	2.67	2.33	3.00	2.33	3.33	3.33	3.67	3.67	4.33
		Risk Score	0.80	0.53	0.47	0.60	0.47	0.67	0.67	0.73	0.73	0.87
Information Assymetry												
1	Level of (mis)understanding of risks	Rating	Low	Average	Low	Low	Low	Average	Low	Low	High	High
		Score	2	3	2	2	2	3	2	2	4	4
		Risk Score	0.4	0.6	0.4	0.4	0.4	0.6	0.4	0.4	0.8	0.8
Total Risk Score			**0.60**	**0.60**	**0.51**	**0.47**	**0.45**	**0.68**	**0.60**	**0.61**	**0.78**	**0.81**

APPENDIX D : PROJECT RISK ASSESSMENT FRAMEWORK

	Risk Identification	Risk Description	Risk Rating	Risk Score (1 - 5)	Risk Weight	Risk Allocation		Weighted Risk Score		Total
						Public	Private	Public	Private	
Project Risk	Construction		Very Low	1	12.5%	0%	100%	0	0.125	0.125
	Operations		Very Low	1	12.5%	0%	100%	0	0.125	0.125
	Demand		Very Low	1	12.5%	0%	100%	0	0.125	0.125
	Regulatory		Very Low	1	12.5%	0%	100%	0	0.125	0.125
	Environmental		Very Low	1	12.5%	0%	100%	0	0.125	0.125
	Social		Very Low	1	12.5%	0%	100%	0	0.125	0.125
	Currency Exchange		Very Low	1	12.5%	0%	100%	0	0.125	0.125
	Interest Rate		Very Low	1	12.5%	0%	100%	0	0.125	0.125
Weight	**60%**				100%			0	1	1
								0.0%	100.0%	
Information Asymmetry	Common understanding of Project Objectives		Very Low	1	33.3%	0%	100%	0	0.3333	0.3333
	Role Clarifcation of Public/Private Sector		Very Low	1	33.3%	0%	100%	0	0.3333	0.3333
	Transparency in Procourement Process		Very Low	1	33.3%	0%	100%	0	0.3333	0.3333
Weight	**25%**				100%			0	0.9999	0.9999
								0.0%	100.0%	
Transaction Cost Factors	Negotiation Period		Very Low	1	25%	0%	100%	0	0.25	0.25
	Administrative Costs		Very Low	1	25%	0%	100%	0	0.25	0.25
	Contracting Process		Very Low	1	25%	0%	100%	0	0.25	0.25
	Project Delays		Very Low	1	25%	0%	100%	0	0.25	0.25
Weight	10%				100%			0	1	1
								0.0%	100.0%	
Public Sector Capacity	Capacity to Implement		Very Low	1	100%	100%	0%	1	0	1
Weight	5%									
				Overall Project Score				0.05	0.95	**1.00**
								5.0%	95.0%	

APPENDIX E : MULTIPLE MODEL REGRESSION DATA

	Project No.	Financing Mechanism	Project Risk	Transaction Costs Risk	Information Assymetry
Maputo N4	1	1	0.82	0.53	0.80
Rustnbrg N4	2	1	0.69	0.40	0.60
Durban N3	3	1	0.67	0.47	0.60
DTI	4	1	0.40	0.40	0.80
DoE	5	1	0.33	0.33	0.60
Prisons	6	1	0.58	0.67	0.20
Ilembe DM	7	1	0.67	0.67	0.20
IALCH	8	1	0.58	0.60	0.60
Humansdorp	9	1	0.44	0.47	0.20
Pelonomi	10	1	0.51	0.33	0.20
Eskom	11	0	0.60	0.80	0.40
REIPP	12	1	0.67	0.53	0.60
GFIP	13	1	0.67	0.47	0.40
ACSA	14	0	0.40	0.60	0.40
Transnet	15	0	0.49	0.47	0.40
Gautrain	16	1	0.78	0.67	0.60
COEGA	17	0	0.73	0.67	0.40
Dube	18	0	0.69	0.73	0.40
CoJ IRPTN	19	0	0.80	0.73	0.80
DBN Point	20	1	0.78	0.87	0.80