Port investment risk: Qualitative review of South African port investment valuation framework

Malibongwe Theophilus Ndlozi

World Maritime University

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PORT INVESTMENT RISK

QUALITATIVE REVIEW OF SOUTH AFRICAN PORT INVESTMENT VALUATION FRAMEWORK

By

MALIBONGWE THEOPHILUS NDLOZI

South Africa

A dissertation submitted to the World Maritime University in partial fulfillment of the requirements for the award of the degree of

MASTER OF SCIENCE

In

MARITIME AFFAIRS

(SHIPPING MANAGEMENT AND LOGISTICS)

2016

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DECLARATION

I certify that all the material in this dissertation that is not my own work has been identified, and that no material is included for which a degree has previously been conferred on me.

The contents of this dissertation reflect my own personal views, and are not necessarily endorsed by the University.

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To my family and friends for your continuous support and love. You have always had faith in me and have always encouraged me to do more.
Title of dissertation:

Degree: MSc

Port investment in South Africa is taking a unique shape with lot of projects in the pipeline over the next few decades. Given the country’s location, natural resources and international trade growth, South Africa is playing a meaningful role as a regional gateway port. Meanwhile, sustainable profitability of these ports remains an important factor not to be neglected, given that neighbouring countries are also beginning to invest substantially in port infrastructure. In order to ensure that good investments are undertaken, proper capital investment valuation framework is crucial.

This study identified risk and returns, source of finance and the port governance as port investment success factors. These factors have a great impact on port investment framework. The biggest challenges facing South Africa today are the exorbitant port charges and huge foreign debt used to fund port infrastructure. South Africa has projected huge future port demands using Freight Demand Model. However, this study highlighted a number of shortcomings in the country’s valuation framework and presented recommendations. One of the weaknesses was the biasness to government political programs like National Development Plan vision 2030, since the port company is 100% owned by government.

This study concluded by recommending that Transnet use Real Option Analysis (ROA) to complement the Cost Benefits Analysis, thus to improve the effectiveness of the valuation framework. A proper model is the one that accounts for risk and enable flexibility for management like ROA. The study also suggested that the Freight Demand Model be reviewed with the view to improve its parameters as some of them might prove insignificant as the market of SA is changing. After it became clear that governance is key in port infrastructural investment, it was suggested that the country access the appropriateness of its port model with the view to invite private sector through PPP.

**KEYWORDS:** Port Investment risk and returns, Port investment finance, port governance, port investment valuation framework, South Africa, Transnet, decision making
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<table>
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<th>Abbreviation</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>ACSA</td>
<td>Airports Company South Africa</td>
</tr>
<tr>
<td>CBA</td>
<td>Cost Benefit Analysis</td>
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<td>DDOP</td>
<td>Durban Dig-Out Port</td>
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<td>FDI</td>
<td>Foreign Direct Investment</td>
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<td>FDM</td>
<td>Freight Demand Model</td>
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<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
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<td>IRR</td>
<td>Internal Rate of Return</td>
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<td>MDS</td>
<td>Market Demand Strategy</td>
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<tr>
<td>NAOF</td>
<td>National Audit Office Framework</td>
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<td>NCPPP</td>
<td>National Council for Public-Private Partnership</td>
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<td>NDP</td>
<td>National Development Plan</td>
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<td>NPV</td>
<td>Net Present Value</td>
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<td>PPP</td>
<td>Private-Public Partnership</td>
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<td>ROA</td>
<td>Real Option Analysis</td>
</tr>
<tr>
<td>SA</td>
<td>South Africa</td>
</tr>
<tr>
<td>SAIMI</td>
<td>South African International Maritime Institute</td>
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<td>SAMSA</td>
<td>South African Maritime Safety Authority</td>
</tr>
<tr>
<td>TLTF</td>
<td>Transnet Long Term Planning Framework</td>
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<td>TNPA</td>
<td>Transnet National Port Authority</td>
</tr>
<tr>
<td>TPT</td>
<td>Transnet Port Terminal</td>
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<tr>
<td>UNCTAD</td>
<td>United Nations Conference on Trade and Development</td>
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1 \hspace{1em} \textbf{CHAPTER ONE}

1.1 \hspace{1em} \textbf{INTRODUCTION}

1.1.1 \hspace{1em} \textbf{Introduction}

South Africa has made remarkable progress since 1994 when it got its freedom in terms of uniting its society, building capital infrastructural and opening opportunities to all its citizens. The current government plan (NDP Vision 2030) reaffirms the importance of redressing the inequalities caused by many years of apartheid and colonialism. With all of these positive developments, South Africa remains a most unequal and divided nation; the scares of apartheid government continue to dominate the economic landscape 20 years after democracy (National Planning Commission, 2011).

In order to reduce poverty, unemployment rate and inequality, the economy of the country ought to grow fast, hence, capital infrastructure has been identified as a major driver for economic growth and to create job opportunities. Due to its history, it has been found that South Africa lacks behind when it comes to capital investment in ports, roads, rail, electricity, as well as water and sanitation. There is a serious capital to be directed to infrastructural development in order to realise economic growth. Private –Public Partnership (PPP) schemes have been identified as solution which will bring the economic benefits to the country. The port capital infrastructure investment strategy announced by Transnet in 2013 is one of the programs driven by government NDP plan. The economic benefits analysis of South Africa will realise that good port investment is enormous and not only will it fast-track economic growth and create employment, it will also enable seamless trading with other countries.

Port infrastructure investment is an expensive undertaking and its life-span is long hence the investment is expected to remain operational at all times in order to make positive benefits for the country. Effectively, this means the proper appraisal of the
project remains an important aspect of port investment. Appraisal helps to better understand the risk and returns associated with the investment beforehand, as port investment cannot be reversed once committed.

This dissertation will first identify and discuss the success factors of the port investment and regroup them into three categories. These success factors of port investment are investigated individually to determine the impact they have on port investment. Most importantly each success factors is then used during the review of the investment valuation framework. The strengths and weaknesses of South Africa’s port model are identified, discussed and appropriate recommendations presented in the name of improving the framework.

Furthermore, this dissertation move from the premise that port governance structure is a central in the success of the port. This is based on its role in port investment including determining the risk tolerant and the capital financing structure. The main aim of this study is to review the South Africa port investment valuation framework with a view of highlighting the strengths and weaknesses and propose recommendations. This chapter provides an introductory background to the industry, the main objectives, the methodology adopted and a summary of the dissertation approach.

1.1.2 The World Maritime Outlook

Port investment is capital intensive. Uncertainty and risk associated with port investment form the market and remains a huge concern on the part of an investor (be it public or privately owned). International trade related businesses are known for their cyclical nature. Talley (2009) maintained that ports have to adapt to rapid changes in order to remain competitive while making sure they do not become too exposed to market risks. There are a number of port investment drivers, other than port service demand, that an investor has to carefully consider before making an investment decision. Spanning from global local economic trade patterns in the form of risk and returns and location.

The steady increase in the international seaborne trade due to cargo demand from emerging economies is one of the port investment drivers changing the facet of the maritime transport. This is redirecting infrastructure investment economies to the
developing worlds in the form of port investment. The seaborne world trade throughput for developing economies, for instance, increased by 0.2% to around 71.9% in 2014 (UNCTAD, 2015), signifying the continued trend of a steady rise in developing countries’ share of world container throughput as a main indicator. The two main drivers for this change are developing countries’ greater participation in global value chains and the continued increase of containers for transporting dry bulk cargo. This is despite the slow GDP growth, high inflation, lower currency value and high unemployment experienced by most of these countries, especially South Africa.

1.1.3 State of Port Investment in South Africa

UNCTAD (2009) reported that some of the Global Port Operator (GTO) companies are showing interest in investing in Africa, especially along the strategic common African shipping routes. Private-public partnerships (PPP) have been reported in some of the African countries. In some of the African countries, these port finance models are prevented by huge national risk exposure. Local economic, physical, social, environmental and legal constraints continue to prevent these companies from entering the business in Africa (UNCTAD, 2009). The report also highlighted “the high numbers of cross border documents, security issues, poor inland connections, excessive transaction costs and delays” as common issues.

With all cross-border issues in Africa, UNCTAD (2009) reported that there is a growing recognition of the need to invest in improving port infrastructure, operations, and hinterland network connectivity. Even though new port infrastructural investments are being considered in in some of the African countries like Nigeria, Kenya, Mozambique, South Africa among others. However, these initiatives are affected by the persisting global financial crisis and higher surface transport costs. Economies are not growing as expected, risking the huge investments. This is one of the main challenges facing South Africa’s economy.

1.1.4 Research Problem Statement
Bad valued port investment projects, in many cases, generates oversupply giving shipping lines bargaining power, or ending up lying idle. This is considered waste of public funds if finance is provided by government taking the full risk of the investment. This is mainly attributed to poor project valuation methods or political interference. This can be considered visionary in the case of when spectacular demand volumes are high, but risky when the expected demand and economic growth is stagnant. Methods used during valuation ought to be able to incorporate these market changes and afford managers to make good decisions.

Landlord ports like South Africa often focus, or rather restrict, themselves on benefits expected on the investment and, as a result, forget about the investment risk. Effectively, this means the infrastructural investment is seen as a means to address employment and economic growth, not as a commercial investment. Based on this background, this dissertation seeks to review South African port investment valuation methods (framework) within the port development plan context.

1.1.5 Research Aims and Objectives
The main aim of this dissertation is to review the South African port investment valuation framework with a view to highlight the strengths and weaknesses and propose the recommendations. This was achieved by attaining the following objectives:

- To identify and discuss port investment success factors.
- To evaluate the appropriateness of the South African Port Model in relation to port investment and present recommendations.
- To review different methods used by South Africa during the capital project valuation process with the view to highlighting strengths and weaknesses; and, lastly,
- To propose recommendations.

1.1.6 Research Methodology
This dissertation adopted a case study approach using qualitative methods. The study used existing literature to review the South African port investment valuation
framework. To complement the publicly available information, a one on one discussion with a Transnet manager was held. The information was collected following the Transnet capital project valuation framework. The purpose was to highlight weaknesses with the view to propose recommendations.

1.1.7 Data Collection Methods
Relevant academic journals, books and articles were used to identify key success factors which support and affect port investment. This study relied mostly on the information publicly and currently available in the form of websites and databases. Institutions like Transnet, Port Regulator of South African, South African Maritime Safety Authority (SAMSA), were also used as sources of information. More importantly, the one-on-one discussion with the Transnet manager was used to understand the Transnet valuation framework better.

1.1.8 Dissertation Structure
Chapter 1 – this chapter provides an introduction and overview of port investment. It also covers the port investment background, the research problem statement, research aims and objectives, as well as the research methodology.

Chapter 2 – this chapter covers the literature review and is divided into 3 parts: port investment risk and returns; port investment finance; and port governance of South Africa. It will further evaluate the appropriateness of the port model used by the country and make suggestions.

Chapter 3 – provides detailed information on the research methodology and method used to collect data, and presents research results using the Transnet capital investment framework.

Chapter 4 – reviews South Africa's capital investment valuation framework by analysing the findings, highlighting strengths and weaknesses at different stages of the process and proposing recommendations.

Chapter 5 – conclusion and Recommendations are presented, thus, the aim of the study fulfilled.
2 CHAPTER TWO

2.1 LITERATURE REVIEW

2.1.1 Introduction

According to Lagoudis, Rice & Salminen (2014), a sea port system can also be seen as a collection of systems and components combined together connecting land and sea to handle cargo arriving by sea by the ship and transferring to land through a port berth terminal, and to be finally transferred using any mode of transportation (rail, road, pipe or air network) to its hinterland in need of the cargo. According to Talley (2009: p.23) “A sea port system is a collection of components bridging land and sea that work together to handle the cargo, which arrives sea-side by vessel at anchorage, is transferred land-side to the port terminal at the port’s berths, and is eventually transported by intermodal links (e.g. road or rail networks) to the population located in the hinterland demanding the goods”. Without a port a country cannot be able to trade with other nations. The world is a globalized community; countries need each other to survive.

As ship-size increases, routes get reconfigured or changed, economies develop, technology improves, and shipping lines take advantage of economies of scale, port system’s capacity may need to change or expand to accommodate future cargo volumes and bigger vessels (Bichou, 2014). Port expansion requires a huge amount of money. As such, decisions have to be taken about whether to invest or not in full view of uncertainty and various factors in the maritime sector.

According to EY (2015), there are three main factors influencing whether major port infrastructure investments take place or not, these are:

(i) capital availability in the market;
(ii) project risk-weighted return; and
These factors can be regrouped into three main factors: port investment risk and returns, port investment finance and port governance. For port investment to be successful, the risk has to be kept low and returns high, funding to be available at lower cost (optimum) and the port governance to be good (commercially motivated). Others have maintained that port governance is the most important factor holding other factors together.

This chapter is divided into three parts. The first part focuses on port investment risk and returns, the second part focuses on sources of finance and the last part discuss port governance with a special focus to South Africa. After highlighting the strengths and weaknesses of each model, this chapter concludes by looking at the appropriateness of the port model used in South Africa.

2.2 PORT INVESTMENT RISK AND RETURNS

2.2.1 Introduction

Dailami and Leipziger (1998), as cited by Chin & Waldron (2014), highlighted the most common factors which negatively affect port investment returns, this includes a country’s GDP, reserves, infrastructure and the size of the investment. Risk represents a significant factor to port investment success. Srikanth, Bell & Evans (2007) understood investment risk as a probability based on factors that the port investment can benefit or suffer from and which can be influenced and managed through decision making. Project risk and returns are calculated using quantitative valuation methods and favorable or unfavorable decision is taken depending on the investor’s risk tolerance. The higher the risk, the higher are the returns.

Frankel (1989) wrote about the basic project investment appraisal concepts under risk/returns and further elaborated on the impact of uncertainties and the financial tools used to measure project viability like NPV or IRR. Likewise, Hawkins (1991: p.34) presented a few practical ideas on port investment evaluation using six appraisal methods, i.e. financial costing, economic costing, cost-benefit analysis, port impact analysis, cross impact analysis and dynamic port modeling. His conclusion was that
one method or combination of methods ought to be in order to achieve higher competition leverage, depending on the nature of the project. These valuation methods would help managers make correct decisions. In the case of port investment these methods should take into account the risk associated with an investment especially the country risk where the project is located. Accordingly, there are number of risks factors present in the port investment which the valuation technique used have to measure and understand how they would impact the project or a decision to invest. The following section focuses on traditional financial and economic appraisal methods, i.e. different types of risk affecting port investments.

2.2.2 Appraisal of the Port Investment

Government or public companies are more interested in the economic profitability of the port investment, hence, they turn to focus more on benefits with the view to channel benefits indirectly or directly to the port community. The Cost-Benefit Analysis (CBA) is the tool commonly to use by the public sector to conduct the economic appraisal. This is achieved by conducting an economic appraisal of the proposed investment looking at the investment costs against total cash inflow over the asset life span (Institute of Chartered Shipbrokers, 2015).

The port investment appraisal differs from case to case depending on the project and who is making that investment between public authority and private investor. Regardless, the returns or benefits during appraisal stage remains uncertain due to risk. The next section presents commonly used financial and economic appraisal methods as part of investment appraisal as contained in the Institute of Chartered Shipbrokers (2015).

2.2.2.1 Financial Appraisal of the Port Investment

Project investment financial appraisal only focus on financial benefits (profitability) of the project. Private investors are more interested in profits as they always want to know about the returns on their investment and how long it will take for the investment to repay the initial capital. Hence the time value of money is important. The time value of money is valuated using discounted rate analysis which sought to present all future cash flows to present values. This financial appraisal enables the investor to compare port investments with other investments available like risk-free treasury bonds. If the
risk-free bonds give a better rate than the project, the investor would obviously prefer the bond market. Common tools used under financial appraisal are: payback, the NPV and the IRR.

### 2.2.2.1.1 Payback Method

This method looks at the time required for investment returns to be paid back, and it is used as a first indicator to access the project profitability. It is calculated by taking the initial investment and subtracting the future periodical projected cash flow. The formulae used in this method is presented as follows: Pay-back in years = \( I / R - C \) (where \( I \) = total investment; \( R \) = average annual operating Income; and \( C \) = average annual operating Costs). This method only shows how long it is going to take for the port investment to break even.

### 2.2.2.1.2 Net Present Value (NPV)

NPV method takes the pay-back method a bit step further by looking at the net present value of all future projected cash flows. NPV is calculated by taking the total sum of all future cash flows discounted into present value and minus the initial investment. If the NPV is positive then the project is acceptable, otherwise if the NPV is negative the project is rejected. NPV formulae is denoted as follows:

\[
NPV = -\text{Initial Investment} + \sum_{t=1}^{T} \frac{\text{Net Cash Flow}_t}{(1 + i)^t}
\]

\( t = \text{Cash Flow Period} \quad i = \text{Discount Rate or assumed interest rate} \)

### 2.2.2.1.3 Internal Rate of Return (IRR)

IRR is a method used in measuring the profitability level of the investment project using the discounted rate of the equilibrium to NPV to see how much is the internal returns of a project. The NPV of all cash flows is equal to zero. The formulae used is the same as the one used for NPV.

### 2.2.2.2 Economic Appraisal of Port Investment

Economic appraisal uses a unique set of tools to access the project investment, therefore the definition of costs and revenue analysis method is not the same. Unlike in the financial appraisal, the economic benefit is not limited to the investor but
translated to other stakeholders of the port: local, regional and the national economy of a country. Where the port is owned by government, economic appraisal presents staff salaries and taxes as a social benefit instead of costs when using Cost Benefit Analysis (CBA) model.

The World Bank (2007) modified the IRR and NPV formula to generate a formulae that takes into consideration the nature and objectives of the port investment and long term investment plans to be used in transport projects economic evaluation. This formulae includes the present value of benefits (PVB) as the sum of discounted benefits over the project lifespan. Therefore the profit is reflected by the positive difference between the discounted net benefits and discounted investment expenditure, both generated over the port project lifespan. The formulae is presented as follows:

\[ NPV_{Econ} = -C + (x + a)^n = \sum_{i=n}^{x} \frac{R}{(1 + i)^n} \]

Where:

- \( n \) = year in which the infrastructure or project is put in service; \( i \) = national economy discount rate in %; \( C \) = discounted investment cost; \( R \) = Benefits (revenue) in year \( n \).

Form the public sector perspective, the economic appraisal forms an essential part of the port investment appraisal. Impact analysis studies are conducted to help in decision making also to determine the ideal source of funding and the capital structure for the port project. Moreover, they help to access whether the project should be fully or partially funded by the public sector (local, regional or national government) or regional or international funding institutions like African Union and World Bank. Impact studies also look at the environmental and social impact of the project like pollution, city extension and employment opportunities, which is beyond just looking at the economic benefits such as infrastructure developments, trade benefits and port efficiency (Institute of Chartered Shipbrokers, 2015). The impact analysis study looks at the topics as shown in Table 1.
Table 1: Components of the Impact Analysis Study

<table>
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<th>Direct Impact</th>
<th>Indirect Impact</th>
<th>Induced Impact</th>
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<tr>
<td>this is where the impact resulting from the port project are positive economic benefits or developments experienced by stakeholders of the port, like the Port Authority, Shippers, Carriers, and Port Operators.</td>
<td>this is the economic benefit as result of port investment or activities benefiting institutions whose business depends on or is linked to the port activities, and have thus chosen to be located around or near the port. These, for instance, are your exporting and importing manufactures, logistics and distribution centres and traders. Close by the port financial institutions servicing port users find themselves indirectly and economically benefiting as well.</td>
<td>this is an aggregated sum of direct and indirect economic benefits resulting from port activities on other economic sectors in the country. They say the input of one economy sector is an output of another economy sector and this referred to as multiplier effects. It is said that in well developed countries induced revenues (impact) can reach as high as 50% of new revenues (projects and investment). Macro empirical analysis tools are therefore used to measure the impact but there are not universal in application. For instance the most common used method is the aggregated added-value (AV) of a port investment, and mass calculation method, is used when reliable detailed date is not available, and lastly the weighted-flow, is used when the impact can all be weighted against various variables that are linked to specific geographical standards like port contribution in job creation, balance of trade, and taxes and revenue for the community.</td>
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Source: Adapted from Institute of Chartered Shipbrokers (2015)

2.2.3 Port Investment Risk

According to Institute of Chartered Shipbrokers (2015), port investment risk can be seen as the possibility that the port investment project may not perform as expected and the investor stands to bear a loss. Effectively, this means the port investment, like any other capital investment, has an inherent risk depending on the type or the size of the project and location. Investment risk and the returns are placed as an important component of port investment appraisal. In the instance where the public sector is
involved, some risks have to be accepted for the benefit of the country or be shared with the private sector. According to Chin & Waldron (2014) and The World Bank (2007), leading strategic risks in the port investment project are construction risk, social risk, financial risk, country risk and monetary risk. Therefore, below, we will look at these risks under these categories.

2.2.3.1 Cost Risk
Any investor is always concerned about spending more than the allocated budget or initial cost estimates. Different investment projects have different risks depending on the nature and the level of risk existing in that project. Risk in port investment may be apparent as a result of different changes, like changes imposed by economic, financial and economical legal frameworks. In the case where the investment is viewed as public priority, these changes are not likely to occur; however, if the project is considered to be a private investment, then the risk may be huge (Institute of Chartered Shipbrokers, 2015).

2.2.3.2 Construction Risk
Construction risk is that type of risk associated with the construction of that particular project or port in time case. This is examined by contrasting the estimated budget to actuals since they often vary. Construction risks often arise due to a sudden drastic increase of construction prices (i.e. building material), project delays and/or conflicting interests by port regulators and/or the port authority. The most used strategy to mitigate the latter is adopting the build-order-operate scheme or builder order transfer and the former is very much not predictable (Chin & Waldron, 2014). Another challenge often faced by ports is the lack of the required skill and financial muscle from construction companies. The fact is that port construction projects are complex and require experienced skills. Often there is a push to utilize local companies in the construction which may lack the skill. Chin & Waldron (2014) suggest the use of strong international standards as stipulated in the FIDIC (Federation International Des Ingenieurs-Conseils) contract in order to mitigate this risk; thus, to identify and allocate the clearly defined risk against the responsibility, hence, the recourse. Without a proper contract like FIDIC, investors and lenders are likely to avoid taking construction risk, thus, not deciding against investing in a project.
Therefore sponsor or government support may be necessary if the construction risk is not arrested.

2.2.3.3 Financial Risk
Financial risk includes a number of variables, where amongst them is the global financial recession risk. This is where the port is not performing well due to international economic meltdown, as a country’s economies experience challenges and are not growing – international trade is negatively affected. The volatility of the port company shares due to stock market fluctuation, especially if the company is financed through equity, may present financial risk as it may affect the cost of borrowing for the port investment (Chin & Waldron, 2014).

2.2.3.4 Political Risk
Political risk often emanates from the country’s regulation inconsistency and corruption, among others, being at the center of government activities (Chin & Waldron, 2014). For instance, the economic outlook in most of the African countries is subject to political risks due to the fragile international trading and financial stability and to the country’s specific problems. Political and social pressure continue to engulf countries like Nigeria, Libya, Egypt and Tunisia, two years after Arab spring, and this still affects exports and imports and, subsequently, the performance of local ports. Unemployment remains high in the region and political transition is slow and difficult. Chin & Waldron (2014) state that political risk causes uncertainty and may make the environment unpredictable and difficult for ports, resulting in difficult port operations and planning.

2.2.3.5 Legal Risk
Legal risk is associated with the disregard or change of rule of law and the interpretation of the law and regulations. Investors are often skeptical of a country’s policy changes especially if they are not conducive for lucrative infrastructural investments. For instance, the case in Venezuela can be highlighted as legal risk; the government of Venezuela under Chavez’ government decided to expropriate all ports into national ownership. Expropriation can be seen as a real risk mostly in emerging markets like South Africa where the issue of nationalization of all strategic institutions is being debated by the opposition political parties. In another case, South Korea’s
well- developed government regulatory framework and transparency has set concise and clear PPP acts, making PPPs more attractive as a form of sourcing port funding. Legal risk has the same impact as the political risk, making the environment unpredictable and difficult (Chin & Waldron, 2014).

2.2.3.6 Economic Risk
A country’s inflation, GPD, trade and fiscal policy forms part of the central variables considered for any investment can be made in that particular country. Any change to these policies could have significant negative impact on the performance of the port investment especially the international trade policy. For port investment it makes a lot sense to carefully study the country’s international trading policy as part of the economic risks (Chin & Waldron, 2014). Economic risk would have a severe impact on the performance of the port since it affects the throughput of the port. Port throughput is at the core of the activities of the port, hence, the financial performance.

2.2.3.7 Social Risk
The risk that impacts the labour market is called a social risk. Port workers are a very much important pillar of the port because without them the port cannot function. The port can be hugely affected if its labour is unionized as this may put demands on the port which may not be honored and, as a result, workers may go on strike. This risk may never be predicted by investors using the financial or economical appraisal tools. Inefficiency and lack of high skill required by the port may result in additional costs for the port and may disrupt the port investment. In some cases, port developers are forced to relocate some communities for the port development which may result in social cost related to alienation. Environmental impact may be one of the challenges the port may have to face as port impact assessments are seldom objective (Chin & Waldron, 2014).

2.2.3.8 Commercial Risk
Commercial risk focuses on causes that put a country at risk of becoming marginal and noncompetitive. This risk speaks to factors like location, world economic conditions and competition amongst ports to attract cargo (Chin & Waldron, 2014). Since profit depends on port throughput, the proper understanding and management of these factors is very much important. This is also important because, by and large,
port infrastructure investment is fully or partially funded with public money especially in developing countries where the risk is high. The port over capacity may provide more choice to carriers which is not ideal for the port entity. In order for the port to get its return on investment, the ports then compete with others to attract these carriers by offering them incentives or committing them into long term contracts. It is important for Port Authorities to balance port competition and avoid port infrastructure over-investment. Chin & Waldron (2014) stated that too much port competition could lead to overcapacity; whereas, stringent port investment planning could lead to second-guessing market intentions; so, the balance is delicate. The port risk could be viewed in the context of being a member of the supply chain. If one part in the supply chain [verb] then everyone gets affected. While there is not much that policymakers can do about their country’s geographical position, some policy options exist to reduce costs by improving port infrastructure and increasing efficiency in the logistics chain, including through trade and transport facilitation, more efficient port operations or by becoming more attractive as a port of call, which would drive port investments with a stable throughput facilitated by policy (UNCTAD, 2015).

2.2.3.9 Monetary Risk
Ports involve multiple international partners financing stage to profit sharing, monetary risk in the form of the country’s exchange rate volatility or depression risk is crucial. Volatility of the exchange rate also translates to volatility in the port investment profit and loan repayment amounts. Interest rate is one of the key components of monetary risks as it affects the investment loan, repayments and profit sharing, as well. Majority of ports internationally are exposed to US$ exchange rate risk as their tariffs are dominated by it, hence their local currency liquidity is not always sufficient to fund the port investment successfully. Chin & Waldron (2014) emphasised the importance of making the financial risks by keeping a health leverage ratio and, where possible, acknowledging the challenge that immature markets may face in this case.

2.2.3.10 Environmental Risk
For any type of infrastructural investment, environment risk is often the most important risk which accessed. An investment in a country with a lot of natural disasters can be considered as a high risk investment and potential adverse land changes around the port is also an important variable factor during port investment risk assessment. Again
an infrastructural investment in a country with strong protest from environment Non-Government Organisations against the new port investment cannot be undermined (Srikanth, Bell, & Evans, 2007). Athanasatos, Michaelides & Papadakis, (2014) conducted a study to assess risk faced by ports using weather as the main cause and the conclusion was that weather is an important part of risk hence climate change.

Climate Change presents a new threat to port infrastructure investment and affects the long term performance of the port. Climate Change risk differs from different geographical locations. Putting huge capital investment in a country that is affected by climate change can be considered very risky by an investor and therefore this risk will have to be taken into consideration during the port investment valuation stage. Implementing risk management measures can prove to be difficult in instances where Climate Change risk cannot be quantified (Olcer & Mutombo, 2016).

2.2.4 Summary
A good project valuation framework is the one that takes risk into consideration. The creation of stability in a country and quality of the regulatory environment are important in attracting foreign direct investment (FDI) and risk management. It is clear that the port investment is made less or more appealing by the level of risk, otherwise finances would always be available. Port governance remains a central success factor for port investment and has a bearing on the risk tolerant and the returns expected. Government turn to focus on benefits (hence the use of CBA) to the country while private sector focus on profitability. Port investment risk has promoted the concept of risk sharing in the form of private-public-partnership (PPP). Of late, global terminal operators (GTO) and port public authority are seen putting their resources together to building ports infrastructure especial in Africa, hence sharing the profit and the risk. The next section discusses available sources of finance for port investment, considering the associated risk.

2.3 PORT INVESTMENT FINANCING

2.3.1 Introduction
This section focuses on various sources of port investment. The study begins by identifying port investment components that were traditionally funded by government or by the port authority and those that are commonly financed by the terminal
operator. Table 2 gives a summary of the port investment infrastructure, showing the user, source of financing and revenue, life-span of the capital investment, who is the deciding stakeholder and lastly the factors in determining that particular port investment project. Table 2 also shows the traditional characteristics of different types of port infrastructure investment along with traditional sources of financing.

Table 2: Characteristic of different types of port infrastructure investment

<table>
<thead>
<tr>
<th>Category</th>
<th>Basic physical infrastructure</th>
<th>Port access infrastructure</th>
<th>Infrastructure plus</th>
<th>Super-structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>User</td>
<td>Non user-specific</td>
<td>Non user-specific</td>
<td>User-specific</td>
<td>User-specific</td>
</tr>
<tr>
<td>Financing</td>
<td>General means</td>
<td>Port manager</td>
<td>Port enterprise or manager</td>
<td>Port enterprise or manager</td>
</tr>
<tr>
<td>Revenue</td>
<td>Indirect</td>
<td>Seaport due, quay due, rent, right to the estate</td>
<td>Customer tariff, sometimes also port manager tariff</td>
<td>Customer tariff, sometimes also port manager tariff</td>
</tr>
<tr>
<td>Time horizon</td>
<td>Long term (50-100 years)</td>
<td>Long (25-50 years)</td>
<td>Medium-long term (15-25 years)</td>
<td>Short term (5-25 years)</td>
</tr>
<tr>
<td>Deciding party</td>
<td>Government</td>
<td>Port manager</td>
<td>Port entrepreneur</td>
<td>Port entrepreneur</td>
</tr>
<tr>
<td>Determining factors</td>
<td>Vision, political will and indirect returns</td>
<td>Port interest, market estimates and returns</td>
<td>Returns</td>
<td>Returns</td>
</tr>
</tbody>
</table>


In order to understand the available approaches to port investment financing, Table 2 distinguishes different categories of port infrastructural (which is basic physical infrastructure, operational port infrastructure and port equipment, safety/security systems, information technology systems and port superstructure investment) as important factors to determine whether or not funding of that particular investment component ought to come from the owner or the terminal operator. These investments are interdependent, hence the risk profile of each is different. Therefore, cost and risk can be very high if the port and the finance structure is not optimal. The risk profile of each component has an impact on the investment and in deciding on the financing source.
2.3.2 Finance Sources for Port investment

Due to adverse market conditions, it is now difficult to secure required capital for port investment from traditional sources of finance than it used to be. This is due to high investment risks and stringent financial regulations introduced by financial institutions during financial crises (Chin & Waldron, 2014). Access to well-developed financial markets is very much an important aspect of port investment to succeed these days.

In developing countries like South Africa, access to capital funding may prove difficult due to stringent regulatory policies put by government for strategic assets of the country. Port infrastructure is considered as a strategic asset of the country and many countries are finding it difficult to let go of control, so is South Africa.

Chin & Waldron (2014) mention that one of the prerequisites, if the port wishes to raise equity capital through the financial markets, is to register with a stock exchange. They further state that in order to raise funds from a stock exchange, the port is required to have a good track record of performance and profits. Financial market regulations are an important feature as they give a framework regarding sources of finance available. Here are the sources of port investment finance: debt markets, equity market, private-public partnership, or from the private investors or state investment corporations. The next section looks at each one of the investment finance sources and the risk associated with them.

2.3.2.1 Lending Institutions (Bank) Financing

The first option available to ports is to approach a bank which will offer a loan with the hope that the port will be able to repay the loan together with interest. However, after the international financial crisis of 2008, banks became skeptical about giving out large loan amounts which port projects require. Alternatively, banks are opting for financial instruments that allow the use of pooled sums of money from financial institutions, like insurance companies and pension funds which are acting on behalf of groups of people (investors) longing for a long term stable investment (Chin & Waldron, 2014). Since ports are able to provide reliable and stable streams of cash flows and have a long lifespan which satisfy these investors’ risk tolerance and their investment profile. According to Chin & Waldron (2014), a suggestion has been made by some OECD studies to adjust the institutional investment to match with the port project lifespan of roughly 20 to 30 years in order to tap into this market.
2.3.2.2 Bond Market Financing

Bonds are a common source of funding for port infrastructure investment. Issuing bonds is like borrowing money from the market and interested investors buying them. Bonds have been used by ports to raise funds for port projects. For instance, Morocco managed to raise US$172.3 million to finance Tangier Me 2 port construction phase 1 through bond market (Port Finance International, 2012a) and Ningbo Port Company from China issued bonds with a value of US$1 billion (Port Finance International, 2012b). Chin & Waldron (2014) state that, after the financial crisis in 2008, bonds markets became slow and reluctant in their response to such funds and have become high risk investment and unfavorable for port investment, but lenient tax regimes and better return rates for enormous investments still promote bonds as better investment compared to other financial instruments. A good example is one from Virginia Port Authority, where the port was able to raise capital by issuing bonds that were highly competitive in terms of rates. This was achieved through tax exempting on the loan that was given to the financial institutions (Port Strategy, 2010). Transnet, the company owning all ports, railway lines and pipelines in South Africa, placed a [noun] in the US bond market, USD750 million in 2011, US$ 1 billion in 2012, and 5 billion ZAR in 2013 through Berlin Exchange (Leveragedloan.com, 2012). These funds were then distributed to each unit in the form of infrastructure investment. US$4.3 billion budget was allocated to Transnet Port Terminal to invest in port infrastructure investment (Port Finance International, 2012c).

2.3.2.3 Equity Financing

Equity provides another source of funding for port infrastructure projects. In this case the investment risk is fully borne by the equity investor. This funding arrangement is achieved by selling the ownership stake of the port to a potential investor. Private equity is usually bought by well-established investing entities since they are the ones who can afford to buy the stake. Due to high risk, Chin & Waldron (2014) made a note that only those ports that are well-established with outstanding reputation in the market are able to raise the required funds to finance port projects, this is especially done for port upgrade or expansion not a new project due to high risk and uncertainties in new projects. For example, Gujarat Pipavav Port was able to raise US$63.2 million in the form of equity (Port Finance International, 2012d). In
developing countries and markets like South Africa, infrastructure equity finance appears to be volatile due to high risk. As a result, others are posing questions like whether equity finance is readily available for small entities from developing countries have been asked and this can be anticipated since the investor is exposed to political risk from corruption (Chin & Waldron, 2014).

Alternatively, ports can be innovative and go public via market stock exchange to raise port finance thus utilizing collective investments (unit trust). Here we are talking about attracting equity by putting together all the projects of the port into one portfolio in order to spread the risk. This can prove easy if the port entity has many projects under its umbrella like Transnet in South Africa. Westports of Malaysia also managed to raise US$500 million as part of Initial Public Offering (IPO) (Port Finance International, 2012e). These ports approached public stock exchanges and sought a place in the investment portfolios that matched their investment profile in terms of risk and returns (low and steady returns).

2.3.2.4 Equipment Leasing as a form of Financing
Ports can strike deals with manufactures through leasing port equipment. Leasing only applies to port equipment, this is often a responsibility of a port operator but in South Africa is the responsibility of the National Port Authority (NPA) representing government. Comparing buying and leasing, it said that leasing has more advantages. For instance, leasing does not require initial capital which is otherwise required to buy port equipment and the equipment can always be returned to the manufacturer if it does not perform as expected or the port is facing bad market conditions. And this reduces the financial burden and the investment risk form the port entity. Another advantage comes from the notion that ports are less efficient when it comes to equipment maintenance as they lack expertise and experience compared to equipment manufacturers. Port equipment is very much expensive and leasing often helps port entities to modify their project debt capital structure thus enabling the port access to funds it would otherwise not be able to access until the investment is at the later stages where cash flow is healthy, and in some cases leasing also presents an opportunity to access equities that requires the project to have good track record and cash flow. With all of these advantages, however, other port equipment are better bought then leased in order to benefit from long term comprehensive warranties, to
enjoy tailored made equipment for your individual port’s needs and tax relief for depreciation (Chin & Waldron, 2014).

2.3.2.5 Port Authority or Government Financing
Government is a key player in port project development and port investment finances. Government’s backing of a seaport project is common in landlord ports. Most governments see a ports as national strategic project or asset; ports help in stimulating the economy and in encouraging trading. Moreover ports are viewed as vehicles to address unemployment for developing countries. Port investment requires huge funding so small port entities are not able to fund themselves from their proceeds and are faced with a challenge of securing capital finance. Due to lack of funding from government, most ports in developing countries are funded through other sources of finance. The lack of interest from private investors often result in the situation where financing a port project becomes a very risky and huge challenge for government. PPP financing is also used as a solution in the case where the government does not have funding for the port investment but not willing to lose control of the port (Chin & Waldron, 2014).

2.3.2.6 Public-Private Partnerships (PPP) Financing
PPP cooperation on port investment finance, especial the delivery of large-scale development projects is increasing globally (Aerts, Grage, Dooms, & Haezendonck, 2014). National Council for Public-Private Partnership (NCPPP, 2012) defines PPP as “a contractual agreement between a public agency (federal, states or local government) and a private sector entity”. Through this agreement the skills and assets of each sector (public and private) are shared in delivering a service or facility for the use of the public (NCPPP, 2012). In addition, to the sharing of resources, each party shares the risks and rewards in the delivery of the services and/or facility. In this case, the project is financed by the government in partnership with a private investor reducing the burden of the high capital required. Private sector involvement in the capital intensive project is preferred by banking institutions when lending funds; since, the private sector often possesses the skill and experience required to deliver in huge projects and are more efficient in running a port project (Chin & Waldron, 2014). There are three different forms of PPP according to Chin & Waldron (2014) and The World
Bank (2007): Operational partnership, design-build-operate partnership, and transfer partnership. Below is a brief explanation of each partnership arrangement:

- **Operational Partnership** – In this agreement the private sector is entrusted with the task to operate the services which otherwise belong to the public sector/government. Operational and Maintenance (OM) and Operations, Maintenance and Management (OMM) are also part of this partnership agreement.

- **Design-build-operate partnership** – Since the private sector has capital and more flexibility, they are, thus, preferred for capital project partnership. With a bit of autonomy, a private entity signs a contract to design, build and operate the port. The following arrangement in this case are common: DB, DBO, DBOM and DBFOM (D = Design, B = Building, O = Operate, F = Finance, M = Maintain, and lastly T = Transfer).

- **Transfer** – At the end of the long term partnership contract of building and operating the port, the port infrastructure ownership is transferred from the private entity to public sector. Therefore, the project would have been financed by the private entity and government. This partnership includes DBFOMT and BOT.

South Africa has been reported to be exploring the PDMC (Port Development and Management Company) model Maritime & Transport Business Solution (2015: p.8). “The PDMC is a public-private joint venture that combines the features of a landlord port and a private Build Operate Transfer (BOT) port type. This structure adds private sector capital, expertise and risk allocation to the traditional public landlord role” according to Port Finance International (2014). Table 3 shows some of the good examples of the port investment partnership concession or PPP that have went successfully in developed and developing countries and Africa, in particular.
### Table 3: Example of PPP structures and ports adopting such structures

<table>
<thead>
<tr>
<th>Structure</th>
<th>Characteristics</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Landlord</strong></td>
<td>• PA acts as traditional landlord</td>
<td>• Rotterdam, Antwerp, Hamburg</td>
</tr>
<tr>
<td></td>
<td>• Substantial investments and financing is required, but only for base infrastructure</td>
<td>• Best practice port reform in African ports</td>
</tr>
<tr>
<td>PA</td>
<td>Operator</td>
<td>No DBFM contract in ports up to date: currently under implementation in a North American port</td>
</tr>
<tr>
<td>Infra</td>
<td>Operator</td>
<td>For Rotterdam MV2 it was concluded to apply DBM</td>
</tr>
<tr>
<td></td>
<td><strong>DBFM infra</strong></td>
<td></td>
</tr>
<tr>
<td><strong>2. Landlord with DB(F)M</strong></td>
<td>• PA acts as traditional landlord</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Construction contract is tendered out as a DB(F)M, which implies that construction and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>maintenance (and financing) is the full responsibility of the infrastructure contracts</td>
<td></td>
</tr>
<tr>
<td>PA</td>
<td>Operator</td>
<td>No DBFM contract in ports up to date: currently under implementation in a North American port</td>
</tr>
<tr>
<td>DB(F)M infra</td>
<td>Operator</td>
<td>For Rotterdam MV2 it was concluded to apply DBM</td>
</tr>
<tr>
<td></td>
<td><strong>PA</strong></td>
<td></td>
</tr>
<tr>
<td><strong>3. PDMC</strong></td>
<td>• PA enters into Master Concession with PDMC (PA as co-shareholder)</td>
<td>• Busan, S-Korea – Hyundai, Bouygues, Busan PA, Macquarie, Kukje, KCT</td>
</tr>
<tr>
<td></td>
<td>• PDMC tenders individual terminal concessions and the construction contract</td>
<td>• Maputo, Mozambique – CFM, DP World, Grindrod</td>
</tr>
<tr>
<td></td>
<td>• PDMC attracts Investors and arranges debt financing for investments (based on securities</td>
<td>• Durban, South-Africa</td>
</tr>
<tr>
<td></td>
<td>from anchor clients)</td>
<td>• Iboom Deep-Sea Port, Nigeria</td>
</tr>
<tr>
<td>PA</td>
<td>Operator</td>
<td></td>
</tr>
<tr>
<td>PDMC</td>
<td>Operator</td>
<td></td>
</tr>
<tr>
<td><strong>Infra EPC</strong></td>
<td>Operator</td>
<td></td>
</tr>
<tr>
<td><strong>4. Full BOT concession tender</strong></td>
<td>• Private consortium is responsible for port development and investments</td>
<td>• Monrovia, Liberia – APMT</td>
</tr>
<tr>
<td></td>
<td>• Appetite restricted by size of the investments</td>
<td>• Mersin, Turkey – PSA &amp; Afken</td>
</tr>
<tr>
<td></td>
<td>• Limited control PA</td>
<td></td>
</tr>
</tbody>
</table>


### 2.3.3 Port Financing Landscape in Africa

In terms of the capital investments and amounts currently or recently as part of port infrastructure development in Africa, Maritime & Transport Business Solution (2015) gave a value of around $79 billion US dollars as highlighted in Figure 1 below. The largest number comes from container terminal (57 projects) expansion which is flowed by dry bulk (31 projects). It is clear that many ports are investing in their infrastructure. This is going to result in ports in the same region competing for the same cargo. Shipping lines stand to benefit from port inter-competition.
Figure 1: The number and the value of Port Investment Projects in Africa


Ports in developing countries, like those in Africa, are encouraged to approach developmental agencies, like the World Bank, who offer lower rates (1% - 3.5%) than commercial rates (10% - 12%), and also sponsor the most important part of the port planning or project development, the feasibility study, and moreover allow for a grace period of 10 years (Chin & Waldron, 2014). However, the disadvantage is that the government may not be able to control or influence who gets the contract to build the port and thus local companies may be disadvantaged as they often do not have the ability to compete with international companies. The local economic growth and empowerment may be local companies may be overlooked. Last, the challenge from private investors is to mitigate all risks in port investment, given the global economic uncertainties. Estimated cargo throughput plays a key role in motivating private investors to finance any port investment. Uncertainty on future market conditions put investors in a difficult position when deciding on the investment.

2.3.4 Summary

It would be misleading to assume that all the multilateral sources of funding are giving cheaper rates. Of course, the government-to-government Fully Drawn Advances
(FDA) loan are often subsidized, but, when we compare it to commercial banks, multilateral lenders benefits in the long term funding. Prices and risk have to be the same since quite often multilateral lenders co-finance the port investment with commercial lenders. Commercial lenders and private investors are scared of taking risk that is associated with the shipping industry since the financial crises, making port finance access difficult.

Farrell (2014) stated that some of the African ports, however, have been successful in attracting private sector to form PPP because services and port infrastructure can be shared in a way that guarantee the financial viability of the port investment project, and as such the risk is also shared. Moreover there are now questions on who should pay for superstructure, equipment, and systems under the concession agreement (The World Bank, 2007). Due to supply chain integration, shipping lines are also becoming more involved in the port financing through port terminal management. On the other hand, global terminal operators are expanding their market share since they have experience and management skills to manage ports profitable better than port authorities or government and many ports are embracing them as partners. GTO are often in a position to finance port investment successful since they have huge financial muscle. Thus a port company has a responsibility to present an optimal port investment capital structure. The structure of port investment funding not only has a profound impact on the port management structure or ownership but also has an impact on public sector participation in port development projects. The next section focuses more on the port institutional structure.

2.4 THE PORT GOVERNANCE STRUCTURE

2.4.1 Introduction
A port is a multi-stakeholder playing field with a lot of companies and stakeholders that contribute to port operations and financial success. These stakeholders are subject to a port’s strategic position and management structure (Tsamboulas & Ballis, 2014). For instance, one strategic decision by a single stakeholder has a far reaching impact within the port structure. This is because different parties within the port are responsible for deferent aspects of port operations and investment strategy. Based on this understanding, this chapter will identify the existing main port ownership models and key stakeholders. The South African administration model will be
presented within the context of port investment risk. It will further present the role played by different stakeholders within the current port structure/model in South Africa and also highlight the challenges faced by the port in securing investment funding.

### 2.4.2 Ports Model

Any discussion around the port infrastructure subject ought to commence from defining the concept of port management and ownership. This is crucial in identifying the key actors involved, most importantly their individual objectives and dynamic interaction. According to The World Bank (2007) Port Reform Toolkit, in terms of management and ownership, there are four types of port administration models, namely: public, service, private and tool port model. A brief summary of the characteristics, strengths and weaknesses of each model is given below in Table 4.

**Table 4: Type of port models summary of strengths and weaknesses**

<table>
<thead>
<tr>
<th>PORT MODEL</th>
<th>CHARACTERISTICS</th>
<th>STRENGTHS</th>
<th>WEAKNESSES</th>
</tr>
</thead>
</table>
| PUBLIC SERVICE PORT | - Infrastructures and superstructure planning and operations under the state control  
                        e.g. Colombo in Sri Lanka)  
                        Dar es Salaam in Tanzania)  
                        and Nhava Sheva in India  
                        - The port is managed like a public department  
                        - Government responsible for funding  
                        - All port investment infrastructure risk borne by the state | - Unit of Command (Same organisation responsible for superstructure development and cargo handling Port cluster with specialised ports) for liquid bulk or container could be realised)  
                        - Lack of internal competition leading to inefficiency (no or limited role of the private operator in the cargo handling)  
                        - In cases of labour disputes, there is no problem solving capacity and flexibility. The port administrator is also a labour employer  
                        - Underinvestment and wasteful of resources due dependence to government budget and interference  
                        - Operations performance are less market oriented and user-oriented  
                        - Political tariffs as oppose to cost based prices for services  
                        - The port labour interest in the port development is overrate | |
| TOOL PORT           | - There is an independent body from   
                        - Avoiding of duplication of facility (port | - Split operations which can lead to conflicting solutions (the public Port | |
The typical example of tool port is the port of Chittagong in other ministries responsible for the port
- Often a mix between state and municipal management.
- There are small private terminal operators
- Port investment risk borne by the public sector.
- Many ports are in transit to Landlord port model

<table>
<thead>
<tr>
<th>LANDLORD PORT</th>
<th>PRIVATE PORT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examples of landlord ports are: port of Rotterdam, Antwerp, New York Bangladesh</td>
<td>Private ports are mainly found in UK and New Zealand</td>
</tr>
<tr>
<td>- Infrastructure is owned by the state or municipality through a public Port Authority. - Super structure is owned by the private port operators (including planning and funding). - Port investment risk shared by public and private sector.</td>
<td>- Infrastructure and superstructure both owned by the private sector. - No or limited public interference in terms of planning and financing. - Port investment risk borne by the private sector. - Normally not universal port, e.g. owned by company dealing with one products like coal imports or exports for a power plant.</td>
</tr>
<tr>
<td>- Management of infrastructure and provision of cargo are clearly separated. - Private terminal operators are better able to respond to market requirements than public sector. - Realistic port investment assessment (a close interrelation of public Port Authority and private sector regarding port development).</td>
<td>- No direct government interference. - The ownership of land enables the market port development and market tariff policies. - Total flexibility with port investment and operations activities.</td>
</tr>
<tr>
<td>- Pressure from various private sector (endemic risk of port investment/infrastructure overcapacity) - Risk to judging the right time to invest due to pressure. - Obstructive public Port Authority (limited public funding may affect private business expansion)</td>
<td>- The possible absence of port regulator. - There is a serious risk of lack of port investment in infrastructure by the private sector. - In terms of port sector business, government loses the opportunity to execute long term economic development policy. - There is a serious risk of speculation with port land by the private sector.</td>
</tr>
</tbody>
</table>

Source: Author adapted from The World Bank (2007), Sorfenfrei (2013), Tsamboulas & Ballis (2014)
### 2.4.3 South African Ports Model

Table 5 is a port function matrix which shows where the South African port model falls within the four port models in terms of ownership, operations and regulation. The South African Port model is unique and, to a certain extent, reflects the evolution of its government history and the strategies over many years back (see Table 6) and cannot be classified to any port model. The question remains if the port model adopted by South Africa is benefiting the country. Of course South Africa is more of a landlord without an advantage of the private terminal manager. The model is a way is influenced by the state developmental agenda of the country as led by state enterprises like Transnet.

Table 5: Port Function Matrix

<table>
<thead>
<tr>
<th>Port Models</th>
<th>Regulator</th>
<th>Land Owner</th>
<th>Operator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Service Port</td>
<td>Public</td>
<td>Public</td>
<td>Public</td>
</tr>
<tr>
<td>Tool Port</td>
<td>Public</td>
<td>Public</td>
<td>Private</td>
</tr>
<tr>
<td>Landlord Port</td>
<td>Public</td>
<td>Private</td>
<td>Private</td>
</tr>
<tr>
<td>Private Port</td>
<td>Private</td>
<td>Private</td>
<td>Private</td>
</tr>
<tr>
<td>South African Ports</td>
<td>Public</td>
<td>Public</td>
<td>Public/Private</td>
</tr>
</tbody>
</table>

Source: Adapted from The World Bank (2007) and Chasomeris (2011)

### 2.4.4 South African Port Governance

Transnet Group, a state owned enterprise (SOE), is a port landlord through a division known as Transnet National Port Authority (TNPA). Port governance in South Africa has evolved under different forms of governance from Pre-Union autonomous structures when it was formed in 1833 to what it is known as Transnet today (see Table 6).

Table 6: Brief history overview of port governance in South Africa

<table>
<thead>
<tr>
<th>Duration</th>
<th>Organisation</th>
<th>Governance</th>
</tr>
</thead>
</table>
| 1833-1908 | Autonomous Structure Pre-Union | • The harbours were financially autonomous.  
• Each port authority administered its own tariffs.  
• Revenue generated as a result accrued to harbour administrations and was easily identifiable.  
• Inter-port competition was rife and promoted competitive tariffs. |
<p>| 1909-1981 | South African Railways and | • The subsequent introduction of a uniform tariff structure brought to an end the prior inter-port competition. |</p>
<table>
<thead>
<tr>
<th>Period</th>
<th>Organisation</th>
<th>Key Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harbours (SAR&amp; H)</td>
<td>The ports were supposed to be run according to sound business principles, generating enough revenue to remain self-efficient, with the exception of providing preferably cheap transport for the agricultural and industrial sectors.</td>
<td></td>
</tr>
<tr>
<td>Harbours (SAR&amp; H)</td>
<td>There was a large degree of cross-subsidisation from the profits generated by harbour activities to cover the losses incurred by the railways.</td>
<td></td>
</tr>
<tr>
<td>1982-1989</td>
<td>South African Transport Services (SATS)</td>
<td>The ports physical capital, from an expenditure and revenue perspective, was controlled by SATS.</td>
</tr>
<tr>
<td>1982-1989</td>
<td>South African Transport Services (SATS)</td>
<td>The Act also required the “economic interest and the transport needs of the whole country” be taken into consideration, rather than just those of the agricultural and industrial sectors.</td>
</tr>
<tr>
<td>1982-1989</td>
<td>South African Transport Services (SATS)</td>
<td>Although SATS reduced inter-modal cross-subsidisation that placed labour profits in better perspective, there was still some surviving inter-modal and considerable intra-port cross subsidisation.</td>
</tr>
<tr>
<td>1989-present</td>
<td>Transnet Group</td>
<td>Corporatisethe activities of SATS; resulting in the formation of Transnet on 1st November 1989, with government as the sole shareholder.</td>
</tr>
<tr>
<td>1989-present</td>
<td>Transnet Group</td>
<td>Transnet as the umbrella company, which maintains five divisions: Spoornet (rail); Portnet (ports); Petronet (pipelines); Autonet (roads); and South African Airways, all of which operated as separate entities.</td>
</tr>
<tr>
<td>1989-present</td>
<td>Transnet Group</td>
<td>Portnet had two conflicting objectives; firstly, it had to act as a port authority to safeguard public interest, and secondly to exploit its comparative advantage in the pursuit of its objectives.</td>
</tr>
<tr>
<td>1989-present</td>
<td>Transnet Group</td>
<td>That conflict, linked to the approach of Transnet to use the excess profit generated by the ports operation to subsidise other operations in the group led to underinvestment in Port infrastructure.</td>
</tr>
<tr>
<td>2002 – to present</td>
<td>Transnet Group (Transnet National Port Authority (TNPA) and Transnet Port Terminal (TPT))</td>
<td>In 2002, Portnet split into a landlord port authority (now called Transnet National Port Authority and a port operator (now called Transnet Port Terminals). This was a result of the National Commercial Port Policy of 2002.</td>
</tr>
<tr>
<td>2002 – to present</td>
<td>Transnet Group (Transnet National Port Authority (TNPA) and Transnet Port Terminal (TPT))</td>
<td>South Africa followed many other countries in separating port infrastructure from port services, creating two separate bodies within Transnet.</td>
</tr>
<tr>
<td>2007-present</td>
<td>Transnet Group and Port Regulator</td>
<td>Ports Regulator was established under the provision of National Ports Act of 2005 which objectives are to:</td>
</tr>
<tr>
<td>2007-present</td>
<td>Transnet Group and Port Regulator</td>
<td>o Develop an effective and productive port industry for economic growth and operations of ports.</td>
</tr>
<tr>
<td>2007-present</td>
<td>Transnet Group and Port Regulator</td>
<td>o Promote and improve efficiency and performance in the management and operations of ports.</td>
</tr>
<tr>
<td>2007-present</td>
<td>Transnet Group and Port Regulator</td>
<td>o Promote the development of an integrated regional production and distribution system in support of government policies.</td>
</tr>
</tbody>
</table>
Ports Regulator allows for industry comments on the TNPA tariff application and TNPA's responses to those comments and then makes a decision.

Source: Adapted from Gumede and Chasomeris (2012), Centre for Competition, Regulation and Economic Development (2014)

The port governance structure in South Africa involves different entities that are having an influence on the port activities and its investment strategy: these entities includes, Department of Transport (DOT), the Department of Public Enterprises (DPE), The Port Regulator of South Africa, the National Ports Authority, and the South African Maritime Safety Authority (SAMSA). Their interaction is shown in figure 2. The Port Regulator reporting ministry is DOT. The TNPA structure goes all the way up to the minister of DPE has the ownership powers to Transnet Group as a state owned entity. The Figure 2 shows that TNPA has oversight power over TPT and private operators that may compete with TPT. While TNPA and TPT are both owned by Transnet Group.

SAMSA is also part of the governance structure as a critical player when it comes to the maritime sector and is involved in the regulatory framework but not in the economic regulation. SAMSA’s main focus is on safety, national ship registry and to stimulate maritime sector economy in South Africa; thus, it forms part of the country’s maritime economic developments. Some port activities are indirectly affected by SAMSA’s environmental and technical regulation, for example, the bunker fuel taxes.
South Africa has nine commercial ports as shown in Figure 3. The port of Durban, Port Elizabeth and Cape Town handles mostly the container and high value and volume cargo. Port of Saldanha Bay and Richards Bay handles primary product cargo. Mossel Bay handles bulk liquids and Port of East London handles bulk, containers and cars. The new, Port of Ngqura handles containers and bulk liquids. The Port of Noloth is leased out to De Beers for its mining businesses.
2.4.4.1 Port Regulator of South Africa

In 2007, the South African government established The Port Regulator of South Africa. Although Transnet and Port Regulator of South Africa are both owned by government, they are independent of each other. The purpose of establishing The Port Regulator of South Africa was to regulate the operations of South African ports under the National Port Act of 2005. The Port Regulator’s main functions are for “economic regulation of the ports system in South Africa, in line with the strategic development context of the state. In accordance with this mandate, the Regulator performs certain functions and activities in the industry that relate mainly to regulation of pricing and other aspects of economic regulation, promotion of equity of access to ports facilities and services, monitoring the industry’s compliance with the regulatory framework and also hearing any complaints and appeals lodged with it” (National Ports Act, 2005: p.3)
The formation of the Port Regular of South Africa was triggered by port shipping users discounting over pricing escalations and thus regarding them to be among the highest in the world (Centre for Competition, Regulation and Economic Development, 2014).

2.4.4.2 Transnet National Port Authority (TNPA)

In South Africa, the public national Port Authority is a division of Transnet Group. Transnet is one of the powerful state-owned enterprises (SOE) in South Africa. Transnet is also a port terminal operator though a division called Transnet Port Terminal (TPT) and it has successfully resisted the pressure form government to establish the Port Authority as an independent entity citing the challenge of triggering loan covenant clause (Transnet, 2015b). One of the most important functions of TNPA under the 2005 Port Act, is to issue licenses to port service providers, giving them full control which may be used to discourage competition. The TNPA makes money through different means. In Table 7 below, the streams of revenue for TNPA may be seen demonstrating how the port is making money by providing what services.
Table 7: TNPA port infrastructure and revenue stream

<table>
<thead>
<tr>
<th>Port Infrastructure</th>
<th>Revenue Stream</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Port land</strong></td>
<td>Lease income (rentals)</td>
</tr>
<tr>
<td>Port land is leased to terminal operators and other port service and port facility providers in the port(s).</td>
<td></td>
</tr>
<tr>
<td><strong>Wet infrastructure</strong></td>
<td>Light dues, port dues, vessel traffic services fees</td>
</tr>
<tr>
<td>Lighthouse services infrastructure (lighthouses, buoys, beacons and electronic / radio navigation equipment), port control and safety, entrance channels, breakwaters, turning basins, aids to navigation within port limits, vessel traffic services, maintenance dredging within ports.</td>
<td></td>
</tr>
<tr>
<td><strong>Dry infrastructure</strong></td>
<td>Cargo dues, berth dues</td>
</tr>
<tr>
<td>Quay walls, roads, rail lines, buildings, fencing, port security, lighting (outside terminals).</td>
<td></td>
</tr>
<tr>
<td><strong>Ship repair services</strong></td>
<td>Preparation fee, docking and undocking fees (vessels at repair facilities), Berth dues (vessels at repair quays)</td>
</tr>
<tr>
<td>Provide and maintain repair facilities as well as the cranes utilised in such facilities.</td>
<td></td>
</tr>
<tr>
<td><strong>Marine services</strong></td>
<td>Pilotage dues, tug assistance fees, berthing fees, running of line fees, floating crane hire fees</td>
</tr>
<tr>
<td>Pilotage, tug assistance, berthing, running of lines, floating cranes</td>
<td></td>
</tr>
</tbody>
</table>

Source: Transnet Port Authority

Table 8 below provides a summary of South African port infrastructure and different type of cargo's representation. Port of Durban is the biggest port in South Africa in terms of port infrastructure, with 19 terminals and 57 berths. However the draught is only 12.8m limiting acceptance of bigger ships. The location of Durban port allows it to be the hub for container cargo from the Middle East, Far East, Indian Ocean Islands and Australia. Durban port serves as a gateway to cargo going to Zambia, Zimbabwe
and Malawi. Landlocked countries like Lesotho and Kingdoms of Swaziland also benefit from the port. The port is well resourced with tandem lift cranes with an ability to carry 80 tons and can handle the new generation of vessels (Transnet Port Terminal, 2016).

Table 8: Summary of South Africa Port Infrastructure

<table>
<thead>
<tr>
<th>Port Name</th>
<th>Terminal</th>
<th>Berths</th>
<th>Sector</th>
<th>Max Draught</th>
</tr>
</thead>
<tbody>
<tr>
<td>Richards Bay</td>
<td>6</td>
<td>22</td>
<td>Bulk and break-bulk</td>
<td>17.5m</td>
</tr>
<tr>
<td>Durban</td>
<td>19</td>
<td>57</td>
<td>Containers, cars, break-bulk</td>
<td>12.8m</td>
</tr>
<tr>
<td>Port Elizabeth</td>
<td>5</td>
<td>12</td>
<td>Cars, Containers, break-bulk</td>
<td>12.2m</td>
</tr>
<tr>
<td>Port of Ngqura</td>
<td>3</td>
<td>5</td>
<td>Containers</td>
<td>16.5m</td>
</tr>
<tr>
<td>East London</td>
<td>4</td>
<td>11</td>
<td>Cars and break-bulk</td>
<td>10.4</td>
</tr>
<tr>
<td>Mossel Bay</td>
<td>1</td>
<td>8</td>
<td>Bulk and Fishing</td>
<td>6.5m</td>
</tr>
<tr>
<td>Cape Town</td>
<td>7</td>
<td>45</td>
<td>Containers, break-bulk</td>
<td>22.5m</td>
</tr>
<tr>
<td>Saldanha</td>
<td>3</td>
<td>7</td>
<td>Bulk, Break-bulk</td>
<td>21.5m</td>
</tr>
</tbody>
</table>

Source: Adapted from SAMSA (2010)

Transnet governance structure is in line with a developmental-states approach. In defining a developmental state Edigheji (2005) mentioned that the state is one who should ensure a strong participation in the governance and transformation process of its country’s facet through broad-based alliances with the general public. He further stated that the state ought to utilize the country’s state owned enterprises to play an important role to promote better economic developments and performance. This concept spells out that the state should be guided by the goals of authoritative governance, inclusive accountability, strong cohesion and stability to encourage popular participation and general consensus (Edigheji, 2005).

South African ports are operated by public and private sectors (SAMSA, 2010). The market share distribution as shown in

TNPA owns all the commercial ports in South Africa. Varying from port to port, the public-private interface exist in a very complex and unique way. The private sector participation is mostly found in Durban and Richards Bay ports and few exist in other commercial ports. This interface is mostly found in the cargo handling and terminal operations. The cargo handling terrain is split in different sectors as shown in Table 9: the public controls the major dry-bulks, neo-bulks, unitized/container cargo, vehicles and most of break-bulk general cargo, while the private sector operators are
found in some important areas of the dry-bulk cargo terrain and sway in liquid-bulk like crude oil (SAMSA, 2010).

Table 9 gives a picture of the port operators in South Africa. The uniqueness of the South African port model shows that there public and private port operators in South Africa who are working under the supervision of TNPA. Unlike in the typical port model, port operations are shared between the public and private sector (see table 3). The public sector, through TPT, is a monopoly in high value cargo like vehicles and dominant in containers handling, while the private sector is handling the bulk cargo which low valued (including foreign port operators) (Centre for Competition, Regulation and Economic Development, 2014).

TNPA owns all the commercial ports in South Africa. Varying from port to port, the public-private interface exist in a very complex and unique way. The private sector participation is mostly found in Durban and Richards Bay ports and few exist in other commercial ports. This interface is mostly found in the cargo handling and terminal operations. The cargo handling terrain is split in different sectors as shown in Table 9: the public controls the major dry-bulks, neo-bulks, unitized/container cargo, vehicles and most of break-bulk general cargo, while the private sector operators are found in some important areas of the dry-bulk cargo terrain and sway in liquid-bulk like crude oil (SAMSA, 2010).

Table 9: Private and Public sector market share for major services.

<table>
<thead>
<tr>
<th>Services</th>
<th>TNPA</th>
<th>Port Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>TPT (Public)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Private Sector</td>
</tr>
<tr>
<td>Marine Services (Port services)</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>Car (RoRo) Handling</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>Container Handling</td>
<td>97%</td>
<td>3%</td>
</tr>
<tr>
<td>Bulk Handling</td>
<td>37%</td>
<td>63%</td>
</tr>
<tr>
<td>Break-bulk Handling</td>
<td>78%</td>
<td>22%</td>
</tr>
</tbody>
</table>

Source: SAMSA (2010)
TPT has a uniform pricing strategy, meaning port users at different ports in the country are paying for investments even if they are not directly benefiting from them. Gumede (2012) went as far as arguing that port users, in the past, paid for TNPA misjudged investments. For instance, container port users in Durban port are paying for the infrastructural investment in other ports, like the Port of Ngqura that is only utilised the 25% its total capacity as sown in Table 10. Under-utilization of port infrastructure facilities is one of the challenges faced by Transnet management in South African (Chasomeris, 2015). This argument is further supported by the statistical reports on container port capacity usage versus total capacity (see Table 10) as container terminals are one making more revenue for TNPA.

Table 10: Port container infrastructure utilization rate for 2013/14

<table>
<thead>
<tr>
<th>Container Terminal</th>
<th>Total TUE</th>
<th>Throughput against design</th>
<th>Throughput against installed capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Durban Port</td>
<td>2 660 144</td>
<td>88%</td>
<td>88%</td>
</tr>
<tr>
<td>Cape Town</td>
<td>907 796</td>
<td>61%</td>
<td>101%</td>
</tr>
<tr>
<td>Port of Ngqura</td>
<td>713 306</td>
<td>25%</td>
<td>145%</td>
</tr>
<tr>
<td>Port Elizabeth</td>
<td>291 233</td>
<td>49%</td>
<td>90%</td>
</tr>
<tr>
<td>East London</td>
<td>41 080</td>
<td>44%</td>
<td>77%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>4 613 559</td>
<td>58%</td>
<td>96%</td>
</tr>
</tbody>
</table>

Source: Transnet, 2015a

The average of individual ports when accessing port investment requirements does not only affect the proper charges of South African ports, it also affects the assessment of port infrastructure investment in terms of identifying those ports needing investment. This means the higher performing ports are forced to pay for the low performing ports.

2.4.5 South African Surface Freight Flow

The total freight flow in the country has a huge influence on the port investment strategy hence the returns on the port infrastructure of the country. According to Transnet (2014) total freight on the South African surface was expected to increase from 762mt to 1 955mt (an increase of approximately 157%), the port cargo demand to increase from 227mt to 540mt, cross-border traffic to increase from 15mt to 37mt (an increase of approximately 150%) by 2043. Subsequent the freight flows on the surface of the country expected to densify significantly by 2043 as illustrated in Figure
4. All these forecasted figure has led to capital investment in for ports where demand exceed available capacity.

The freight is predominantly focused on two major corridors (the Cape corridor and the Durban to Gauteng corridor). From the freight forecast perspective, the economy has a positive trajectory while in reality the South African market is showing negative signs. The country market economic indicators like GDP, inflation, interest rate and exchange rate are showing an economy that is dwindling. The economy that would not be able to generate the amount of freight projected. Can it be that the forecasted port demand is no fully take into account economic indicators? This will mean the forecasting model is not effective thus rendering the whole capital investment project valuation framework ineffective.
2.4.6 Conclusions

The current market dynamics have seen many port sector administrations reforming from a traditional port model to modern port structures. This is done with the aim to improve performance and to access funding. Modernization of management and...
administration through liberalization, commercialization, corporatization, and privatization of port governance has seen port improvement in so many ways in terms of performance and administration (The World Bank, 2007). Transnet got corporatized in 1983 and, to date, it is operating as a commercial entity.

This chapter concludes by suggesting that the South African government conduct a detailed review to access whether or not the port model used is appropriate given the strengths and weaknesses of each model as shown in Table 4 together with the challenges faced by the country. This should include the cost benefits analysis of using a PPP scheme if used in the port sector. There is big question about the effectiveness of the port demand forecast model used by Transnet to develop a port investment plan, as its expectations are not in line with what the economic indicators are communicating. The next chapter focuses on the South African port investment valuation framework.
3 CHAPTER THREE

3.1 RESEARCH METHODOLOGY

3.1.1 Introduction
This chapter provides a detailed description of the methodology adopted and further discusses the results of the study. The study uses a qualitative approach and heavily relies on existing information to review the South African capital project valuation framework with the view to highlight strengths and weaknesses and presents recommendations. The importance of ports in the structure of a country’s economy has been supported by literature with indicators pointing to the fact that they take the central place in maritime transport systems and in supporting investment in business, employment, and development of related areas and growth of the country’s economy. Port investment is capital intensive. It is important to understand the effectiveness of the port investment valuation framework used by South Africa.

3.1.2 Methodology
Methodologically, this research adopted a case study approach. The study uses qualitative methods. The qualitative method allows for flexibility, as adjustments can be made during the process of the research (Davis & Baulch, 2010). Many factors were taken into consideration before a decision to choose this research method was taken. McCusker & Gunaydin (2014) argue that before any research methodology, whether qualitative or quantitative, assessments have to be completed on the appropriateness of both methods.

This dissertation mostly relied on secondary data (existing literature). According to Assessment Capacities Project (2012: p.2) “secondary data is information which has typically been collected by researchers not involved in the current assessment and has undergone at least one layer of analysis prior to inclusion in the needs...
assessment. Secondary data can comprise published research, internet materials, media reports, and data which has been cleaned, analysed and collected for a purpose other than the needs assessment, such as academic research or an agency or sector specific monitoring reports." The nature of this study is therefore suitable to use the qualitative method because most of the information required in reviewing a framework is currently in public domain.

In obtaining secondary data, text books and electronic journals, academic papers and websites information were utilized. For instance, data from TNPA, TPT, Port Regulator of South Africa, as well as reports and studies on ports were useful. Local and international academic papers and authors who have produced reports on SA ports were collected and used. The information gathered was then supported by information gathered from a personal discussion with Transnet Manager, Mr Kana Mutombo, who is part of the Transnet port capital planning team. This discussion helped to develop the framework involved in port capital project valuation in at TNPA. Furthermore, the discussion helped to close the gaps on the publicly available information regarding the way TNPA operates. The TNPA framework was then followed to gather information and review the process each of the steps identified. Reasonable actions and steps were taken to ensure the acceptable quality of this study was maintained.

The next section, presents results about port investment in South Africa and TNPA investment valuation framework with the view to highlight strengths and weaknesses. TNPA is responsible for port planning, port infrastructure investment and port terminal management in South Africa, hence the review of its investment framework. All port related capital investment projects in South Africa are handled by TNPA, hence the study is focusing on TNPA.

3.1.3 Port Investment in South Africa
The regulatory manual issued under section 30 of the Act, allows TNPA to earn and recover on the Regulatory Asset Base (RAB) and grant on capital spending in the form of work in progress in order to recover its investment, costs and to make profit matching the risk of managing, controlling, owning and administering ports and its investment in port services and facilities (Chasomeris, 2011). Even though TNPA and TPT as divisions of Transnet enjoys a certain level of autonomy regarding business
and operational decision making, the investment funding strategy (where to source the funding and how to use it) remains at the hands of the Transnet Group board.

Port investment is a very expensive undertaking and the cost of capital is therefore high, forcing ports to raise port charges. For instance port users in South Africa have been expressing discount on the higher port pricing and commercial performance of ports hence motivating for port reforms. However, the government of South Africa has moved the port reform discussions on the potential concession of port terminals to discussions on public-private partnerships (Centre for Competition, Regulation and Economic Development, 2014). Still, there are those within government who are very skeptical about bringing PPP scheme and they believe the maritime sector should remain an important vehicle for government to address unemployment and to stimulate economic activities in the country. The private sector is known to focus on profit maximization rather than on building the country’s economy.

The question about where to source finance for port infrastructure investment in view of different challenges (risks) facing South Africa is very much important. There are a lot of investment options available for Transnet to build an optimum port investment capital structure. Currently, policies limit Transnet to bonds, loans and the use of retained income. It is vital to understand the vision, economic and political setting of South Africa within which the port is operating before applying a particular port model. South Africa is a ‘developmental state’. South Africa has a number of challenges, e.g. high unemployment rate, low currency rate, inflation, low GDP growth, high interest rates, and unionized workers (Gumede & Chasomeris, 2012). And, SOEs like Transnet and Eskom are expected to be key in addressing these challenges. Therefore, port governance systems and the port model reflects an active government strategy. This governance system presents a unique port operating model and has obviously prevented private global terminal operators to fully participate in the country’s port business. Furthermore, it has also created a conducive environment that promotes coordination amongst South African ports and with its railway system controlled by the same entity.
3.1.4 South Africa Port Investment Valuation Framework

TNPA port investment framework involves 3 important steps. These steps were established during a personal discussion with Transnet Manager, Kana Mutombo (2016). Hence the results are divided into three categories, or steps for simplicity purposes.

3.1.4.1 Step 1 – Port Future Cargo Demand

TNPA uses the model called Freight Demand Model (FDM) to forecast future port cargo demand in order to develop port investment plan thus to be ahead of demand. This model was designed and developed by GAIN to support South African government in making strategic, tactical and operational transport planning decisions in 2006 (GAIN Group, n.d.). According to GIAN Group, n.d) “FDM provides a much wider measure of freight flows between all magisterial districts in South Africa, for all commodities on all modes. It also forecasts freight flows 30 years into the future with 5 year intervals and provides a likely, high and low growth scenario. It utilizes a disaggregated social accounting matrix framework based on magisterial district supply and demand, compared with detailed industry research and correlated with known freight flows. The model is a demand side model, based on the supply and demand of commodity and products. All the technical description of the model are reportedly available in Chapter 8 of the Dissertation: “The creation and application of a freight flow model for South Africa”, by Havenga (2007). The output of this model is used for long-term planning within Transnet Group.

According to Transnet (2013: p.2), “Freight Demand Model is a well-established freight flow and forecasting model. The objective of the model is to consider the sources of supply and demand in the economy, disaggregated to 352 districts and 72 commodities. This model essentially translates economic activity in the form of currency (Rand) into production and consumption of goods in the form of tons. It determines where goods are produced and consumed in an origin-destination matrix format”. The FDM forecasts are based on the following macroeconomic variables: population growth; GDP growth and projected growth of industry sectors; national capital spending; International economic outlook; and various other forecasting factors.
The model output is then used as a base for which the port development plan is derived. The port development plan of South Africa as contained in TLTPF and Market Demand Strategy (MDS), in which the investment plan for each individual port is presented. The TLTPF focuses on the 30 year plan while the MDS focuses on 7 year plan. TLTPF is developed or reviewed every 7 years by TNPA in consultation with other stakeholder (Transnet, 2015a).

“Growth forecasts scenarios for the ‘high’, ‘likely’ and ‘low’ scenarios are independently produced and workshopped by two economist firms before being modelled. The TLTPF uses the ‘likely’ growth forecast to estimate demand forecasts for long-term planning, while the low/high band is used to assess the practicality of the seven- to 10 year MDS forecasts” (Transnet, 2015a: p.3). These plans contain important components of the port investment in South Africa. Like other previous TLTPF versions, the TLTPF 2013 as revised in 2015 was developed based on forecasted port volume demands using the FDM.

TLTF presented volume forecasts for different cargo sectors and by ports. The ports cargo sectors are: liquid build, vehicles, dry bulk, and containers (Transnet, 2015a). Port investment plans distributed based on forecasted port cargo volumes to each of the 8 commercial ports in South Africa. The South Africa ports that fall under the custodianship of Transnet, as per the National Port Regulations of 2007 are: Saldanha Bay, Cape Town, Mossel Bay, Port Elizabeth, Ngqura, East London, Durban and Richards Bay. The nine ports are grouped into the Western Ports (Western Cape), Central Ports (Eastern Cape) and Eastern Ports (Kwa-Zulu Natal) (Transnet, 2015a).

For instance, the Transnet National Port Authority (TNPA) forecast showed that the container volumes in South Africa were expected to increase from the current (2015) 5 million TEU p.a. to roughly 6.8 million in seven years (2042) and 13.9 million in 30 years (2044) (Transnet, 2015a). The 13.9 million TEU may sound too ambitious to achieve by 2044 given the stagnant South African economy. It did report that unrealistic forecasts by TNPA in 2013 unveiled a 30 year port development plan which was estimated to cost ZAR 300 billion in port and railway service. As demonstrated in Figure 5, the volumes are expected to grow, but that they are other drivers relating to specific port plans, assumptions about regional/hinterland growth that support the
projections, and the role of each port in regional as well as global trade. The National Authority’s planning principles are informed by these, amongst others.

As shown in Figure 5 below, Durban’s container volumes are forecasted to grow over 7 years from 2.57m TEU handled in 2012/13, to 3.2m TEU in 2013/14, and thereafter to rise to 9.5m TEU in 2042/43. These figures mean that the existed combined capacity of 3.0 million TEU for Durban port (Pier 1 & Pier 2) will be exceeded by 2019/20. Plans have already been made for Pier 2 berth-deepening and Pier 1 infill, reconfiguration and extension onto Salisbury Island to bring the port capacity to 5.1 million by 2021/22 in order to be ahead of the forecasted demand. According to the maritime consultant of the South African Association of Freight Association (SAAFF), Dave Watts, the Port of Durban’s current terminals can only be expanded to accommodate 3.5 million TEU form the current 2.6 million TEU (Skyline Global Logistics, 2015). The decommissioned DDOP remains the only solution to address the 30 year forecasted capacity demands of 9.5.
The freight projections have resulted in TNPA placing the container expansion projects at the center with larger capital requirements in contrast with other sectors like car and bulk cargo. According to Transnet (2015a) LTPF port development plan has the following projects set to be implemented to increase port container terminal capacity in order to meet forecasted future demands as shown in Figure 5:

- **2019 - Port of Port Elizabeth** - The Charl Malan Quay to be available for handling containers, increasing port capacity from 600 000 to 900 000 twenty-feet equivalent units (TEUs) per annum.
- **2020 - Port of Durban** - Deepening and lengthening of the North Quay to be completed, increasing the capacity from 3.5 million to 3.9 million TEUs (an additional 400 000 TEUs).
- **2022 - Port of Durban** - Salisbury to be expanded by 2 new berths, taking capacity to 5.1 million TEUs (an additional 1.2 million TEUs).
- 2027 - **Port of Durban** - New Dig-Out Port phase 1 completed increasing capacity to 7.7 million TEUs.
- 2034 - **Port of Ngqura** - 4 new berths adding 1.4 million TEUs.
- 2039 - **Port of Cape Town** - An additional berth at the Container Terminal adding 400,000 TEU capacity.

### 3.1.4.2 Step 2 - Project Valuation

TNPA uses the cost-benefit analysis (CBA) (Mutombo, 2016). This investment valuation tool is used to help managers decide on the project option to be chosen. This done during the feasibility study. CBA measures the net benefit of the each project option. CBA determines if the project is a sound investment by looking at the justifications and their feasibility by providing scientific basis for comparing projects. It involves comparing the total expected cost of each option against the total expected benefits, to see whether the benefits outweigh the costs. CBA endeavors to identify and classify all costs and benefits and present them in monetary terms, thus allowing decisions to be taken on a rational informed basis.

TNPA cost-benefits ratio analysis uses a 10 point Likert scale for each option (Mutombo, 2016). According to Ma (2014), if your respondents are highly educated and literate, the use of the 10 point Likert scale is recommended, but if your respondents are less educated and less literate, it is wise to use 7 point Likert scale. Since TNPA uses an experienced, internal management team to conduct the survey in order to develop weightings (Mutombo, 2016), the 10 Likert scale is therefore correctly used.

According to Mutombo (2016), the feasibility study is conducted to present net benefits for different options using the CBA. Each benefit is given a relative weighting and these weights are then used to estimate benefits/cost ratio for each option as shown in Table 11 option 1 example. TNPA uses the estimated weightings instead of monetary values because it would be impossible to estimate benefits (Mutombo, 2016). Through an internal survey, the management weighs each variable of the model based on their experience. Project costs are easier to estimate than project benefits. Estimating benefits and costs has its limitations. This is because costs are
incurred immediately and benefits are realised in the future and, as such, they remain a perception.

The project option has to score above 1.0 to be considered, as the benefits must outweigh the costs. All available options, including the option to do nothing, are then evaluated with the aim to choose the best option using a scale of 1 (low impact) to 10 (high impact). Using the example shown in Table 11 and for illustrative purposes, “Do nothing” is calculated as follows: Benefits \( \frac{(80\%\times1) + (20\% \times1)}{(25\%\times10) + (20\% \times1)} = 0.54. \)

Table 11: Example of the Cost-Benefit ratio analysis template

<table>
<thead>
<tr>
<th>BENEFITS</th>
<th>Relative weightings</th>
<th>OPTION 1</th>
<th>OPTION 2</th>
<th>OPTION 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generation of income</td>
<td>80%</td>
<td>Do nothing</td>
<td>Expand the existing port</td>
<td>Build a new Port</td>
</tr>
<tr>
<td>Strategic/Business Plan</td>
<td>20%</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>SUM</td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>COSTS</th>
<th></th>
<th>OPTION 1</th>
<th>OPTION 2</th>
<th>OPTION 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital Expenditure</td>
<td>50%</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintenance</td>
<td>5%</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SHE</td>
<td>25%</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time delays on Return on Investment</td>
<td>20%</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SUM</td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cost/Benefit (must be greater than 1 to be considered)</th>
<th>0.54</th>
</tr>
</thead>
</table>

Source: Author and information from Mutombo, 2016

The project investment project option with the higher score becomes the preferred option. The model is designed to simply compare benefits against costs and it is easy to use.

The TNPA CBA model spreadsheet template is divided into two sections (Mutombo, 2016): Costs and Benefits, hence called cost and benefits analysis (CBA). Each option is individually analyzed in terms of the benefits it presents and costs to be incurred if implemented.
**Benefits** - covers financial benefits, infrastructural design and life expectancy, maintenance requirements, safety and environmental benefits, and all other advantages of each option. The number of job opportunities to be created during the implementation of the project is reflected under benefits. Benefits in terms of sourcing local material and equipment is also presented to make the project acceptable.

**Costs** - focuses on the total capital expenditure; costs associated with maintenance, SHE (Risk exposure) and lastly the opportunity cost. The total expenditure cost covers the total estimated cost for the project which include the project implementation cost, cost of borrowing, and the feasibility study cost.

A motivation request containing the output of the CBA conducted is then presented to Transnet for fund allocation. The recommendation of one option is highlighted, supported by CBA output. The question is, is this valuation method enough to use in the changing economies. One cannot argue that CBA models are useful; like any other model they have their weaknesses.

3.1.4.3 Step 3 - Port Investment Funding

All TNPA projects are submitted to head office for approval, same as other projects across the various divisions of Transnet Group. The transactions have to comply with Section 54(2) of the Public Finance Management Act (PFMA), once approved. The information about the transaction has to be submitted to the Minister of Public Enterprises and the Treasury before it can get the go-ahead.

Transnet is 100% owned by government and is responsible for port, railway, and pipeline capital infrastructure investment on behalf of government. Transnet has a responsibility, on behalf of government, to provide inter-modal freeing transport that is seamless to its clients (Transnet, 2015a). Transnet has a mandate to reduce the cost of doing business in South Africa and make the country's economy more competitive. This makes it difficult for Transnet management to valuate projects on the bases of risk and returns rather costs and benefits since they are operating like another government department. Effectively, this means Transnet investments valuation framework is somehow aligned to government priorities. Transnet management is then left with a huge task to decide which project is a priority. In the
case where the project is huge, government has to be convinced before any port capital investment project can be implemented.

Transnet uses the international and local financial markets to raise funds. The company raises capital through long term borrowings like loans, bonds and currency bonds. For instance, the total issued bonds as of 2015 had a total carrying value of ZAR 70 632 million (domestic R41477m, foreign R8 022m and foreign currency bond R21 133m) (Transnet, 2015b). Since the South African port authority, TNPA and the terminal operator, TPT are both owned by Transnet Group, both companies are required to contribute a certain percentage towards port capital investment. TNPA contributing towards infrastructure and TPT contributing towards port equipment. Government provides bond guarantees to Transnet to enable fund raising.

Transnet, through Market Demand Strategy (MDS) and TLTPF, reported that the company has budgeted around R300 billion on port and rail capital projects over the next 30 years (Transnet, 2015a). The current investment plan is largely aimed at building freight capacity to support South Africa’s economic growth and position South Africa as a regional transshipment hub for Sub-Saharan Africa for next year 7. In 2015, TNPA and Transnet Port Terminals (TPT) set aside ZAR 78 080 million and ZAR37 826 million, respectively (Transnet, 2015a). Most of these port investments are focused on the increasing port capacity in order to handle estimated increasing volumes of traffic and improve cargo handling efficiency. From the government side, these projects will create job opportunities.

It was reported that the capital budget did not include the proposed Durban Dig-out Port (DDOP) which alone could cost R75 billion to R100 billion of the budget (Mkhize, 2014; Creamer, 2012). The build-operate-and-transfer PPP scheme was identified as possible solution to fund the project by the former Transnet CEO, Brain Molefe and former mister of Public Enterprises, Malusi Gigaba. This was during the official handover of the site from Airports Company South Africa (ACSA) to Transnet in 2012 to develop a new port (Creamer, 2012). PPP can be tested at the DDOP capital projects investment as initially proposed. Transnet had already began a process of inviting private sector to be part of port investment in South Africa, but that initiatives never materialize since the project got decommissioned by Transnet. There was no official update on the PPP deal or why the project stopped, but there is believe that
the fear might have been the competition the private sector would bring to TPT (Mutombo, 2016).

There port identified finance sources based on Transnet Group strategy, liquidity, investors or lenders’ appetites as well as pricing: commercial papers, domestic bonds, DFIs, Export Credit Agencies, Bank loans and others. (Transnet, 2015b). This budget covers all projects from pipeline to railway, port infrastructure. Each project services its portion of the debt according to Transnet report (2015b).

According to Transnet (2013), the LTPF plan DDOP construction project was supposed to commence in 2016. However, the Transnet (2015b) report indicated that this project has been decommissioned, without any details. The decision to decommission this port investment project may be attributed to lack of funding or the fear that private investors may bring competition to TPT. The DDOP example shows that Transnet may have to consider other sources of funding other than relying on debt financing, if indeed this port investment project was to take off. Port competition is necessary in South Africa so that port performance and prices can be competitive as well.

3.1.5 Common weaknesses in project valuation Models

Poor forecasting or modeling are an entrenched problem which leads to project costs overruns, unrealistic assumptions which are often driven by government agenda (Morse, 2014). This results in managers taking ill-informed investment decisions. To increase the value for money, his report highlighted proper and sufficient high quality forecasting techniques as an essential part of achieving an optimal investment plan. During the review, the report argued that analysts are often under pressure to produce supportive [noun] instead of realistic forecasts data. This study reported poor quality data and optimism bias forecasts amongst the root causes of poor project planning and forecasts.

There are different important questions that ought to be kept in mind when conducting a review, which are based on the mnemonic “RIGOUR” (TM Treasury, 2015):

**Repeatable:** It is reasonably expected that the same inputs and limitations in the model should produce the same outputs in order for a model to be considered
‘reliable’. In this case, this would mean that the framework used to evaluate the project is credible, since when it is repeated the results should be the same.

**Independent:** The model should produce output that is unbiased and not prejudiced. Therefore, this means sufficient care ought to be taken to properly balance the views across all stakeholders and experts.

**Grounded in reality:** The valuation model should be able to help managers to separate views and perceptions from reality in order for well informed decisions to be taken. In this case, this means managers have been protected against failing to properly comprehend the context of the problem which is being analyzed for capital investment.

**Objective:** Is the model effectively managed and suitable for reducing potential biases to allow managers to be clear about the interpretation of results?

**Uncertainty-managed:** Have all the uncertainties in the model been identified, managed and communicated throughout the process?

**Robust:** Does the model provide systematic results in the context of limitations and residual uncertainty in order to ensure they are used effectively and appropriately?

### 3.1.6 Limitations

Although the study was carefully planned, there were both limitations and shortcomings. Firstly, the study solely relied on publicly available information. However the discussion with the Transnet manager was used to confirm whether the presented information deviated from what was truly happening at Transnet.

The reasons the study focused only on the qualitative review is not that the quantitative was relevant. Initial this dissertation wanted to develop a port investment model but because the port statistical data information required was not available than focused on reviewing the existing investment framework.

The review of effectiveness of the project valuation framework required proper measurement tools that review the whole project lifecycle. Accordingly, this can only be achieved by conducting the economic impact assessment, comparing forecasted profits against actuals, etc. This could only happen after the project had been implemented.
Lastly, the success of any investment valuation framework or model depends on the vision of the project owners and the main purpose of the project. Therefore, the framework is subject to the owner’s vision. In the case of Transnet, government is the owner of the project and government is not commercial driven.

3.1.7 Conclusion

The case study methodology approach provided the flexibility for analysis and review of the TNPA capital project valuation framework using a qualitative method. The use of existing literature and the discussion with the Transnet manager was enough to understand each step of the process. At each step, discussion of the key success factors of the port investment were kept in mind and the common weaknesses flagged. The TNPA project valuation framework was followed as a systemic guide to present findings. This study found that TNPA uses freight forecasted demand as a main driver for port capital investment and uses cost benefit analysis to choose the best project option. And it also uses debt and loans plus retained income from TNPA and TPT port finance. The FDM and CBA does not sufficiently consider risk as identified by the study as one of the port investment economic factors. The study presents an opportunity to review and analyze the current port governance of South Africa Port. The review and analysis are presented in the next chapter.
4 CHAPTER FOUR

4.1 REVIEW ANALYSIS

4.1.1 Introduction
This chapter presents an analytical review directed at Transnet capital investment valuation framework. The port investment success factors identified in this study (port capital investment risk and returns, port investment finance and port governance) and questions based on the mnemonic “RIgour” were kept in mind during the review to determine the effectiveness of the capital investment valuation framework. The review analyses are presented in the form of strengths and weaknesses and appropriate recommendations are given at each step of the process being reviewed.

TNPA capital investment valuation process is a three stage process. It begins with modelling and analyzing the forecasted demand using FDM. The outcome of FDM are then translated into a port development plan, which is then presented in the TLTPF. The port investment plan is then followed by project valuation whereby the cost-benefit analysis is used to choose the project option with a higher net benefit. This is achieved through conducting a feasibility study. Lastly, the request for investment finance is submitted for consideration and funds are released and allocated. These three stages complete the TNPA investment valuation framework. The next section focuses on the TNPA port investment framework review.

4.1.2 TNPA Capital Project Valuation Framework

4.1.2.1 Cargo Demand Forecast (STEP 1)
TNPA relies only on Freight Demand Model to plan the development of each individual port investment plan in South Africa. Every model has its own strengths and weaknesses, depending on how it is used. The weaknesses of the FDM model would have a great impact on port investment planning decisions, and have the potential of
rendering the whole project valuation framework ineffective. In light of the stagnant economic growth, high inflation, low currency rate and the general falling economic outlook of the country, most of the forecasted figure may not be released, at least not in the timeline expected. Some in the industry believe the estimated figures are not realistic. For instance, they say it will take years before Durban port can reach the estimated 9.5m TEU by 2022, especial under current economic conditions. There are very few ports in the world able to reach 10m TEU (Mutombo, 2016). Moreover, the current market indicators and the size of the economy in South Africa is not favorable to attract such amount of cargo. Therefore, TNPA is taking a huge risk by investing solely based on these estimates.

To just use the model without a full understanding of the design and concept behind the model can lead to wrong decisions. TNPA management has to understand that the model only provides estimates which is based on historical trends, events and expectations. For instance, variables like population growth may no longer be significant as there is no correlation with economic growth of the country like it is common a case. South African GDP fell 0.2 percent in 2015 and is expected to be negative in 2016. This is due to government’s inability to address structural problems such as, low-skilled labour force, high unemployment rate, deteriorating infrastructure, high corruption and crime rates, and the widening gap between rich and poor. On the other hand, the [noun] keeps on growing (Trading Economics, 2016). As well, population may prove to be statistically insignificant to estimate the port cargo demand volumes, since it does not result in growth of the economy in South Africa.

The model has to take into consideration the changes and other factors, especially at risk in order to better estimate cargo volumes. Port infrastructure investment is capital-insensitive; therefore, in order to properly plan port capacity expansion, the risk exposure must be identified and be incorporated into a model with the view to avoid waste of capital. Below is a summary of the strengths and weaknesses identified.

4.1.2.1.1 Strengths
One of the strengths of the forecast model is that the model considers important economic variables to predict the future port demand. For instance, economical related variables like a country’s GDP, population growth and currency risk are
incorporated into the model. These variables significantly affect cargo demand of the country and they have a direct impact on the port investment returns. The question may be on the accuracy and originality of the data used. But the quality of data can only be ensured by a single quality assurance management structure. Transnet has control over the model and, as a result, it can assure the quality of its application but not its effectiveness. As indicated that Transnet uses two independent firms to validate its forecasted output, thus boosting the independency application of the model and quality of output, thereof, assured. The model is repeatable and grounded on the realities.

Depending on the details and quality on the data input, the model is able to help in better estimating regional and local freight for port investment planning in line with that particular freight transport corridor. This allows Transnet to use the output for port development plans or infrastructure investment. The model uses scientific methods and reduces subjectivity.

4.1.2.1.2 Weaknesses
The model requires substantial historical data collection for desegregated inputs. FDM is based on historical trends analysis and predictions are not always correct especial in the maritime sector; therefore, the output of the model has a potential of misleading TNPA investment strategy. More so because the maritime industry is full of uncertainties. Some of the data required by the model may not be available or be of good quality to use in the model.

The model requires TNPA to have a good understanding of a country’s macroeconomic policies including local and international markets economic indicators and trading of goods and services. Without an adequate understanding and knowledge of the model variables, TNPA management cannot effectively use the model. Most importantly, the model does not allow for flexible decision making and adaption for future market changes.

4.1.2.1.3 Recommendations
The model strengths outweigh the weaknesses. Therefore modernization of the port model governance to ensure quality of the model is important. Moreover, a continuous holistic review of the model is also recommended to make sure that the assumptions
and limitations are revised. The introduction of new significant and removal of insignificant variables will improve the model. The review will also afford TNPA an opportunity to review access if there is no other model which better than FDM

4.1.2.2 Project Valuation (STEP 2)

It would for TNPA to accurately predict the future benefits of the projects until they are delivered. Especially long term capital projects like a new port investment. Although all port investment plans are based on expectations, forecasted freight presents huge risk to the company as some of the investment decisions may be wrong. As indicated, TNPA uses CBA to evaluate its capital projects.

TNPA management may estimate port investment benefits through by looking at the benefits derived by projects of similar nature in other countries. This may give a fair estimate of the benefits the South Africa could expect from the project, however the investment success factors of each countries are not the same, and so as their port governance. The South African economic set-up and port model is unique. Therefore, arriving at the fair estimate of the monetary value that particular benefits or costs may prove to be difficult, if not impossible. This would result in TNPA model data output not being robust and accurate.

The costs of building a new port, for instance, may be fairly uneasy to determine using CBA. This is because it might be difficult to determine monetary value of the intangible benefits the port will generate given the uncertainty of business. As indicated in the previous step of valuation, is may be hard to quantify the true throughput of the port, hence, to calculate the benefits of the project. A summary of strengths and weaknesses are given bellow.

4.1.2.2.1 Strengths

Since TNPA is only interested in knowing if the benefits outweigh the costs. Thus the use of CBA as it is easy to make that decision using CBA due to the following advantages (Hamel, 2016):

The CBA is a scientific project valuation tool and it provides an objective means of comparing different projects net benefits. Traditionally, CBA evaluate projects based on the actual financial benefits and costs which eliminates the personal views and
biases of managers. CBA is simple to understand. This means everyone involved gets to understand the net benefits of a project before a decision is made. Different project options have different types of expenses especially at the lower level. The use of CBA translates all project benefits and costs into the same simple and comparable terms, making it easy to understand. This enables management to compare projects of all types no matter how different they are.

4.1.2.2 Weaknesses
The capital project valuation process is, by and large, influenced by many factors that may not be incorporate in the CBA model. The first weakness is the use of the weightings instead of monetary values. Weightings by internal management opens room for manipulation of the CBA output. This may happen if the company is being pressured to estimating higher benefits and lower costs, especially if there is a political interest on that particular project. The following inaccuracies would render the TNPA model output not objective and independent (Hamel, 2016): use of subjective impressions by project valuation team members, inappropriate use of heuristics techniques to derive monetary cost of the intangible elements, confirmation bias among project stakeholders (looking for reasons to proceed with the project), Overreliance on data from past projects (often differing markedly in function or size and the skill levels of the team members).

Getting a fair estimate of the monetary value for a project benefits or costs may prove to be difficult, if not impossible. This would result in TNPA model data output not being robust and accurate. TNPA CBA model does not take into consideration risk and returns of the capital investment. The use of weightings instead of monetary values make it impossible to factor in the risk premium, since the risk premium is normal incorporated into a discount rate. The TNPA CBA model does not take into consideration the issue of time value of money. Using the example of building a new port, TNPA would incur costs now and realize benefits in the future. Benefits are exposed to different risks over time which affect the benefits of the project. The model does, however, consider cost of capital (interest on capital), depicted as Return on Investment (ROI). As a result, these miscalculated estimates of the model may negatively affect the TNPA ability to calculate a fair net benefit value of the project, hence, to make correct port investment decisions. It said that CBA works well in the
perfect market (Hamel, 2016). The port sector in South Africa is monopolistic, with one player controlling all ports. CBA may not be able to give a clear picture of the project status.

4.1.2.2.3 Recommendations

Weaknesses of the TNPA and CBA models outweigh the identified strengths. Therefore, this dissertation recommends the following:

TNPA consider the use of monetary values in the CBA instead of weightings to eliminate subjectivity. This will further enable the model to use discount cash flow analysis and to account for risk premium. It is important for TNPA to incorporating the financial or market trends variables as they have a huge impact on cargo volumes (project returns) in the form of a risk premium.

To further strengthen the valuation framework, this dissertation recommends TNPA considers using Real Option Analysis (ROA) tool. ROA expands investment risk/returns parameters when evaluating a project delivered in an uncertain market when evaluating the investment projects (Amram & Howe, 2003). The socio-economic benefits that may have a positive impact on surrounding communities and eventually increasing the economic value of the project and environmental factors that may have a negative impact on the economic value of the project shall continue to be valuated using the CBA. ROA considers market related parameters for the purpose of making it simple, and due to difficulties in accessing the sensitive information. ROA allows management to be flexible, hence, to revise its decision and adapt to new information available to the market. Furthermore, the ROA tool increases the potential of a project by minimizing the risk and increasing the returns (Campbell, 2002). Therefore, this model will allow TNPA management to consider possible alternatives (real options) when undertaking infrastructure investment in case the economic realities turn out unfavorable compared to what initially was envisaged when making an investment decision (Bendall and Stent, 2010).

Borison (2005) defines real options as a right, not an obligation, to embark on certain business initiatives. For instance, the model would analyze the option to defer the construction of a new port project, the option to expand the existing terminal, and the option of leasing the port to global terminal operator if the economic conditions
becomes unfavorable. In this case, the management’s decision flexibility relates to actual real options, generally real options relate to project size, project timing and operations of the project once constructed. A model could be developed to fit TNPA needs and the challenges of the country.

4.1.2.3 Port Investment Financing (STEP 3)
Port investment capital projects rely on funding provided by the Transnet Group. This, effectively, means TNPA has to undertake projects that are aligned Transnet and government investment strategy. One of the challenges faced by the TNPA projects is that they compete against each other for finance across the various divisions of Transnet Group. Transnet would then review the request and decide whether to fund the project or not based on CBA results and their capital investment strategy. In short, the competition against other projects within Transnet, the requirement to present a viable business case and the limitations of Transnet’s balance sheet, means that key port infrastructure projects may remain unfinanced until these requirements are satisfied (World Bank Group, 2016).

The use of debt to finance projects puts a lot of risk to Transnet as the government borrowing or credit ratings directly affects the company’s borrowing too. The choice of source of finance is influenced by the fact that South African government is not willing to lose control of Transnet one of the country’s strategic asset.

Global Terminal Operators (GTO) are becoming important partners in port investment partner as they bring in the know-how, experience and innovative ways to access funding. Thus the presence of the private sector in the port is viewed as a sign that government is treating the port as a commercial asset, and thus enabling it to be internationally competitive. On the other side, the non-involvement of government in port assets can also be viewed as a lack of the political will and financial muscle to finance its strategic projects. Again, if government is not involved in the port financing, this presents a political risk. Investors always want to be assured of the political stability. This is due to the fact that port investment requires conducive environment for trading over a long period of time in order to fully reap the investment benefits (Chin & Waldron, 2014).
There has been a lot of public-private partnership (PPP) type schemes which have emerged as a result of lack of funds to invest from the public sector and investment risk distribution. Investment risk/returns and investment finance as identified in the study as key success factors any infrastructural investment plays a critical role in port reforms. Traditionally the port is funded by the public sector through an entity entrusted with the responsibility to manage the port on behalf of government (Tsamboulas & Ballis, 2014). In the absence of government funding, the management, from a public or private port authority, is faced with difficult decisions about where, when and by how much to invest in port infrastructure.

There is no doubt that South Africa's government has huge influence over the direction of port investment as all capital projects together with their funding plan has to be approved by the minister responsible for state owned enterprises (SOE). This is further validated by the fact that Transnet bonds are guaranteed by government (Transnet, 2015b). South African ports are seen as engines for job creation, economic growth and for driving trading. For instance, Transnet Group 2015 capital investment funding plan indicates that they are planning to raise about R125.6 billion by 2022 which is well above the third quarter of the total capital investment plan budget of R336.6. Below is a summary of strengths and weaknesses of Transnet funding.

4.1.2.3.1 Strengths

Since port capital funding comes from Transnet Group, this means TNPA has access to a huge capital budget. The current centralized South African port governance allows TNPA to focus on planning and managing port operations while Transnet raise and manage capital project funding. Moreover, the South African port governance structure allows for different freight entities of Transnet Group to complement one another. For example, a new port capital investment – as a multimodal node – required infrastructural support from railway and pipeline divisions of Transnet Group. Transnet centralized structure allows for smooth implementation of supportive projects. The South African port governance structure allows TNPA, TPT, Transnet Railway and Transnet Pipeline (Transnet Group) to have a centralized investment plan which allows for a smooth integrated freight supply chain system.
4.1.2.3.2 Weaknesses

The process of financing TNPA projects is bureaucratic. TNPA capital investment projects first have to satisfy all valuation steps with TNPA and then get approval of Transnet Group. Transnet will then seek approval from Department of Public Enterprises (Transnet shareholder). Furthermore, the funding proposal competes with many other capital projects from other division of Transnet Group.

The project valuation framework independence may be compromised by government political interferences through the involvement of Department of Public Enterprises in the process. This could results in TNPA implementing projects that are political motivated rather than viable projects.

One port investment returns may be made available to fund other TNPA and Transnet Group projects which are not performing well. For instance the returns generated by Durban Port are not reinvested into a port to improve its performance, but made available to all Transnet Group projects not linked to port investment. Another weakness is the risk is not distributed to other partners, it is 100% taken by Transnet.

Transnet source funds from the loans and bond market. According to Transnet (2015b), the company cannot exceed the 50% debt leverage ratio since government insist on remain sole owner. This is further putting a limit in terms of how much the company can raise in the market. The dwindling government credit rating due to structural challenges facing the country, corruption, higher inflation rate, higher unemployment rate and lower economic growth has a direct impact on Transnet ability to raise funds for port investment projects. This is because Transnet’s credit rating is linked to government risk and from the fact that government is the one issuing guarantees for all Transnet bonds and loans contracts.

The South African port structure allows TNPA to charge exorbitant port charges. This is partly done in order to be able to repay its debts and budget for new capital projects. This has resulted in the cost of doing business in South Africa rising. This is further worsened by cargo imbalance in South Africa which results in shipping lines charging shippers higher freight rate in order to cover ballast trip and TNPA port charges. This is against the very main purpose if its existence. The reason why TNPA is able to
charge high prices is because all ports are under the control of TNPA and there is no port competition in South Africa.

### 4.1.2.3.3 Recommendations

Based on literature and results from framework review, it is clear that the TNPA port investment funding model possess a lot of weaknesses against its strengths. This dissertation recommends the use of the following:

It is recommended that TNPA consider introducing PPP scheme for port investment funding, but a favorable PPP policy be defined that would protect TPT from private sector inter-port competition while keeping the state in control. An appropriate structure will have to be developed that will best suit South Africa other than coping and pasting the already existing schemes.

It was also recommended that government limit its involvement in port investment strategy in order to eliminate biasness, thus, allowing fairness in project valuation process. Of course, this could be difficult given the country’s take on SOE as they seen as an engine for economic growth in a developmental state country. However, this is necessary if the country wants to remain competitive in the region. Lot of ports are being built in the SADC region which has a potential of leading the region.

This dissertation further recommends that TNPA be separated from Transnet Group. This would allow TNPA to operate autonomously, this will strengthen its investment strategy and valuation framework. This will further allow TNPA to be competitive as a commercially motivated entity. This will further eliminate bureaucratic processes. According to Transnet (2015), this idea has been discussed before and a decision was taken that TNPA must be an independent entity, due to technical challenges like the existing loan covenant clause, this could not be implemented.

### 4.1.3 Conclusion

The review of the capital investment valuation framework presented some of the strengths and weaknesses South African port investment strategy. It was clear that TNPA project valuation framework does cover some of the key success factors of port investment. Weaknesses that warranted alternative solutions were identified.
The study results presented room for improvement in the FDM, CBA and funding model. FDM has to be able to consider the uncertainties of the South African market and international factors. TNPA has to ensure that the FDM model is effective and robust and the annual review of limitations and parameters of the model is properly conducted. Generally, the use of CBA works positive for the country. However, ROA is seen as an ideal alternative to boost the valuation process and to help TNPA managers to consider market risk before committing capital into a project and further allowing them to be flexible during the lifecycle of the project.

Port governance is a very crucial factor of port investment. The possibility of involving the private sector in the port investment and operations in South Africa is not a bad idea. The introduction of PPP in the South African port environment is likely to expand access to funding and improve port performance. Participation of the private sector in infrastructure investment is generally viewed as a positive sign by potential investors in other important sectors of the country’s economy. This could further lead to reduction in cost of doing business in South Africa, a good thing for traders.
5  CHAPTER FIVE

5.1  RECOMMENDATIONS AND CONCLUSION

5.1.1  Introduction
As outlined in the first chapter, the main objective of this dissertation was to review the South African port investment valuation framework with the view to highlight strengths and weaknesses and propose recommendations. This chapter is a concluding part of the dissertation. It begins with a summary of the review findings and recommendations. This is followed by conclusion remarks highlighting key areas of the South African port investment framework which are hugely influenced by the type of port model and port governance used as identified in this study.

5.1.2  Summary of the review and Recommendations
The following Table 12 presents a brief summary of the review and recommendations as identified in the study.

Table 12: Research Objectives, findings and recommendations

<table>
<thead>
<tr>
<th>OBJECTIVE</th>
<th>REVIEW FINDINGS</th>
<th>RECOMMENDATIONS</th>
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<tr>
<td>To identify port investment success factors</td>
<td>The first port investment success factors identified was risk and return.</td>
<td>The investment evaluation techniques should consider pure business and external risk. The tool must allow management flexibility once resources are committed. CBA and standard cash flow discount analysis may not take into account the flexibility of management to lease out the port infrastructure.</td>
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<tr>
<td></td>
<td>Most ports turn to use CBA to evaluate capital project investment, especial landlord ports. These investments are driven by estimated port demand than profit. Often benefits exceeds the risk, giving the port and its stakeholders to proceed with the project.</td>
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<tr>
<td>The second key success factor is <strong>port investment finance</strong>. Here we are talking about loans, bonds, equity, Foreign Direct investments, Leasing, etc. The commonly used sources of finance for port investment are loans and bonds. PPP is beginning to pick up as well. Banks are stringent to give out loans since economic crisis.</td>
<td>The port company has to find an optimal investment capital structure in order to realise maximum benefits. The capital structure model which minimize risk and cost of capital, but gives higher returns. PPP are providing the best solution in this regard. However each country has to find the best PPP structure based on its vision.</td>
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| The last and important success factor for port investment is **port governance**. It was discovered that governance plays key role in the port’s ability to access funding, and it also determine the risk tolerance of the investment. The type of the model adopted determines the port performance. It was also found that if the port is government owned, the focus gets placed more on country benefits than making profit. | An ideal type of the model which supported by good port governance is recommended. Proper assessment of all types available especially the weaknesses and strengths should be conducted within the context of the country. A decision should factor-in investment risk and source of finance, and country vision. Introducing the private sector is not a bad idea. Port performance can be improved by involving private sector in port investment. |

| South Africa uses a hybrid port model (landlord port/private model). Transnet is experiencing challenges when it comes to port infrastructure and performance. Basically, Transnet is surviving because it is a monopoly in the freight sector in South Africa. SA ports charges are high. Transnet has a bureaucrat structure and ports are used as a tool to address country’s economic ills. | It is suggested that SA conducts detail study on the appropriateness of the port model given the strengths and weaknesses of each model and challenges facing the country. They may be a need to develop a unique model that would best address the current challenges other than the current available models. Separating TNPA could also present positive benefits. |

| Access the appropriateness of the South African Port Model in relation to port investment and present recommendations | To review different project valuation models (framework) with STEP 1- The first step of the process begins with analyzing the future demand forecast (FDM). Based on the Continuous review of FDM model parameters and limitations. Remove insignificant variables and |
the view to highlighting strengths and weaknesses.

forecasted data, a port development plan is developed and capital investment committed in order to meet the future demands.

add significant variables. An alternative model be considered to compliment FDM and enable flexible decision making.

STEP 2 - Viability and feasibility of project options are valuated using the CBA. Some of the weaknesses identified in the model are use of weightings instead of monetary values and investment risk is not considered since TNPA CBA does not use cash discounted rate analysis. Only ROI is included.

The use of CBA is good for SA government, however there is a need for another model to complement CBA. This study suggested Real Option Analysis. ROA allows managers to be flexible and to adapt to market changes. It has been used successfully in mining sector projects. A proper model has to be developed that would suit the SA port investment profile.

STEP 3 - The final step of the framework is fund requisition from Transnet Group. All capital investment projects are financed by the group, not TNPA. Transnet finance its capital projects through local and international sourced debts, and retained income. Transnet pays huge interest and this presents currency risk and interest rate risk. Projects competes for limited funding.

This study recommends that Transnet consider other sources of finance, especial PPP scheme. PPP would allow TNPA to share investment risk and it provide wider access to capital. However the country has to find or develop and define its own suitable PPP scheme which will results in more benefits to TNPA/TPT and the country. Furthermore, it is suggested that TNPA be made autonomous.

5.1.3 Conclusion

This study began by reviewing literature to identify key success factors of port investment. After identifying many factors, the study regrouped them into three main categories: port investment risk and returns, port investment finance and port governance. For an investment to be successful, the port investment risk has to be kept low and the returns high. The cost of capital has to be at low (optimum level) and port governance has to be good. As identified by the study, investment risk and returns remains common factor for private investors. For instance, environmental risk,
financial risk, operational risk, legal and political risk, as well as country and commercial risk all play a significant role in the success or failure of the port investment.

Due to adverse market conditions, it is now difficult to secure required capital for port investment from traditional sources of finance than it used to be. This is due to high investment risks and stringent financial regulations introduced by financial institutions during financial crises. Therefore countries have to structure their capital investment to be attractive with minimal risk.

The government of South Africa is obviously more interested in the economic profitability of the port investment; thus, they would focus more on costs and expected benefits. Hence the use of CBA in the valuation of net benefits indirectly or directly to be directed to the port community. Unlike in the financial appraisal or discount rate analysis, the economic benefits are not limited to an investor but look beyond to other stakeholders and the national economy of a country.

Since Transnet uses the freight forecast model to access the need for port investment, the study highlighted the need to improve the FDM parameters as some of the variables may be insignificant over time. A weak freight forecast model might cost the country a lot of money. TNPA has to ensure that the model used is effective, robust and is continuously updated to revise its parameters and limitations. The use of CBA is not a bad decision, however complimenting it with ROA can boost the valuation process and help managers to consider market risks and moreover allow TNPA management to be flexible during the project lifecycle. There may be a need for accessing the possibilities of involving the private sector in the port investment and operations.

The averaging of individual ports when accessing port investment requirements is another weakness identified. It does not only negatively affect port charges in South Africa, it also affects the assessment of port infrastructure requirements in terms of identifying those ports that need investment. This means the higher performing ports are forced to pay for the lower performing ports. The current market changes have seen the port sector administration reviewing the port model. GTO are playing an important role in port investment and they bring in the know-how, experience and
innovative ways to access funding. The presence of the private sector in the port is viewed as a sign that government is treating the port as a commercial asset, and enabling the port to be internationally competitive.

There has been a lot of PPP schemes which have emerged as a result of lack of funds to invest from the public sector and to distribution risk, since risk (returns) and finance are key success factors for any infrastructural investment. PPP presents an opportunity for management to build an optimum port investment, for now Transnet is limited to bonds, loans and retained income. South Africa is a developmental state. Transnet’s model structure is therefore in line with developmental states approach. Developmental states utilize the country’s state owned enterprise to play an important role to promote better economic developments and performance.

The introduction of PPP in the South African port environment will likely expand access to funding and improve port performance. Participation of the private sector in infrastructure investment is viewed a positive sign by investors. This could further lead to reduction in cost of doing business in South Africa and improve port performance. The private sector attracts other private investors; there will be a multiplier effect. Reduction of political risk, creation of stability in country and the quality of the regulatory economic environment is key in attracting foreign direct investment (FDI).

South Africa is experiencing a number of challenges, e.g. high unemployment rate, low currency rate, inflation, low GDP growth, high interest rates and unionized workers. Together with other SOE, Transnet has a significant role to play in addressing some of these challenges on behalf of government. Therefore the port governance system and model ought to reflect an active government strategy to remain in control of the strategic country assets. This dissertation, though, concludes by recommending that South Africa conduct a detailed study to access whether the port model used in the country is appropriate given the strengths and weaknesses as highlighted in this study. Since governance has a huge impact on port investment and finance.
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