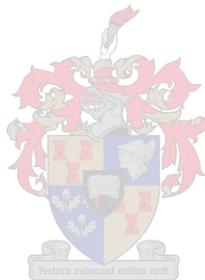


# AN INTEGRATION OF FREIGHT TRANSPORT INFRASTRUCTURE

MARIA BOTHA

THESIS PRESENTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE  
DEGREE OF MCOMM (LOGISTICS MANAGEMENT)



AT

STELLENBOSCH UNIVERSITY

Department of Logistics  
Faculty of Economic and Management Sciences

Prof W.J. Pienaar

December 2008

**DECLARATION**

By submitting this thesis electronically, I declare that the entirety of the work contained therein is my own, original work, that I am the owner of the copyright thereof (unless to the extent explicitly otherwise stated) and that I have not previously in its entirety or in part submitted it for obtaining any qualification.

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Copyright © 2008 University of Stellenbosch

All rights reserved

## ABSTRACT

One of the results of globalisation is that supply chains are getting longer, in both time and distance. For example, the local bookstore around the corner now competes with the bookstore in the USA. Logistics ties together geographically distant sources and markets. The implications of this are that there is a greater need for efficiency in specifically transportation and distribution networks. The integration of transport infrastructure into a logistics hub is seen as an enabler of distribution on a global basis.

A solution to overcome the above complications is the development of logistics hubs as a means to simplify supply chain processes. Logistics hubs are generally defined as *integrated centres for transshipment, storage, collection and distribution of goods* (Jorgenson, 2007). Universally logistics hubs have intermodal or multi-modal solutions to abridge transportation difficulties and creating seamless movement of goods and in doing so optimising general operations. Freight shipments now have the ability to be consolidated at a central point and distributed from that point to its final destination. This creates added value for freight products. Customers now receive products at the right time, at the right place and in the right quantity, but with the benefit of paying less as a result of economies of scale created by the value added at the logistics hub.

Logistics hubs are very well established internationally and many examples exist where these have been successfully built and implemented. This does not suggest that there is one specific recipe to success. Each region has its own demands which need to be satisfied. There are however numerous common characteristics which were identified during the course of the study. It is important for South Africa to integrate existing transport infrastructure to optimise logistics in the country and in doing so, ascertaining itself as a regional logistics hub.

A location has been earmarked for possible development of a logistics hub in the City of Tshwane. The proposed site is evaluated against internationally accepted criteria and using different modes of transport for a logistics hub. The suggested site is considered to be appropriate for the establishment of a logistics hub which could provide a vehicle for South Africa to fulfil its potential as the regional logistics hub of the SADC Community.

The question does however remain: Is the establishment of a logistics hub indeed a viable option for a developing country such as South Africa? This is something which will require further research by a multi-disciplinary team. From a logistics point of view the proposed site and the concept of a logistics hub for South Africa, which can translate into Southern Africa is a real opportunity, which should be pursued.

## OPSOMMING

Een van die gevolge van globalisasie is dat voorsieningskettings langer word beide wat tyd en afstand betref. 'n Voorbeeld hiervan is dat die plaaslike boekwinkel om die hoek nou direk kompeteer met die boekwinkel in die VSA. Logistiek bring geografies verspreide bronne en dienste nader aan mekaar. Die implikasie hiervan is egter dat daar 'n groter behoefte ontstaan vir veral effektiewe vervoer- en distribusiesisteme. Die integrasie van vervoerinfrastruktuur tot 'n logistieke sentrum, word gesien as 'n metode om distribusie op 'n globale basis te bemagtig.

Logistieke sentrums is internasionaal reeds goed gevestig en ontwikkel en daar is wêreldwyd verskeie voorbeelde waar dit suksesvol gebou en geïmplementeer is. Daar bestaan egter nie 'n resep vir die sukses van so 'n ontwikkeling nie. Elke streek het sy eie behoeftes wat aangespreek moet word. In die studie word egter 'n aantal eienskappe geïdentifiseer wat algemeen by logistieke sentrums voorkom. Daar bestaan 'n geleentheid vir Suid-Afrika om huidige vervoerinfrastruktuur te integreer en sodoende die land te vestig as 'n logistieke sentrum vir die streek.

'n Stuk grond is in Tshwane geïdentifiseer vir die moontlike ontwikkeling van 'n logistieke sentrum. Hierdie studie area word gemeet aan die internasionale eienskappe wat geïdentifiseer is om te bepaal of dit inderdaad 'n lewensvatbare opsie is om dit verder te ontwikkel tot 'n volwaardige logistieke sentrum. Die studie ondersoek ook die verskeie vorme van vervoer wat gebruik kan word by die spesifieke studie area. Die bevinding is dat die studie area wel geskik is om ontwikkel te word in 'n logistieke sentrum en daardeur Suid-Afrika in staat te stel om sy potensiaal te vervul om die logistiek sentrum te word vir die hele Suider Afrikaanse Ontwikkelingsgemeenskap

Die vraag bly egter staan: Is die ontwikkeling van 'n logistieke sentrum prakties vir 'n ontwikkelende land soos Suid-Afrika? Dit sal ondersoek moet word deur 'n multi-dissiplinêre span. Vanuit 'n logistieke oogpunt is die studie area sowel as die konsep van 'n logistieke sentrum wel gepas vir Suid-Afrika en kan die ontwikkeling daarvan Suid-Afrika se potensiaal vervul om 'n logistieke sentrum vir die streek te word.

## TABLE OF CONTENTS

|   |               |
|---|---------------|
| <b>DECLARATION.....</b>                                       | <b>-i-</b>    |
| <b>ABSTRACT.....</b>  | <b>-a-</b>    |
| <b>OPSOMMING.....</b>   | <b>-c-</b>    |
| <b>TABLE OF FIGURES.....</b>                                  | <b>-v-</b>    |
| <b>LIST OF TABLES.....</b>                                    | <b>-vii-</b>  |
| <br>  |               |
| <b>1 INTRODUCTION.....</b>                                    | <b>- 1 -</b>  |
| 1.1 Problem Statement.....                                    | - 1 -         |
| 1.2 Globalisation.....  | - 4 -         |
| 1.3 Government in the Global Context.....                     | - 6 -         |
| 1.4 The Freight Transport Sector and the Economy.....         | - 8 -         |
| <b>2 LITERATURE STUDY.....</b>                                | <b>- 10 -</b> |
| 2.1 Dallas Logistics Hub.....                                 | - 14 -        |
| 2.2 Duisport International Inland Port and Logistics Hub..... | - 16 -        |
| 2.3 Daventry International Railfreight Terminal.....          | - 19 -        |
| 2.4 Virginia Inland Port.....                                 | - 22 -        |
| 2.5 Conclusion.....   | - 23 -        |

|          |  |               |
|----------|--|---------------|
| <b>3</b> | <b>SOUTH AFRICA AS A REGIONAL LOGISTICS HUB.....</b> | <b>- 24 -</b> |
| 3.1      | Geographical position .....                          | - 25 -        |
| 3.2      | South Africa in SADC.....                            | - 27 -        |
| 3.3      | South Africa’s International Trade.....              | - 29 -        |
| 3.4      | Transportation Infrastructure.....                   | - 31 -        |
| 3.5      | South African Ports .....                            | - 32 -        |
| 3.6      | Intermodal Integration .....                         | - 37 -        |
| <b>4</b> | <b>INTERMODALISM IN SOUTH AFRICA .....</b>           | <b>- 41 -</b> |
| 4.1      | Modal Cost Structure .....                           | - 42 -        |
| 4.1.1    | Road Transport Cost Structure.....                   | - 42 -        |
| 4.1.2    | Rail Transport Cost Structure .....                  | - 42 -        |
| 4.2      | Container Movement In South Africa.....              | - 44 -        |
| 4.3      | Intermodal Transport Possibilities .....             | - 49 -        |
| 4.4      | Why Intermodalism? .....                             | - 51 -        |
| <b>5</b> | <b>TSHWANE LOGISTICS HUB CASE STUDY.....</b>         | <b>- 54 -</b> |
| 5.1      | Geographical Position.....                           | - 54 -        |
| 5.2      | City Development Strategy .....                      | - 56 -        |
| 5.3      | Study Area.....                                      | - 60 -        |
| <b>6</b> | <b>METHODOLOGY OF STUDY .....</b>                    | <b>- 63 -</b> |
| 6.1      | Physical Attributes .....                            | - 63 -        |
| 6.2      | Interviews .....                                     | - 66 -        |
| <b>7</b> | <b>EMPIRICAL STUDY.....</b>                          | <b>- 71 -</b> |
| 7.1      | Alternative 1 – Two Modes: Rail and Road .....       | - 72 -        |
| 7.1.1    | Infrastructure .....                                 | - 72 -        |

|        |  |        |
|--------|--|--------|
| 7.1.2  | Basic Service .....  | - 72 - |
| 7.1.3  | Economic Development/Activities .....                      | - 73 - |
| 7.1.4  | Telecommunication Systems.....                             | - 76 - |
| 7.1.5  | Transportation and Warehousing Industry .....              | - 76 - |
| 7.1.6  | Workforce.....   | - 77 - |
| 7.1.7  | Highway Access .....                                       | - 78 - |
| 7.1.8  | Road and Bridge Conditions .....                           | - 81 - |
| 7.1.9  | Road Density and Congestion .....                          | - 83 - |
| 7.1.10 | Planned Road Infrastructure .....                          | - 84 - |
| 7.1.11 | Vehicle Taxes.....   | - 86 - |
| 7.1.12 | Railroad Infrastructure .....                              | - 86 - |
| 7.1.13 | Proximity to Market and Market Need .....                  | - 89 - |
| 7.1.14 | Location Away from Residential Areas.....                  | - 90 - |
| 7.1.15 | Developed at a Reasonable Cost.....                        | - 90 - |
| 7.1.16 | Air Cargo Infrastructure.....                              | - 90 - |
| 7.1.17 | Job Creation.....  | - 91 - |
| 7.2    | Alternative 2 – Three Modes: Rail, Road and Air .....      | - 92 - |
| 7.2.1  | Feasibility of Airport .....                               | - 92 - |
| 7.2.2  | Impact and Effect On Wonderboom Airport.....               | - 93 - |
| 7.2.3  | Impact of Proximity to OR Tambo International Airport..... | - 94 - |
| 7.2.4  | Moving Wonderboom .....                                    | - 94 - |
| 7.2.5  | Exchanging the Land.....                                   | - 95 - |
| 7.2.6  | Air Management and Regulation .....                        | - 95 - |
| 7.2.7  | Political Support for the Airport .....                    | - 95 - |
| 7.2.8  | Proximity to Markets and Market Needs.....                 | - 96 - |
| 7.3    | Cost of Developing an Airport .....                        | - 97 - |

|           |  |                |
|-----------|--|----------------|
| <b>8</b>  | <b>RESULTS</b> .....                                       | <b>- 102 -</b> |
|           | 8.1 Benefit to South Africa .....                          | - 102 -        |
|           | 8.1.1 Economic competitiveness.....                        | - 102 -        |
|           | 8.1.2 South Africa in the SADC region .....                | - 103 -        |
|           | 8.1.3 Humanitarian Logistics .....                         | - 104 -        |
|           | 8.1.4 Improvement of Intermodalism in South Africa .....   | - 105 -        |
|           | 8.2 Logistics Hubs in South Africa.....                    | - 107 -        |
|           | 8.3 African Renaissance .....                              | - 108 -        |
| <b>9</b>  | <b>CONCLUSIONS</b> .....                                   | <b>- 109 -</b> |
|           | 9.1 Summary of Results of Empirical Study .....            | - 109 -        |
|           | 9.2 Advantages of an Airport.....                          | - 111 -        |
|           | 9.3 Conclusions .....                                      | - 114 -        |
|           | 9.4 Success Elements of Tshwane Logistics Hub .....        | - 116 -        |
|           | 9.4.1 Position of Logistics Hub .....                      | - 116 -        |
|           | 9.4.2 Access to the logistics hub .....                    | - 116 -        |
|           | 9.4.3 Ownership .....                                      | - 117 -        |
|           | 9.4.4 Value Added Service.....                             | - 117 -        |
|           | 9.4.5 City Deep .....                                      | - 119 -        |
|           | 9.4.6 Runway of Tshwane International Freight Airport..... | - 119 -        |
|           | 9.4.7 Maintenance facilities .....                         | - 120 -        |
|           | 9.4.8 Airport’s International Status.....                  | - 120 -        |
|           | 9.4.9 Centurion Aerospace Village .....                    | - 120 -        |
|           | 9.4.10 2010 Soccer World Cup .....                         | - 121 -        |
|           | 9.5 Accessing the “Physical Internet” .....                | - 121 -        |
| <b>10</b> | <b>REFERENCES</b> .....                                    | <b>- 123 -</b> |

## TABLE OF FIGURES

|  |        |
|--|--------|
| FIGURE 1: FLOW OF CHAPTERS .....   | - 2 -  |
| FIGURE 2: TRANSPORTATION INFRASTRUCTURE AND THE ECONOMY .....  | - 9 -  |
| FIGURE 3: LOCATION OF STUDIED LOGISTICS HUBS.....  | - 13 - |
| FIGURE 4: CONTAINER TRAFFIC ON AFRICAN ROUTES .....  | - 24 - |
| FIGURE 5: AFRICAN PORT VOLUMES .....   | - 24 - |
| FIGURE 6: GEOGRAPHIC POSITION OF SOUTH AFRICA IN THE SADC REGION<br>.....                                | - 26 - |
| FIGURE 7: LAND TRANSPORT INFRASTRUCTURE IN SADC COUNTRIES..  | - 31 - |
| FIGURE 8: SOUTH AFRICAN TRANSPORT INFRASTRUCTURE AND BORDER<br>POSTS.....                                | - 33 - |
| FIGURE 9: TRANSPORTATION COSTS TO THE NEAREST MARKET TOWN,<br>PORT AND INTERNATIONAL LOGISTICS HUB ..... | - 40 - |
| FIGURE 10: COMPARATIVE ROAD AND RAIL COST PER TON FREIGHT.....   | - 43 - |
| FIGURE 11: ROAD CONTAINER FREIGHT MOVEMENT AND CORRIDOR<br>ISSUES .....                                  | - 44 - |
| FIGURE 12: RAIL CONTAINER FREIGHT MOVEMENT AND CORRIDOR ISSUES -<br>46 -                                 |        |
| FIGURE 13: TRANSNET FREIGHT RAIL CAPITAL EXPENDITURE.....  | - 47 - |
| FIGURE 14: GEOGRAPHIC POSITIONING OF TSHWANE LOGISTICS HUB..   | - 55 - |
| FIGURE 15: THE TSHWANE CITY DEVELOPMENT “HOUSE” .....  | - 57 - |
| FIGURE 16: POPULATION DISTRIBUTION OF TSHWANE .....  | - 59 - |
| FIGURE 17: LOCATION OF PROPOSED TSHWANE LOGISTICS HUB.....   | - 62 - |

|   |         |
|---|---------|
| FIGURE 18: ANNUAL ECONOMIC GROWTH FOR SOUTH AFRICA, GAUTENG AND THE CITY OF TSHWANE ..... | - 74 -  |
| FIGURE 19: ANNUAL EXPORTS FOR SOUTH AFRICA, GAUTENG AND THE CITY OF TSHWANE .....         | - 76 -  |
| FIGURE 20: RESIDENTIAL AREAS IN NORTHERN TSHWANE .....                                    | - 78 -  |
| FIGURE 21: HIGHWAY ACCESS INTO HAMS HALL LOGISTICS HUB.....                               | - 79 -  |
| FIGURE 22: ROAD DENSITY AND CONGESTION IN TSHWANE .....                                   | - 84 -  |
| FIGURE 23: PLANNED ROAD INFRASTRUCTURE IN GAUTENG.....                                    | - 85 -  |
| FIGURE 24: SOUTH AFRICA'S LOGISTICS COST STACK ELEMENTS.....                              | - 103 - |
| FIGURE 25: SOUTH AFRICAN VEHICLE EXPORTS .....  | - 108 - |
| FIGURE 26: PROPOSED LOCATION OF THE TSHWANE LOGISTICS HUB. -                              | 118 -   |

## LIST OF TABLES

|   |         |
|---|---------|
| TABLE 1: DRIVE TIME AND DISTANCE FROM DRIFT.....                            | - 20 -  |
| TABLE 2: RAIL TRAVEL TIME TO SOME EUROPEAN DESTINATIONS FROM<br>DRIFT.....  | - 21 -  |
| TABLE 3: GDP, POPULATION, LITERACY AND HIV IN SADC COUNTRIES...             | - 28 -  |
| TABLE 4: TOP 5 SOUTH AFRICAN EXPORT AND IMPORT COUNTRIES .....              | - 29 -  |
| TABLE 5: TOP 20 SOUTH AFRICAN TRADING PARTNERS.....                         | - 30 -  |
| TABLE 6: MAJOR PRODUCTS HANDLED AT SOUTH AFRICAN PORTS .....                | - 34 -  |
| TABLE 7: SUMMARY OF CARGO HANDLED AT SOUTH AFRICAN COMMERCIAL<br>PORTS..... | - 36 -  |
| TABLE 8: PHYSICAL COMPONENTS OF SOUTH AFRICA'S GDP .....                    | - 41 -  |
| TABLE 9: CONTAINER CARGO FORECAST .....                                     | - 51 -  |
| TABLE 10: DEMOGRAPHICS OF REGION IN A 200KM RADIUS AROUND<br>TSHWANE .....  | - 54 -  |
| TABLE 11: EXPORTS FROM THE CITY OF TSHWANE .....                            | - 75 -  |
| TABLE 12: SUMMARY OF COSTS.....   | - 100 - |
| TABLE 13: SUMMARY ASSESSMENT OF TSHWANE LOGISTICS HUB .....                 | - 109 - |

## 1 INTRODUCTION

“THE WORLD IS A VILLAGE”.

EMPTY CLICHÉ OR BRUTAL REALITY?

### 1.1 PROBLEM STATEMENT

South Africa needs to facilitate economic growth for the country as well as the Southern African region. In this regard there are challenges which are not necessarily unique to South Africa, but are surely exaggerated in this country. Poverty alleviation and basic service provision are some examples. The result is that other developments such as transport infrastructure establishment and even maintenance are sometimes moved to the background. For South Africa to regain and maintain global competitiveness, it has to consolidate current infrastructure. This study aims to propose a step towards such consolidation with the introduction of logistics hubs in South Africa. The remainder of this study is dedicated to logistics hubs and whether, from a logistics point of view, they are in fact a viable option for South Africa. A specific case study will be used to demonstrate the potential of South Africa to indeed optimise infrastructure and in doing so, becoming a global player. Figure 1 illustrates the flow of chapters for the study.

Logistics hubs are a fairly new phenomenon especially in South Africa. There is not a winning recipe for the development of such a hub and each hub should be measured against the requirements of the region it feeds. There are a few international success stories which are studied in Chapter 2 to determine current international best practice. A literature study was conducted on four logistics hubs already in operation in the developed world. The aim of the chapter is to give some background information on infrastructure and operational capacity required in such a hub.

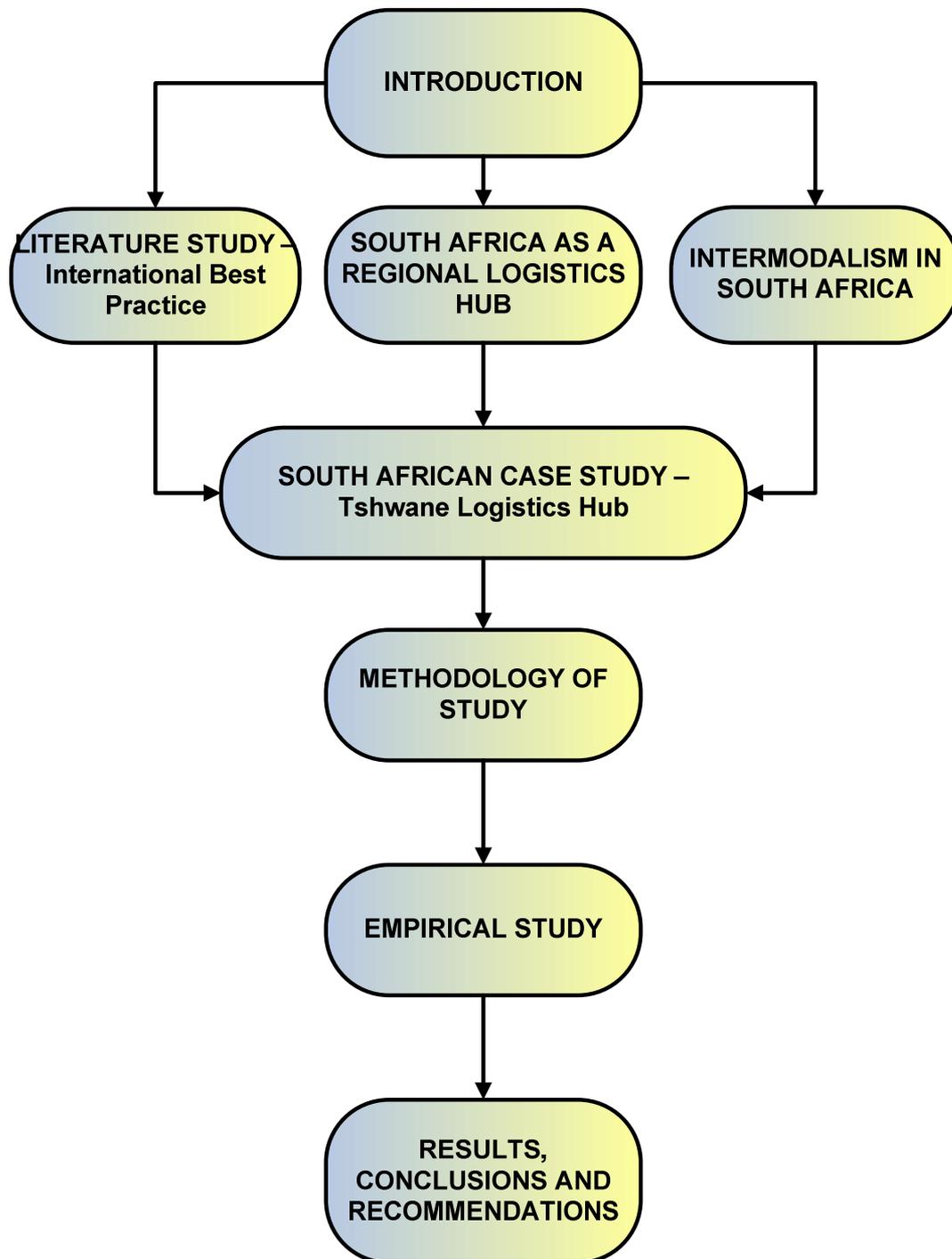


Figure 1: Flow of Chapters

Chapter 3 considers South Africa in its regional context. South Africa forms part of the South African Development Community (SADC) and is generally seen as the leading economy in the region. This statement is investigated in further detail from not only an economic outlook, but also taking into consideration other elements that influence the logistics of a country.

An integral part of logistics hubs is the intermodal solutions it incorporates. This is investigated in Chapter 4. Currently in South Africa there is a state of modal competition, not cooperation. Different alternatives which can be implemented in South Africa are investigated along with future forecasts for container movements from our major ports. It concludes with the benefits which could be gained from promoting rail as a mode of transport in the country.

Chapter 5 is dedicated to the discussion site ear-marked for the case study. It describes the attributes of the site as well as the local government strategic objectives. The city development strategy was developed by the City of Tshwane to achieve certain pre-set goals. It is investigated whether the site aligns itself with this plan.

Through the literature study, a number of attributes were identified which are common at each of the logistics hubs. Chapter 6 lists these features and gives a short description of what each entails. This sets out the methodology against which the case study will be measured. The chapter wraps up with a list of interviews conducted during the study and their significance to obtain a conclusion and recommendations for the study.

Chapter 7 is the actual evaluation of the site against the characteristics of an already established and successful logistics hub. Each of the attributes identified are measured against the site's features. This is done with the aim of reaching a conclusion on whether the site is indeed feasible to be developed into a logistics hub. Although the site might not have the entire infrastructure available or the resources to obtain extra infrastructure, it should be evaluated in context.

The study concludes in Chapter 8. The specific criteria are summarised in a table rating each of them and giving a short description. Additional recommendations for the success of a logistics hub beyond the already identified traits are made, but which are specific to the earmarked site and its surroundings. These recommendations are made with the intent of adding additional value to the already existing resources available to the community. Finally, the study reaches its conclusion on the feasibility of developing logistics hubs in South Africa. Other areas are identified which may also benefit from the development of logistics hubs. One of these areas is the optimisation of humanitarian logistics to the benefit of the rest of Southern Africa.

## 1.2 GLOBALISATION

Friedman (2005: 134) in his book *The World is Flat* states that the 21<sup>st</sup> century will be remembered as the new age of globalisation and the “flattening of the world”. Technological developments contributed towards levelling the playing field as never before so that every individual, organisation, industry or country is potentially an equal and a competitor of the other. The reality of this is that work now gets done where it’s the most efficient and effective, not necessarily where it’s the closest to its end destination. Friedman identified ten forces that flattened the world of which four have direct impact on logistics and supply chain management:

- **Supply chaining:** It’s a method of collaborating horizontally, among suppliers, retailers and customers, to create value and aiming to drive costs down
- **Outsourcing:** This entails focussing on your core capabilities. It means taking some specific, but limited function, that an organisation was doing in-house and having another organisation perform that exact same function on your behalf and then incorporating their work back into your overall operations
- **Off-Shoring:** This happens when an organisation moves the total operations of its factories which is operating in for instance South Africa to China

- **In-Sourcing:** It involves third party managed logistics. A company gets another company which specialises in logistics to synchronise its entire operations and its interaction with both customer and suppliers.

We have entered the age of consumerism. Consumers have choices that were not previously available to them. They have the power to utilise these choices and this results in the economy being demand-driven and not supply-driven as was previously the case. Products do not have to be pushed onto the market; the constant replenishment of quality goods to meet the demands of the consumer, however poses a problem. *Sending the right goods to the right place at the right time is no longer negotiable*, it's a necessity. This results in more complex supply chains. Companies have to start collaborate and cooperate with other companies beyond their borders, relying on relationships to optimise their supply chains. Customer service is non-negotiable and greater responsibility now rests upon companies to maintain their excellent customer service levels. Transparent and resilient supply chains are very important in this regard. The focus should be holistic. Every person in the supply chain should know his or her function in the bigger picture as well as the impact they have on the others. The business should have a shared vision among all its employees and having them work towards a common goal. This entails organisations being run on processes instead of functions. Logistics hubs are an enabler to achieve this goal.

The new conditions of global trade are vital tools in the ongoing search for lower costs and better customer service levels and beyond these the search for increased market share and margins (Barloworld logistics, 2006). To be globally competitive, South Africa has to be an early adopter of change. This will attract multi-national companies who do not have one specific country to which it is loyal, but rather to the country from where it is most advantageous to operate. It is also important for South Africa to move from the group of countries known as the technology imitators to the technology innovators. Technology life cycles are short lived and competitive advantage is gained by innovating constantly. It is important to aim to reducing cost and improving service.

Globalisation has increasingly become survival of the fittest, where the organisation who best adjust to the change associated with globalisation, often come out on top. A country, on the other hand, has to be a trend setter to achieve a competitive advantage. Loyalties are no longer strong enough to rely on. If another country or organisation can do it better, faster and cheaper the market will respond accordingly. South Africa has the potential to compete in the world market and especially multi-national organisations are interested by what South Africa has to offer.

### 1.3 GOVERNMENT IN THE GLOBAL CONTEXT

In 2006, Barloworld's supply chain foresight report revealed that the benefits of globalisation drive strategic agendas. These benefits are hampered by three factors, namely:

1. The challenge of aligning supply chain strategies involving collaboration and integration with business objectives such as cost reduction and service level improvement.
2. The shortage of high-level skills to re-engineer supply chains from a silo-based efficiency approach to a collaborative, integrated and responsive effectiveness approach.
3. The lack of local benchmarking in key areas of the supply chain.

These problems are not unique to South Africa and occur all over the world. Other countries have overcome these challenges and have dealt with them through:

- partnering with supply chain specialists to acquire high-level skills
- taking a globalised perspective of their supply chain operations
- adopting best practices and benchmarking
- undertaking continuous improvement.

Government's aim should not be to eradicate poverty by giving free houses and promising jobs alone, economic activity has to be created to maintain this growth and elevation. Decisions made now by the South African government have long term effects on the whole of South Africa and the SADC region. In a world where the barriers are coming down, perpetual subsidy of unviable industry is not sustainable in the long run and ultimately undermines developing competitive ability (Joynt, 2007). The government should take care in guaranteeing that the essential South African companies remain South African and not become foreign owned as well as the core competencies of these companies remaining in-house rather than being outsourced to foreign based companies. Government should identify key areas within which it is viable for South Africa to compete. An example is the labour market. It does not make sense for South Africa to compete in the labour market if the cost of labour is too high and productivity levels are low compared with for instance China.

Friedman (2005) quotes an old African proverb in his book:

*Every morning in Africa a gazelle wakes up.*

*It knows it must run faster than the fastest lion, or it will be killed.*

*Every morning, a lion wakes up.*

*It knows it must outrun the slowest gazelle, or it will starve to death.*

*It doesn't matter whether you are a lion or a gazelle.*

*When the sun comes up, you better start running.*

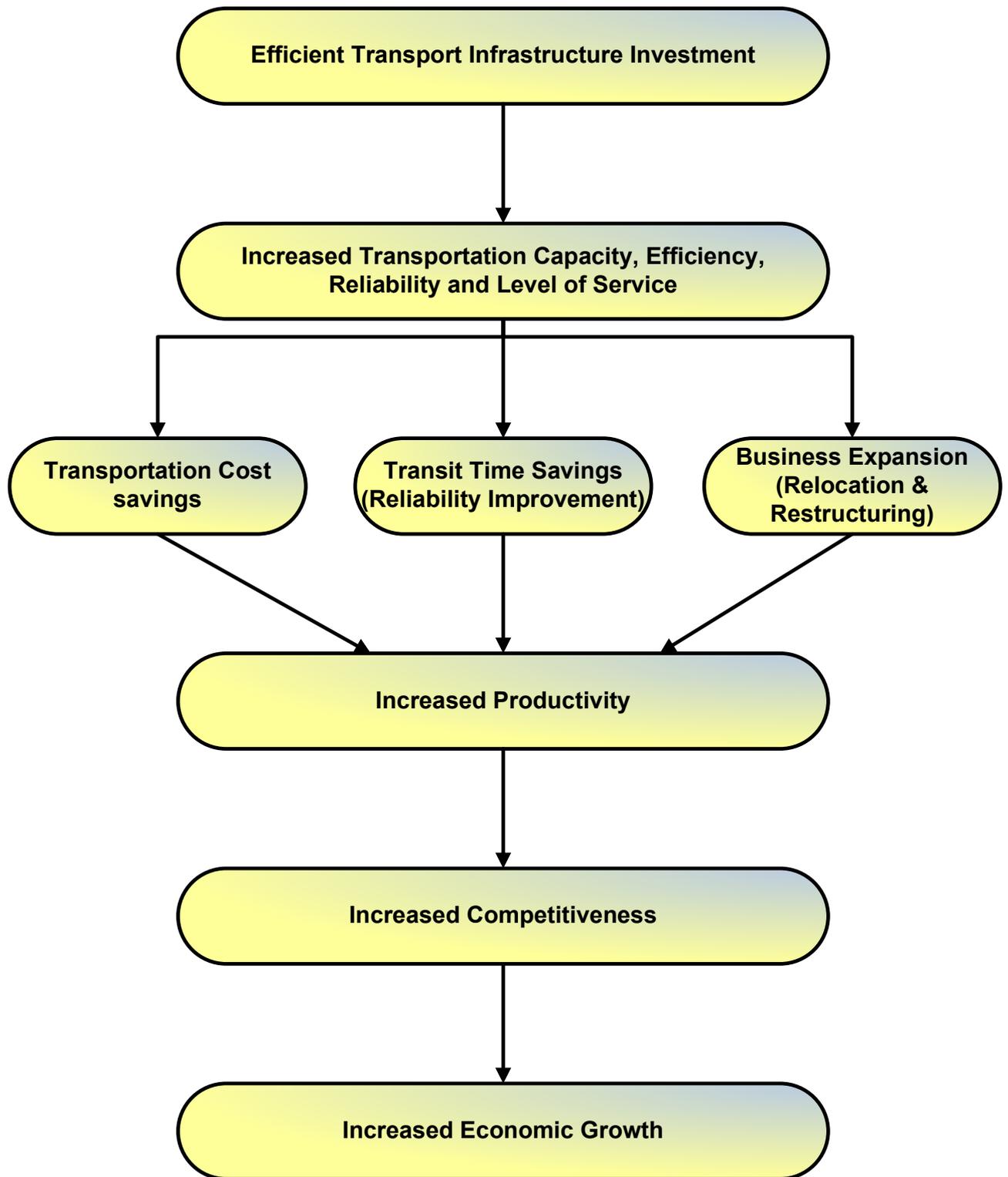
In the global market place it does not matter who the gazelle is or who the lion is; since the re-awakening of China, the rest of the world has to run faster and faster to keep up. Government should take this into consideration when deciding whether it is indeed worthwhile to run against China, or any other trend setting country, in their niche markets.

#### 1.4 THE FREIGHT TRANSPORT SECTOR AND THE ECONOMY

Figure 2 depicts the relationship between transportation and the economy. It is deduced that an improved transport system can lead to increased economic growth. This also holds true for freight transport. The figure clearly indicates the interdependence of the different aspects and the influence it has on one another.

It is estimated that the economic growth for the whole of Africa will be 5.4% in 2008. Compared to the growth rate of the United Kingdom, which is estimated at a mere 1.9% and the United States which will be approximately 2.2% for the calendar year 2008, it should be an indication of what transport infrastructure will be needed. The growth rate should also indicate to which extent it is necessary to optimise our current infrastructure. As mentioned in the previous section, China is currently the leading developing country. This is again shown in the forecast of its growth in 2008. It is estimated that China and Hong Kong will show a staggering 8.9% growth in 2008. The rest of Asia is estimated to show a growth rate of 6.5% (Rohde, 2008). South Africa should take this into consideration when deciding on its strategic objectives to become a global market player.

Logistics hubs could be utilised as a means to an end to reach the goal and establish Africa in the global market place.



**Figure 2: Transportation infrastructure and the Economy**

(Arcus Gibb. 2007)

## 2 LITERATURE STUDY

It is important, at the onset, to get a common understanding of what a logistics hub entails. But first, logistics hubs are dependent on both intermodal and multi-modal transportations. These two terms are defined as follows:

According to Baluch (2005: 44) multi-modal transport means incorporating transport modes such as sea, air, rail and road. Freight forwarders optimise these modes and create value for customers by finding the most cost-effective and timesaving route for their cargo.

In concurrence with this definition, intermodal transportation is defined as: *the shipment of cargo and the movement of people involving more than one mode of transportation during a single, seamless journey* (Jones, Cassady & Bowden).

It is important to note the main difference between intermodal and multi-modal transportation is that intermodal transport operations are a single, seamless journey, whereas multi-modal transportation makes use of modes of transport which are not integrated and the journey might not be seamless. An example of the latter is air transport combined with a second leg of the journey on road. The journey can thus be divided into two or more legs, namely air transport and road transport.

The term logistics hub has been used internationally over the last number of years although there is also reference to a logistics precinct in this regard. Information with regard to such facilities is not readily available, and no one term has been defined and used as such.

Transportation hubs are described as: *A location where traffic is exchanged across several modes of transport. These modes may include any of railway, tramway, metro or rapid transit, bus, coach, automobile, truck, airplane, spacecraft, ship, ferry, pedestrian, or any other kind of transportation. The term is used for both passenger and freight transfers. Some transportation hubs also allow transport to be exchanged between the same kinds of transport mode* (Wikipedia, 2008).

A broad definition of a logistics hub is: *Integrated centres for transshipment, storage, collection and distribution of goods (Jorgensen, 2007).*

The Texas Transportation Institute (2008) defines an inland port as: *A site located away from traditional land, air and coastal borders. It facilitates and processes international trade through strategic investments in multimodal transportation assets and by promoting value-added services as goods move through the supply chain.*

According to Europlatforms (2004) logistics centres can be defined as: *The hub of a specific area where all the activities relating to transport, logistics and goods distribution – both for national and international transit – are carried out, on a commercial basis, by various operators.*

*The operators may be either owners or tenants of the buildings or facilities (warehouses, distribution centres, storage areas, offices, truck services, etc.) built there. In order to comply with free market rules, a Logistics Centre must be accessible to all companies involved in the activities set out above.*

*A logistics centre must also be equipped with all the public facilities necessary to carrying out the above-mentioned operations. If possible, it should also include public services for the staff as well as users' equipment. In order to encourage intermodal transport for goods handling, a Logistics Centre should preferably be served by a variety of transport methods (roads, rail, sea, inland waterways, and air).*

*It is vital that a Logistics Centre be managed as a single and neutral legal body (preferably by Public-Private-Partnership) if synergy and commercial cooperation are to be ensured. Finally, a Logistics Centres should comply with all standards and quality performance in order to provide the framework for commercial and sustainable transport solutions.*

In essence a logistics hub is a centre which facilitates more than one mode of transport. Transport is managed in such a way that it simplifies the process and aims

to make it seamless, all the while driving down costs. It assists with logistics activities such as warehousing and transshipment which results in the provision of a value added service and complete end to end solution to the customer.

Examples of existing logistics hubs/logistics precincts/logistics centres:

- Duisport International Inland Port and Logistics Hub (Rhine- and Rhun rivers, Germany)

<http://www.duisport.de/en/>

- Hams Hall Distribution Park (Birmingham, United Kingdom)

<http://www.hams-hall.co.uk/spec.php>

- Daventry International Rail Freight Terminal – DIRFT (Northamptonshire, United Kingdom)

<http://www.dirft.com/index.asp>

- Virginia Inland Port (Norfolk, Virginia, USA)

<http://www.vaports.com/index.asp>

- Kansas City Smart Port (Kansas City, Missouri, USA)

<http://www.kcsmartport.com/>

- Dallas Logistics Hub

<http://www.dalaslogisticshub.com>

The location of these logistics hubs are illustrated in Figure 3 along with the position of the case study to be discussed in Chapter 5: Dallas Logistics Hub, Duisport International Port and Logistics Hub, Daventry International Rail Freight Terminal and Virginia Inland Port are all logistics hubs in use in different parts of the world and will be discussed briefly in this chapter. Dallas Logistics Hub is currently the largest new logistics park in North America. The reason behind discussing Dallas Logistics Hub is that the aim of the hub is to establish Dallas as a trade hub in the South West of the United States of America. This aligns itself with the aim of the case study to be discussed in Chapter 5. .

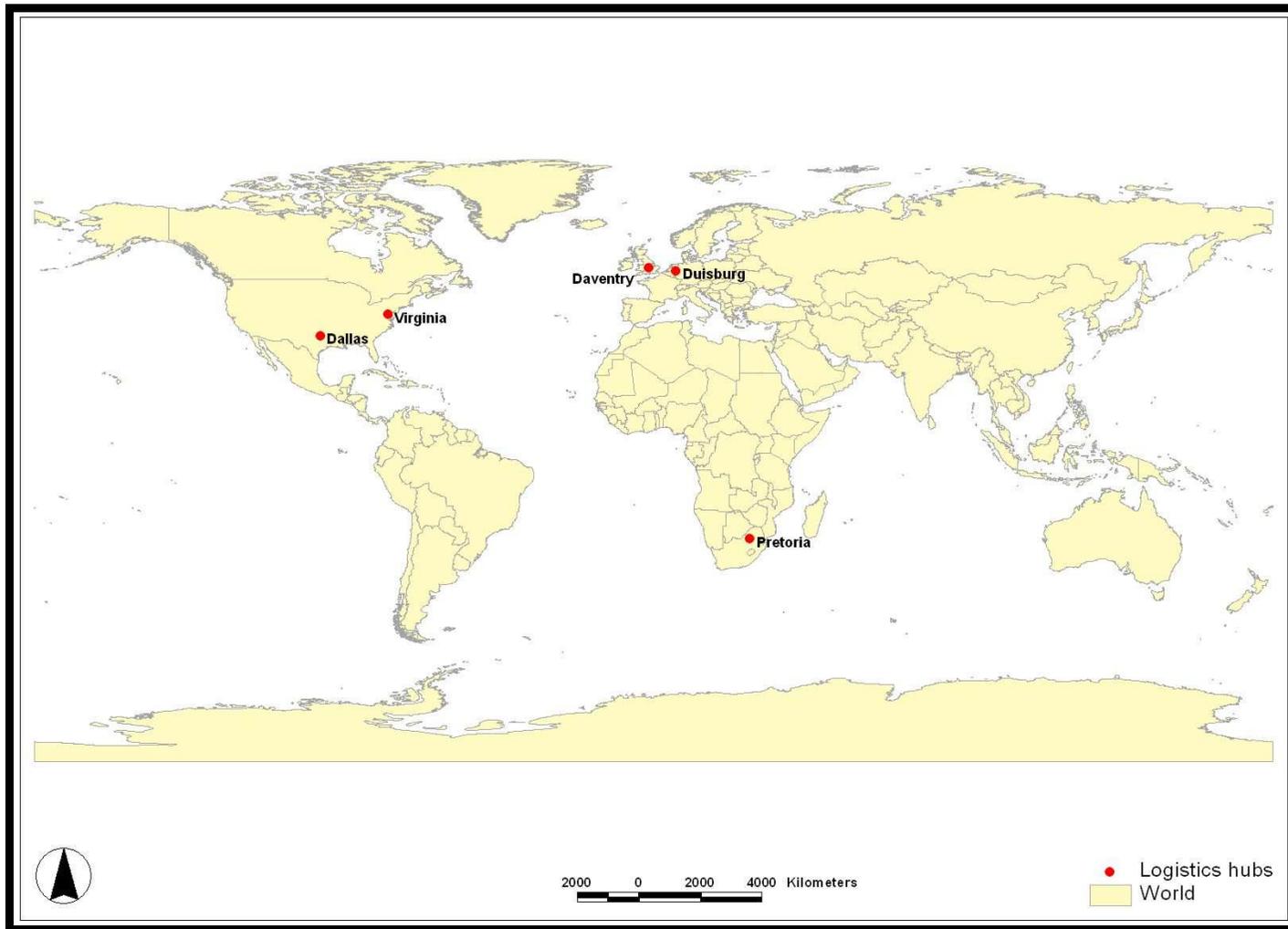


Figure 3: Location of studied logistics hubs

Duisport International Inland Port and Logistics Hub on the other hand has direct access to inland waterways which does not apply to South Africa. The motivation behind studying Duisport is the fact that it has a very favourable geographic position and is serving the region, not just Germany. The third logistics hub under examinations is Daventry International Railfreight terminal. This particular logistics hub does not have access to inland waterways which is similar to the situation in South Africa. It does not have direct access to an airport either, but does make use of intermodal solutions between rail and road. Lastly, a short description will be given about the capabilities of Virginia Inland Port in the United States of America. This particular hub was built with the intent to bring the capabilities of the Port of Virginia closer to the inland US markets. That is the reason why it is referred to as an inland port rather than a logistics hub and this gives it a different perspective than the previous three logistics hubs which will be discussed in the chapter.

## 2.1 DALLAS LOGISTICS HUB

On 13 April 2007 the Dallas Logistics Hub was officially opened. Dallas is the ninth largest city in the United States of America and has an estimated population of 1.2 million. It is also the fourth largest industrial market in the USA. Upon initiation of the project, Dallas Logistics Hub was the largest new logistics park in North America and aims at positioning Dallas as the number one trade hub in the Southwest region of America. The hub is not yet completed, but it is expected that upon completion the hub would create more than 30 000 direct jobs and 33 000 indirect jobs in the Southern Sector of Dallas.

The hub has access to just over 20 million square meters available for development. This is the equivalent of 5 574 182 m<sup>2</sup> floor space of development potential. The site is build-ready for distribution, manufacturing, office and retail developments. A major advantage of the Dallas Logistics Hub is its location. It is adjacent to:

- **The Union Pacific Southern Dallas Intermodal Facility**

This facility comprises of a 1 450 000 m<sup>2</sup> intermodal terminal, known as the Dallas Intermodal Terminal (DIT). It was designed to facilitate the ever

increasing intermodal volumes in the region. A distinct feature of the terminal is the technology it uses when trucks access the terminal. Technology allows a truck to process a container through a high-tech, biometric secured automated gate system (AGS) in 30 – 90 seconds as opposed to the norm of four minutes. The features of the facility include:

- 365 000 Lift capacity
- 10-Lane Automated Gate System entrance
- State of the art security
- 24 Hour a day, seven day a week operations
- Real time OASIS software
- Four loading tracks
- Repair buildings
- Customs.

The lifting capacity of the terminal is planned to increase to 600 000 lifts per year and the terminal is also in close proximity to Union Pacific Miller Intermodal Facility which more than doubles the intermodal capacity within Dallas.

- **BNSF Railway**

The developers of the Dallas Logistics Hub granted the Burlington Northern Santa Fe Railway (BNSF) the right to purchase land inside the logistics hub for the possible development of further intermodal facilities. This increases the efficiency of the Dallas Logistics Hub.

- **Four major highway connectors**

- The I-20, the primary east/west trucking corridor for the southern United States borders the logistics park's north entrance.
- The I-35, the NAFTA Trade corridor runs 5 km west of the Dallas Logistics Hub.
- The I-45, the direct interstate to the Port of Houston lies to the east of the entrance of the hub.

- The proposed Loop 9/Trans-Texas Corridor is a future rail and truck corridor. It is a multi-billion dollar highway which is planned to run along the south boundary of the Dallas Logistics Hub.

- **Lancaster Airport**

Lancaster Airport is situated adjacent to both the Union Pacific Dallas Intermodal Terminal and the Dallas Logistics Hub. The airport is owned by the City of Lancaster and is located on a 1,25 million square meters piece of land. Future development includes the extension of the current runway to 1 980 m.

The above strategically places Dallas Logistics Hub in an ideal location for distribution and easy access. Other advantages include the fact that it is a foreign trade zone and a triple Freeport. Currently in planning for April 2008 is a 59 000 m<sup>2</sup> cross dock facility and a 17 916 m<sup>2</sup> office or warehouse facility.

(Dallas Logistics Hub, 2007)

## 2.2 DUISPORT INTERNATIONAL INLAND PORT AND LOGISTICS HUB

Duisport is the commercial and transportation centre of the Rhine region in Germany. The hub is ideally located with 30 million people living and working within 150 km from Duisberg, and 300 000 companies which are operational in the region. Of these companies, 250 are specializing in transportation and logistics and offer their services in the logistics hub. The hub covers an area of 13,55 million square meters and has four container terminals with 10 container gantry cranes.

Easy access to the hub can be gained from major European waterways, railroad lines and highways and is ideal for ship, train, truck and passenger vehicle traffic. The hub comprises four intermodal terminals and 1.2 million square meters of

covered storage area. There are three modes of transport directly linked to the Duisport Logistics hub, namely waterways, railroads and highways.

In 2006 the bulk cargo transferred from the hub totalled 12.6 million tons with general cargo amounting to 13.1 million tons which includes container cargo. Ship cargo accumulated to 15.6 million tons, rail cargo handled was 10.1 million tons and truck cargo 24.0 million tons in the year 2006.

The Duisport Logistics Hub seized an opportunity by developing a dedicated coal blending and loading facility, five coal unloading terminals and five steel service centres for processing steel products.

The port of Duisberg is Germany's largest inland coal hub. There are five dedicated coal terminals with an annual capacity of eight million tons. Coal from Rotterdam or Amsterdam is moved on the Rhine River to Duisberg. Imported coal is received from the USA, South Africa, Poland, Australia and Colombia and is distributed to power stations in the region or to the steel industry. Apart from coal, the port also handles around 100 000 tons of scrap metal per month and 19 terminals handle liquid cargo. The scrap is sorted at Duisport and delivered to steel mills in Germany and other countries.

## **Shipping**

For the Dutch and Belgian North Sea ports, Duisport is the most important hinterland hub. It is an ideal site for bundling and distributing cargo as a result of the port's vicinity to both consumers and industry. With ever increasing congestion on highways, short-sea shipping has grown in stature. Duisberg serves over 100 European sea ports and inland ports located close to the coast. Over 2 000 sea-going river vessels call at the Port of Duisburg every year and these vessels can carry as much as 4 500 tons of cargo. Scheduled services are offered to Scandinavia, Portugal, Spain and the British Isles with the latter increasing fivefold since 1998 in the shipment of standard container units. Duisport also forms part of the Short-sea shipping Promotion Centre whose objectives include the creation of

new ship-based transportation routes. The benefits of short-sea shipping for Duisport are:

- Transportation is reliable
- Timing can be planned
- Low costs
- Seamless transportation – no reloading
- Reduced impact on the environment

### **Railroad**

The predominant mode of transport for cargo in and out of Duisport is rail with scheduled services linking the port to 75 European destinations and more than 300 regular links weekly. Duisport has an overall objective to “*optimize the railroad services available in the port, the region and beyond*”. In 2001 the port’s own railroad company was set up, namely Duisport Rail and it pursues the same policy through its operations in the market place. Duisport Rail in collaboration with several other rail companies aims to further widen the network of efficient rail links, as well as create modern services between Duisport and several other strategic ports. Key criteria identified for this project are the consolidation of freight, optimization of intermodal interfaces and the promotion of solutions which respond to the needs of customers. Services rendered by the port of Duisberg include:

- Classification, marshalling and shunting services
- Incoming and outgoing freight car weighing
- Rail loading points upon request
- Freight car and locomotive parking areas

### **Road**

The Port of Duisberg recognises the fact that road transport still has a competitive advantage mainly over short haul. However, it is committed to the development of

transportation chains which shift cargo from the road, either to rail or waterways. This is as a result of increasing congestion on the highways, growing restrictions and increasing financial burden of freight transport on road. Duisport is ideally integrated with five interstate highways and a number of Federal highways linking it to Europe. Improvements to existing infrastructure are supported by Duisport and aim to minimize impacts on residents as well as to calm traffic flows.

There are three intermodal container terminals and a further one rail/road terminal which integrates trucks and railroads into complete container, swap body and semi-trailer transportation chains. The rail capacity of Duisport enables extensive coverage throughout Europe, not even to mention the possibilities created beyond that by the waterway infrastructure.

(Duisport International Inland Port and Logistics Hub, 2007)

### 2.3 DAVENTRY INTERNATIONAL RAILFREIGHT TERMINAL

Daventry International Railfreight Terminal, also known as DRIFT is in a prime location. It is located between three main roads, the A5, A428 and the M1, with further links to the A45, M6, A14 and A426. DRIFT is a rail port and logistics centre which is situated on Junction 18 and approximately 6.5 km south of the M1/M6/A14 interchange, the major highway crossroads at the heart of the United Kingdom. This interchange gives access to Birmingham and the North West through the M6, whilst the A14 provides access to the East coast resulting in direct access to Felixstowe, one of the largest deep sea ports in the United Kingdom. DRIFT is also within a 4.5 hour drive of 85% of the United Kingdom's towns and cities which is indicated in Table 1.

**Table 1: Drive time and distance from DRIFT**

| <b>Destination</b> | <b>Distance</b> | <b>Approximate travel time<br/>by road</b> |
|--------------------|-----------------|--|
| London             | 127 km          | 1.5 hours                                  |
| Birmingham         | 64 km           | 0.75 hours                                 |
| Birmingham Airport | 52 km           | 0.5 hours                                  |
| Coventry Airport   | 31 km           | 0.5 hours                                  |
| Manchester         | 195 km          | 2.25 hours                                 |
| Bristol            | 198 km          | 2.25 hours                                 |
| Southampton        | 204 km          | 2.5 hours                                  |
| Felixstowe         | 259 km          | 3.5 hours                                  |
| Leeds              | 190 km          | 2 hours                                    |
| Glasgow            | 530 km          | 6 hours                                    |

Currently under development is DRIFT Logistics Park 2 which will result in a 200 hectare site adjacent to the West Coast Main Line rail. DRIFT Logistics Park 2 has outline planning consent for approximately 180 700 m<sup>2</sup> of distribution and manufacturing floor space. The park also offers individually designed rail connected buildings 4 645 m<sup>2</sup> to 92 900 m<sup>2</sup>. The railport of the logistics park is often seen as the basis of all activities. It is an open access railport and has enjoyed significant growth in freight transport since its opening in 1997. In 2001 it became the busiest Channel Tunnel intermodal interchange in the United Kingdom and now sets the trend for future developments. The railport is operated under a management contract from DRIFT by a private company Tibbett and Britten plc, and Excel Logistics Company. This aspect is seen as one of the factors contributing to the success of DRIFT Logistics Park. Its strategic location offers customers the opportunity to choose between either road transport or rail transport, or make use of both modes of transport. Intermodal handling services are available 24 hours a day and rail freight services are readily available to major European and domestic

destination. Travel time from DRIFT to some major destinations in Europe is shown in Table 2.

**Table 2: Rail travel time to some European destinations from DRIFT**

| Destination      | Rail Time |
|------------------|-----------|
| Metz, France     | 15 hours  |
| Milan, Italy     | 32 hours  |
| Barcelona, Spain | 42 hours  |
| Paris, France    | 10 hours  |

The success of the Daventry International Rail Freight Terminal can be attributed to its exceptional location along with integration of existing transport infrastructure. Currently a number of companies have centres within the logistics hub which contributes to the efficiency of the hub, as well as testifying to its success story. These companies are:

- Tesco
- Exel
- Eddie Stobart
- WH Malcolm Logistics
- Royal Mail
- Ingram Micro
- Mothercare.

Locally, the area is surrounded by towns and villages, hotels, bars and shops which make it easily accessible for the general public. Towns include Daventry, Rugby, Northampton and Lutterworth.

(Daventry International Rail Freight Terminal, 2007)

## 2.4 VIRGINIA INLAND PORT

Virginia Inland Port is situated just west of Washington D.C. in Warren County in the United States of America. The port is just over 350 km inland and effectively brings the benefits of the Port of Virginia 350 km closer to the U.S. markets. The facility is operated as an intermodal container transfer facility and provides an interface between truck and rail for the transport of ocean-going containers to and from the Port of Virginia. Containers arrive at the Virginia Inland Port (VIP) via truck transport where it is immediately loaded upon a rail car or for short term storage prior to loading. There is also the possibility of containers arriving by rail and being unloaded for transshipment by truck to different inland destinations.

There is a five day a week dedicated rail service available between the Virginia Inland Port and the marine terminals in Hampton Roads. This allows for direct access to the trade routes of 75 international shipping lines. There are approximately 5435m of on-site rail serviced by one of the largest railroads in the U.S., namely the Norfolk Southern railroad. It has an ideal location with access to major markets in Pennsylvania, Northern Virginia, West Virginia, Washington D.C. and Eastern Ohio. The port is located within 1.6km of the Interstate 66 and within 8km of the Interstate 81, these add to its ideal location.

The facility is a U.S customs-designated port of entry, and the full range of customs functions is available to customers. Its operating hours are 08:00 – 17:00, however 24 hour access could be arranged with prior notification. Cross docking warehouse facilities are available for transferring cargo and consist of a three-door cross dock warehouse. There is an on-site maintenance building for making repairs to trucks or to improve their roadworthiness. All the inspections which are needed to be done can also be done on-site. (Virginia Inland Port, 2007)

## 2.5 CONCLUSION

There are a number of differences between the facilities discussed, nevertheless there is one major point which has to be highlighted, and that is the fact that all four the above mentioned logistics hubs feed already established markets. There is no denying the truth that for a logistics hub to be successful there has to be a market need for such a resource. It should also have the ability to attract further business investment and attracting major companies to locate at the facility.

Logistics hubs give a regional advantage to both the city where it is located as well as the country in which is it situated. A study was conducted in 2005 to promote Germany as Europe's Logistics Hub. The study focused on its geographical position, its transport infrastructure, the logistics and transport industry in Germany, industrial development and investment guidelines. This was compared to the rest of the European Union (Invest in Germany, 2005). South Africa can be seen in a similar light for the SADC region in Africa. The next chapter aims to highlight South Africa as regional logistics hub.

### 3 SOUTH AFRICA AS A REGIONAL LOGISTICS HUB

Shipping routes connected with Africa accounts for 37.1% of the container traffic on the world's shipping routes. Exceptional growth has been experienced on the routes between Europe and Africa as well as the Far East and Africa as seen in the figure below. Durban port is the busiest port in the whole of Africa, followed by Port Said.

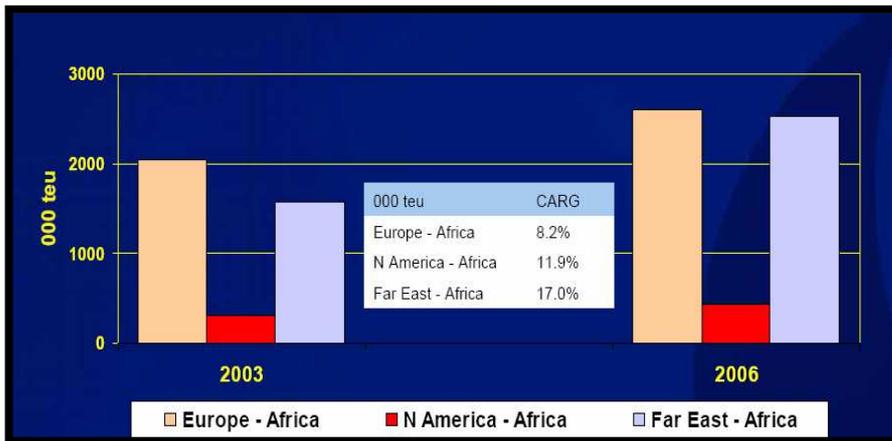


Figure 4: Container Traffic on African Routes

(Source: Haynes, 2008)

Figure 5 gives and indications of just how important the Port of Durban is to the African continent. This is reason enough for South Africa to be seen as the region's logistics hub. The rest of this chapter will study further issues to motivate this notion.

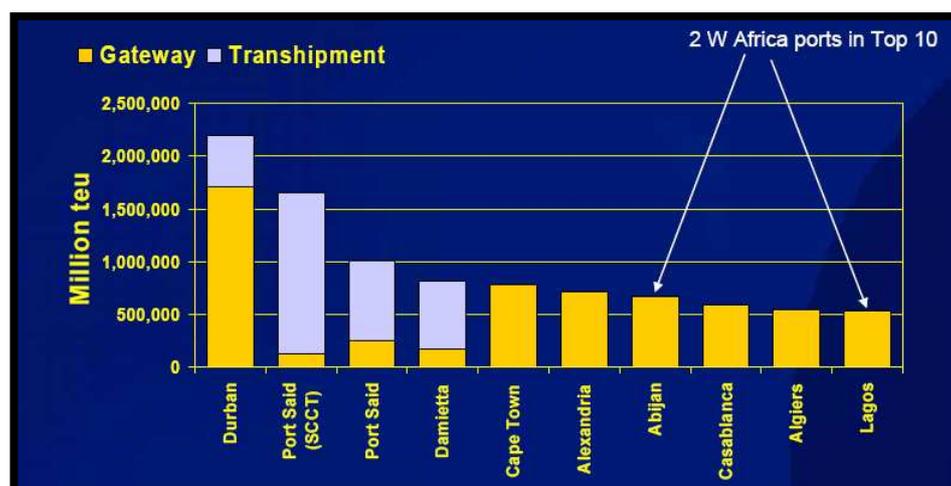


Figure 5: African Port Volumes

(Source: Haynes, 2008)

### 3.1 GEOGRAPHICAL POSITION

Geographically South Africa forms the southern most tip of Africa. It's arguably the continent's commercial hub with access to the rest of Africa north of its border, and further access to the rest of the world predominantly to the east and west. The map below illustrates the accessibility of South Africa to the rest of the SADC region. The concentric circles indicate 500 km intervals from the midpoint namely Gauteng. Johannesburg alone accounts for 20% of the country's exports and a further 39% passes through the city. This is the reason why Gauteng is used as a starting point for movements from South Africa (Corporate Planning Unit, 2002). The Southern African Development Community, better known as SADC, comprises 14 member states. It has been in existence since 1980 and the main aim of the organisation was to coordinate development projects in order to lessen the dependence on the then apartheid government of South Africa. Recently it has developed into a development community for the whole southern region of Africa and the member states have grown from nine initial states, to the current 14 member states.

The vision of SADC is one of a common future, a future in a regional community that will ensure economic well-being, improvement of the standards of living and quality of life, freedom and social justice and peace and security for the peoples of Southern Africa. There are three main objectives which aligns itself with the further development of South Africa as a logistics hub, namely:

- Achieve development and economic growth, alleviate poverty, enhance the standard and quality of life of the people of Southern Africa and support the socially disadvantaged through regional integration;
- Promote self sustaining development on the basis of collective self-reliance, and the interdependence of Member States;
- Promote and maximise productive employment and utilisation of resources of the region. (SADC, 2007)

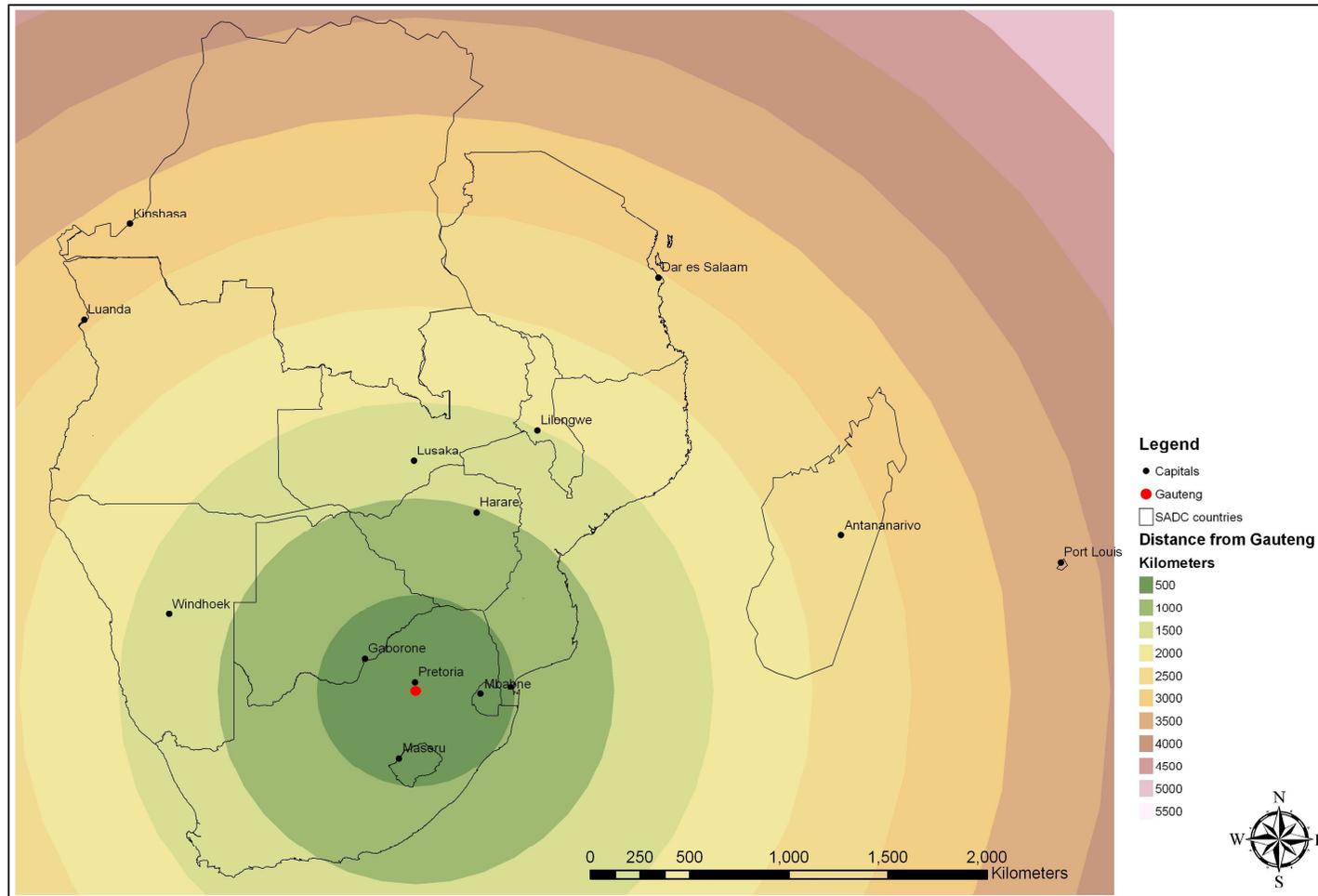


Figure 6: Geographic Position of South Africa in the SADC Region

Apart from the extremely favourable geographic location of South Africa, as a logistics hub it could further support its position by aligning itself with the above mentioned vision and objectives of the SADC region. Regionally, the member states should surely benefit from South Africa's economic affluence and development opportunities.

### 3.2 SOUTH AFRICA IN SADC

#### SADC'S LEADING ECONOMY

Table 3 shows South Africa in relation to the rest of SADC, comparing the GDP, population, literacy and the prevalence of HIV in each country.

The South African economy is the largest economy in the SADC region. Its GDP comprises 67% of the total GDP of the region. South Africa has a population of 47.4million which gives it access to more consumers resulting in more consumer power than most countries in Southern Africa, second only to the Democratic Republic of Congo. The GDP growth for the country also remains constant and is registered as 5% for 2006. Apart from the economic aspects, South Africa has the second highest literacy percentage in SADC of 86%, second to Zimbabwe, and the literacy figure is well above the 74% average for the region. A concerning factor for future developments however still remain the high percentage of HIV prevalence in the population. The figure for 2005 indicates that 18.80% of our population between the ages of 15 and 49 are infected with the disease. Traditionally, this specific sector of the population comprises the majority of the labour force. This figure is above the average of 14.34% for the region.

On the whole the South African economy is head and shoulders above the rest of the region. Of the 14 member states of SADC, the closest country in terms of GDP to South Africa is Angola with a further 11.62% of the total GDP. As a result, the two countries account for nearly 80% of the region's GDP and the leading economy comprises two thirds of the GDP. (World Bank, 2007)

**Table 3: GDP, Population, Literacy and HIV in SADC Countries**

| <b>Country</b>    | <b>GDP in US\$ bn<br/>(2006)</b> | <b>Population in<br/>m (2006)</b> | <b>Literacy in %<br/>(2006)</b> | <b>Prevalence of HIV<br/>as % of<br/>population (ages<br/>15-49)</b> |
|-------------------|----------------------------------|-----------------------------------|---------------------------------|--|
| <b>RSA</b>        | <b>255 / 67.34%</b>              | <b>47.4 / 19.11%</b>              | <b>86%</b>                      | <b>18.80%</b>  |
| <b>Angola</b>     | 44                               | 16.4                              | 40%                             | <b>3.70%</b>   |
| <b>Botswana</b>   | 10.3                             | 1.8                               | 79%                             | <b>24.10%</b>  |
| <b>DRC</b>        | 8.5                              | 59.3                              | 75%                             | <b>3.20%</b>   |
| <b>Lesotho</b>    | 1.5                              | 1.8                               | 78%                             | <b>23.20%</b>  |
| <b>Madagascar</b> | 5.5                              | 19.1                              | 52%                             | <b>0.50%</b>   |
| <b>Malawi</b>     | 2.2                              | 13.2                              | 58%                             | <b>14.10%</b>  |
| <b>Mauritius</b>  | 6.4                              | 1.3                               | 85%                             | <b>0.60%</b>   |
| <b>Mozambique</b> | 7.6                              | 20.1                              | 46%                             | <b>16.10%</b>  |
| <b>Namibia</b>    | 6.4                              | 2.1                               | 81%                             | <b>19.60%</b>  |
| <b>Swaziland</b>  | 2.6                              | 1.1                               | 81%                             | <b>33.40%</b>  |
| <b>Tanzania</b>   | 12.8                             | 39.5                              | 71%                             | <b>6.50%</b>   |
| <b>Zambia</b>     | 10.9                             | 11.9                              | 67%                             | <b>17.00%</b>  |
| <b>Zimbabwe</b>   | 5                                | 13.1                              | 97%                             | <b>20.10%</b>  |
| <b>SADC</b>       | <b>378.7</b>                     | <b>248.1</b>                      | <b>71.14%</b>                   | <b>14.34%</b>  |

(Source: World Bank, 2007)

### 3.3 SOUTH AFRICA'S INTERNATIONAL TRADE

Table 4 indicates the top 5 countries to which South Africa exports and imports

**Table 4: Top 5 South African Export and Import Countries**

| <b>Country</b>        | <b>Export<br/>R'000 *</b> | <b>% of<br/>Total</b> | <b>Import<br/>R'000 *</b> | <b>% of<br/>Total</b> |
|-----------------------|---------------------------|-----------------------|---------------------------|-----------------------|
| <b>United States</b>  | 33 983 210                | 11.5%                 | 27 794 919                | <b>7.6%</b>           |
| <b>Japan</b>          | 33 848 877                | 11.5%                 | 24 054 135                | <b>6.6%</b>           |
| <b>Germany</b>        | 23 245 659                | 7.9%                  | 44 299 058                | <b>12.1%</b>          |
| <b>United Kingdom</b> | 22 650 590                | 7.7%                  | 18 653 634                | <b>5.1%</b>           |
| <b>China</b>          | 20 601 336                | 7.0%                  | 37 013 655                | <b>10.1%</b>          |

(\* Preliminary results Jan 2007 – Aug 2007)

(Source: Department of Trade and Industry, 2007)

The top five countries for both export and import are the same, only the order in which South Africa trades with them differs. An obvious element of concern is the fact that not one of the top five exporting and importing countries is from the SADC region. This automatically creates the problem of increased complexity and transportation complications when either importing or exporting goods. The top 20 trading partners of South Africa include seven SADC countries, two of them in the top five. The top trading partners are determined by the balance between the exports and imports involving South Africa and the particular country.

Globalization has benefited South Africa in various ways, none more so than its trading with other countries. South Africa's export market showed an annual growth of 21.7% and the import market increased by 19.0% from 2006 to 2007.

**Table 5: Top 20 South African Trading Partners**

| <b>Rank</b> | <b>Country</b>             | <b>Trade Balance<br/>(R'000)</b> |
|-------------|----------------------------|----------------------------------|
| 1           | Japan                      | 9 794 743                        |
| 2           | Netherlands                | 7 661 046                        |
| 3           | United States              | 6 188 291                        |
| 4           | Mozambique                 | 4 371 112                        |
| 5           | Zambia                     | 4 102 189                        |
| 6           | United Kingdom             | 3 996 956                        |
| 7           | Belgium                    | 3 646 343                        |
| 8           | Spain                      | 3 071 667                        |
| 9           | Switzerland                | 3 008 550                        |
| 10          | Kenya                      | 2 862 532                        |
| 11          | Dem Republic of Congo      | 2 819 108                        |
| 12          | Israel                     | 1 999 168                        |
| 13          | Tanzania                   | 1 624 356                        |
| 14          | Ghana                      | 1 404 568                        |
| 15          | Zimbabwe                   | 1 215 590                        |
| 16          | Mauritius                  | 970 477                          |
| 17          | Hong Kong                  | 892 754                          |
| 18          | Malawi                     | 889 853                          |
| 19          | United Arab Emirates       | 714 836                          |
| 20          | Peoples' Republic of Korea | 640 551                          |

(\* Preliminary results Jan 2007 – Aug 2007)

SADC countries



(Source: Department of Trade and Industry, 2007)

### 3.4 TRANSPORTATION INFRASTRUCTURE

South Africa has the longest road network of any country in Africa. The highway network of South Africa is designed to exploit the geographical advantage of the country. The South African National Roads Agency Limited (SANRAL) is currently the custodian of 16 150km of national roads and each of the nine provinces is the custodian of provincial roads which feed into the national roads. This accumulates into a widespread road network which covers the most of South Africa. Apart from the extensive road network, Transnet Freight Rail's infrastructure accounts for approximately 80% of railroad infrastructure in the whole of Africa. (Transnet, 2007)

Figure 7 illustrates the supremacy of the South African land transport infrastructure in comparison to other SADC countries. Apart from rail, it indicates the total paved roads and excludes gravel or non-paved roads, which in Africa forms the majority of the road network.

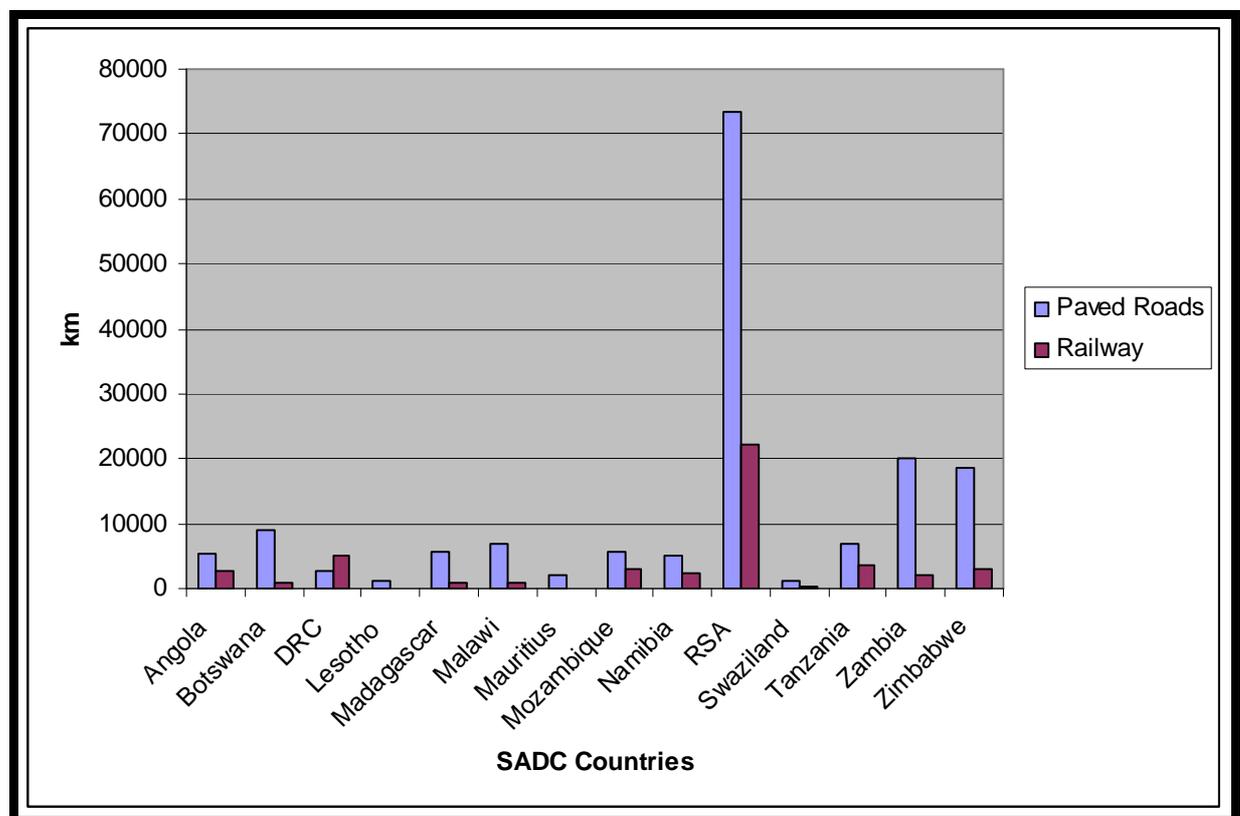


Figure 7: Land Transport Infrastructure in SADC Countries

Land transport infrastructure in South Africa is constantly being improved and integrated. Government will mobilise an investment of more than R25 billion from both public and private sectors over the next five years for utilisation on national roads. This is over and above the R2 billion allocated annually to SANRAL to manage non-toll roads. Transnet Freight Rail also announced a R24 billion capital expenditure plan over the next five years. All of these factors combine to give South Africa an unprecedented land transport infrastructure in the region (CIA, 2007). Figure 8 maps out road (national) and rail infrastructure in South Africa as well as border posts to its direct neighbours. It gives a clear indication of the excellent coverage of infrastructure throughout the whole country.

### 3.5 SOUTH AFRICAN PORTS

It is estimated that the operation of merchant ships contributes approximately US\$380 billion in freight rates within the global economy which is roughly the equivalent of 5% of world trade. A country's sea port handles around 90% of international trade which makes it a vital mode of transport and it is critically dependent on the support of road and rail transportation for efficient intermodal transfer of freight. Intermodal transfer is severely simplified by the use of containers and as a result, containerisation has accounted for the biggest growth in volume in shipping type, even though bulk and break-bulk shipping remain common. South Africa is no exception to the global trend and has experienced growth from 369 812 TEU's of cargo in 2000 to 639 184 TEU's in 2006. This trend resulted in ports trying to adapt to accommodate the ever growing container traffic, by either increasing stacking height or area, or employing tools such as Rubber Tired Gantries (RTGs) or Rail Mounted Gantries (RMGs). It is of the utmost importance to make intermodal interchanges as efficient as possible. The reason being that the entire maritime supply chain has become increasingly important, in particular the seamless movement of containers between road and rail to and from the ports (CSIR, 2007).

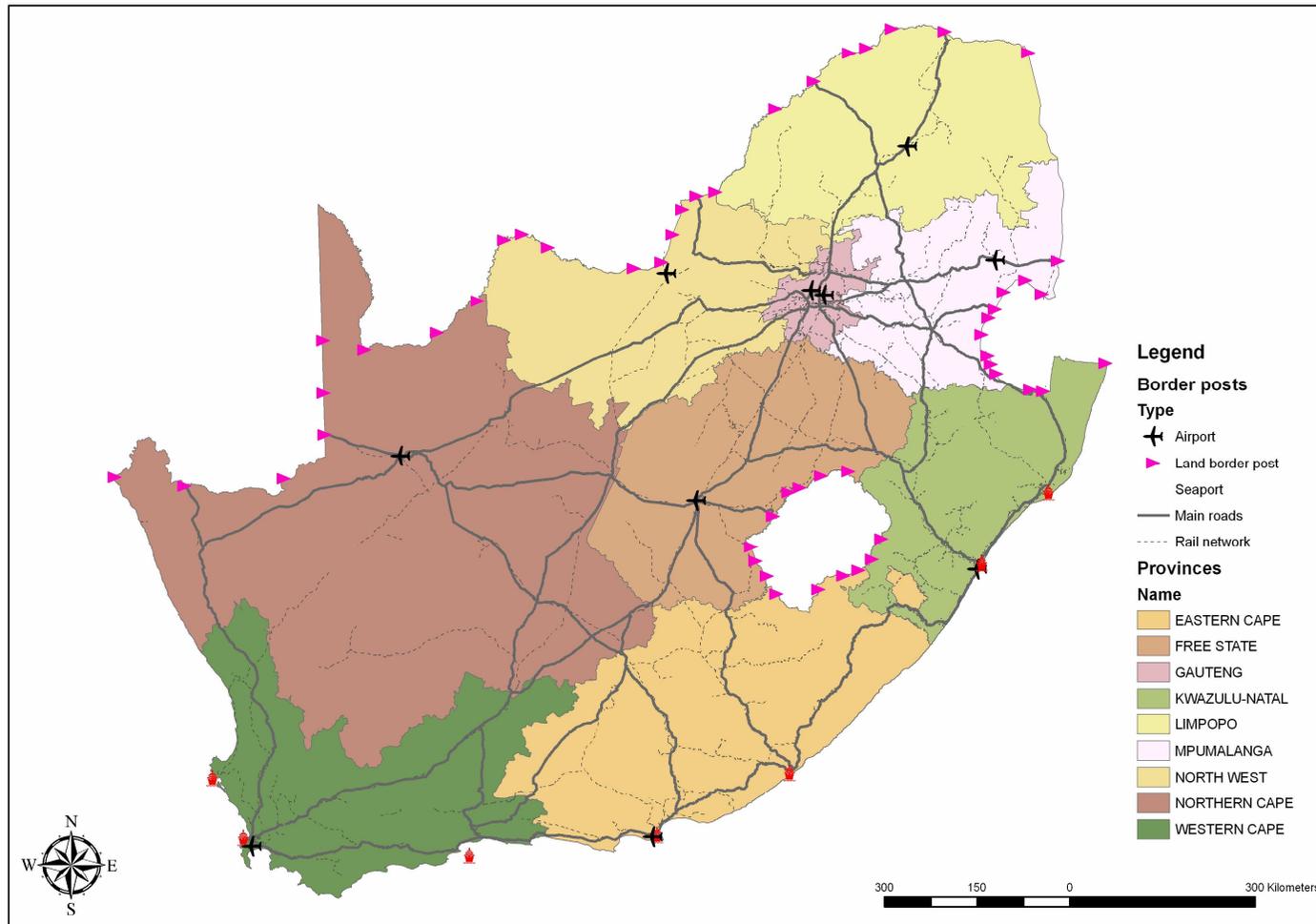


Figure 8: South African Transport Infrastructure and Border Posts

The eight South African commercial ports all serve natural economic hinterlands producing specific cargo types, which results in the ports being rather uncompetitive. Table 6 indicates this phenomenon.

**Table 6: Major Products Handled at South African Ports**

| Port                  | Terminals                    | Major products handled  |
|-----------------------|------------------------------|---|
| <b>Saldanha</b>       | Oil Terminal                 | Oil and petroleum products  |
|                       | Iron Ore jetty               | Iron Ore  |
|                       | Multi-Purpose Terminal       | Lead and Copper Concentrates, Pig Iron, Zircon, Rutile, Chloride and Sulphate slag, Steel Coils. Imports: Steel Pellets, Anthracite and Coaking Coal. |
| <b>Cape Town</b>      | Dry bulk Terminal            | Maize, Soya, Barley   |
|                       | Cape Chemicals               | Chemicals   |
|                       | Cape Tank Terminal           | Molasses, vegetable & fish oil  |
|                       | Oil Terminal                 | Petroleum products  |
|                       | Cape Town Bulk storage       | Chemicals, bunker fuel  |
|                       | Container Terminal           | Containers (including reefers)  |
|                       | Multi-Purpose Combi-Terminal | General cargo, fruit, timber, steel, containers   |
| <b>Mossel Bay</b>     | Fresh Produce Terminal       | Fresh produce, timber, containers   |
|                       | Single Point Mooring         | Mossgas Products  |
|                       | Oil Industry Terminal        | Export Mossgas Products   |
| <b>Port Elizabeth</b> | Submarine Pipeline           | Export Mossgas Products   |
|                       | Container Terminal           | Containers  |
|                       | Multi-Purpose Terminal       | Steel, fruit, timber and bagged cargo including mini-bulk such as grain and feedstock   |
|                       | General Terminal             | Deciduous and citrus fruit, timber, steel, unitised and bagged cargo  |
|                       | Dry-bulk Terminal            | Manganese ore & other free flowing commodities for export   |
| <b>East London</b>    | Oil terminal                 | Refined petroleum products  |
|                       | Dry bulk Terminal            | Grain and other dry bulk  |
|                       | Tanker Terminal              | Liquid bulk (refined fuels)   |
|                       | Container Terminal           | Container & breakbulk   |
|                       | Car Terminal                 | Vehicles  |

|                     |   |  |
|---------------------|---|--|
| <b>Durban</b>       | Soda ash Terminal   | Soda ash   |
|                     | Dry bulk Terminal   | Coal, coke, minerals, fertiliser   |
|                     | Fresh Produce Terminal  | Fresh produce (citrus) for export  |
|                     | Bulk sugar Terminal   | Sugar for export   |
|                     | Durban shipping Terminal  | Dry bulk, grain and vegetable oil  |
|                     | Durban Coal Terminal  | Minerals, sulphur, fertiliser, coal and coke   |
|                     | Grain elevator  | Grain  |
|                     | Liquid Bulk (Bulk Molasses)   | Liquid bulk molasses   |
|                     | Liquid Bulk Terminal  | Lubrication oils, glycols, alcohol, chemicals solvents, vegetable oils   |
|                     | Island View Storage   | Chemicals, molasses, petroleum products, vegetable oils  |
|                     | General Cargo/ breakbulk Point Terminal   | Granite, steel, timber, general and unitised cargo   |
|                     | City Terminal   | General cargo  |
|                     | Rennies Cargo Terminal  | Steel and general cargo  |
|                     | Ocean Terminal  | Passenger and cruise ships   |
|                     | Forest products Terminal  | Forest products  |
|                     | Forest products   | Forest products, paper and pulp  |
|                     | Container Terminal  | Containers   |
| Combi Terminal      | Steel, ferro-chrome, timber, granite, motor vehicles, scrap, grain, pulp, paper |  |
| Car Terminal        | Vehicles  |  |
| <b>Richards Bay</b> | Dry bulk Terminal   | Imports: andalusite, chrome ore, fertiliser, rock phosphate, rutile, titanium slag, vanadium slag, vermiculite, woodchips, zircon. Exports: alumina, coking coal, fertiliser, petcoke, potash, rock phosphate, salt, sulphur, urea, zinc |
|                     | Coal Terminal   | Coal   |
|                     | liquid bulk quay  | Fuel   |
|                     | Multi-Purpose Terminal  | Ferro-alloys, pig iron, granite, forestry, aluminium, steel, scrap, containers, pitch coke   |
|                     | Island View Storage   | HAZMAT Storage: bulk liquids and liquefied gases   |
|                     | Richards Bay Bunker service   | Bunker fuel  |

(Source: Maritime handbook Southern Africa, 2006 and National Ports Authority Yearbook, 2004)

As Figure 8 indicates, all seven South African ports are well served by both road and rail networks, but that is not the problem. In general, these ports lack sufficient intermodal transfer points to facilitate the seamless movement of containers to the rest of South Africa. To emphasize the need for an optimisation of cargo handling and transport infrastructure at South African ports, Table 7 shows the cargo handled at South African ports for the calendar year 2006.

**Table 7: Summary of Cargo handled at South African Commercial Ports**

| <b>SUMMARY OF CARGO HANDLED AT COMMERCIAL PORTS OF SOUTH AFRICA</b> |                     |                   |                    |                       |                   |                  |                   |                    |
|---|---------------------|-------------------|--------------------|-----------------------|-------------------|------------------|-------------------|--------------------|
| <b>JANUARY - DECEMBER 2006</b>                                      |                     |                   |                    |                       |                   |                  |                   |                    |
|   | <b>RICHARDS BAY</b> | <b>DURBAN</b>     | <b>EAST LONDON</b> | <b>PORT ELIZABETH</b> | <b>MOSSEL BAY</b> | <b>CAPE TOWN</b> | <b>SALDANHA</b>   | <b>TOTAL</b>       |
| <b>BULK CARGO (METRIC TONS)</b>                                     |                     |                   |                    |                       |                   |                  |                   |                    |
| BULK LANDED   | 6,137,418           | 28,580,245        | 1,051,466          | 1,121,637             | 472,533           | 2,569,588        | 4,014,437         | <b>43,947,324</b>  |
| BULK SHIPPED  | 75,247,420          | 7,410,512         | 87,970             | 2,686,937             | 958,089           | 816,847          | 28,233,075        | <b>115,170,850</b> |
| TRANSHIPMENT CARGO  | -                   | 156,065           | -                  | -                     | -                 | 131,539          | 4,453,412         | <b>4,741,016</b>   |
| <b>TOTAL BULK HANDLED</b>   | <b>81,384,838</b>   | <b>35,876,822</b> | <b>1,139,436</b>   | <b>3,808,574</b>      | <b>1,430,622</b>  | <b>3,517,974</b> | <b>36,700,924</b> | <b>163,859,190</b> |
| <b>BREAKBULK (METRIC TONS)</b>                                      |                     |                   |                    |                       |                   |                  |                   |                    |
| BREAKBULK LANDED  | 130,917             | 4,312,182         | 260,451            | 584,273               | 41,634            | 223,499          | 242               | <b>5,553,198</b>   |
| BREAKBULK SHIPPED   | 4,803,308           | 3,532,882         | 106,224            | 477,666               | 46,341            | 336,103          | 1,072,026         | <b>10,374,550</b>  |
| TRANSHIPMENT CARGO  | 137                 | 139,355           | -                  | -                     | -                 | 57,164           | -                 | <b>196,656</b>     |
| <b>TOTAL BREAKBULK HANDLED</b>                                      | <b>4,934,362</b>    | <b>7,984,419</b>  | <b>366,675</b>     | <b>1,061,939</b>      | <b>87,975</b>     | <b>616,766</b>   | <b>1,072,268</b>  | <b>16,124,404</b>  |
| <b>TOTAL CARGO HANDLED</b>  | <b>86,319,200</b>   | <b>43,861,241</b> | <b>1,506,111</b>   | <b>4,870,513</b>      | <b>1,518,597</b>  | <b>4,134,740</b> | <b>37,773,192</b> | <b>179,983,594</b> |
| <b>CONTAINERS (TEU's)</b>   |                     |                   |                    |                       |                   |                  |                   |                    |
| CONTAINERS LANDED   | 1,376               | 1,095,911         | 17,110             | 220,519               | -                 | 380,979          | -                 | <b>1,715,895</b>   |
| TRANSHIPMENT CONTAINERS   | -                   | 237,980           | 2                  | 20,963                | -                 | 71,619           | -                 | <b>330,564</b>     |
| <b>TOTAL CONTAINERS SHIPPED</b>                                     | <b>2,815</b>        | <b>1,102,689</b>  | <b>21,198</b>      | <b>172,294</b>        | <b>-</b>          | <b>401,889</b>   | <b>-</b>          | <b>1,700,885</b>   |
| TRANSHIPMENT CONTAINERS   | -                   | 251,776           | 123                | 24,484                | -                 | 75,977           | -                 | <b>352,360</b>     |
| <b>TOTAL CONTAINERS HANDLED</b>                                     | <b>4,191</b>        | <b>2,198,600</b>  | <b>38,303</b>      | <b>392,813</b>        | <b>-</b>          | <b>782,868</b>   | <b>-</b>          | <b>3,416,780</b>   |

(Source: Transnet National Ports Authority, Port Statistics)

In 2006, containerised traffic grew by 7% and a general increase of 5% was achieved over all cargo types except breakbulk. According to the CSIR (2007) this is attributable to the continued growth in the containerisation of cargo. It is forecast that container traffic will grow by a further 8% in 2007. Bulk export volumes increased by 6% and bulk imports by 4%.

Regional competition between ports for cargo volume is on the increase and it can only benefit the nations involved through continued economic development stimulated by increased trade (CSIR, 2007). Ports have to increase the value added

service they supply, albeit at the port or feeding into the port. A very good example of such a development is the Maputo Development Corridor:

*Through close cooperation between the governments of South Africa and Mozambique, a highly efficient transportation network has been created. The corridor stretches from Johannesburg to Maputo through one of the most highly industrialised areas in the region serving industries such as steel, petro-chemical, mining, and agriculture. Much of the transportation network has been concessioned to private operators: the N4 corridor to Trans African Concessioning (TAC) and the rail to an international consortium led by New Limpopo Bridge Project Investments (NLPI). Due to the success of the corridor, some cargo traffic has already moved from the port of Durban to the port of Maputo. In a recent paper it was argued that shippers no longer choose a port per se, but rather a supply chain solution that provides them with efficient access to markets. The port therefore needs to ensure that it adds value to the supply chains in which it participates.*

(CSIR, 2007)

### 3.6 INTERMODAL INTEGRATION

South Africa does have one major inadequacy compared to both developing and developed countries, which is the lack of intermodal and multi modal integration and transshipment facilities. In the study conducted on Germany as Europe's logistics hub it is said that the value of any transport node increases with its ability to interface with multiple transport modes. This is often referred to as the "law of intermodality" (Invest in Germany, 2005). China, one of the world's fastest developing countries also saw the use of investing in the development of logistics hubs. According to People's Daily Online Kerry Logistics Network Limited, a Hong Kong company and a Beijing city government-sponsored company based in Hong Kong will jointly invest 11 billion Yuan (US\$ 1.3 billion) to build a logistics hub in Beijing. The hub will be located in southeast Beijing between the city's fourth and fifth ring roads and near expressways and railways. It will be able to handle 300 000 standard containers annually after it is completed. The result will be that Beijing will have 7.7 million

square meters of storage space and also comprise China's largest road and railway traffic networks (People Daily, 2001).

South Africa has a number of major corridors such as the Gauteng-Durban corridor and Gauteng-Cape Town corridor for especially container traffic. Economic activity is mostly centred in and around Gauteng. Saxton (2006) provides a unique outlook on this phenomenon and gives a view on Gauteng:

*Most of the economic activity of South Africa, for example, is based around Johannesburg, which is located over five hundred kilometres from the nearest port, has no means of effective transportation out of it, and whose very existence was based initially on its mining activities. We really have to decide what the future of Johannesburg will be. In the twenty-first century South Africa needs to develop skills, industries and businesses that relate in a positive way to its location and its peoples. We need to develop skills and abilities that aren't so industrialised and industrially based, to which high logistics costs wouldn't be like an albatross around their necks – like finance, technology and similar service-orientated businesses, where location of Johannesburg would seem to be ideal and where the delivery system is digital. From a logistics and supply chain point of view, we must assess where we build our resources, and what resources we build. If we are entering into global markets, with greater reliance on imports and exports and consequent higher logistics costs, we should leave Johannesburg to build it on new advantages. It must create for itself newness in areas that don't rely on the low cost of logistics to support exports and imports.*

In the 2006 State of Logistics (CSIR) the cost of transporting a ton of goods to the nearest market town, port and international logistics hub were calculated and mapped out. This is shown in Figure 9. The first map indicates the freight transport costs to and from the closest market town, yellow indicating low cost areas. As expected, the lowest costs areas are around the major urban areas in South Africa. These are surrounded by higher cost areas. There are a couple of high cost areas in the rural areas. This is to be expected as its geographic position is located away from the urbanised areas.

Map 2 illustrates the freight transportation costs to the closest port with a medium to high capacity, and by implication the closest transshipment hub. These hubs are used for the import and export of heavy bulky and/or low value goods which cannot be transported by air at all. This map is a totally different picture from the previous map. The low cost areas in this instance are minimal and are situated around the ports of South Africa namely Durban, Richards Bay, Port Elizabeth, East London, Cape Town and Saldanha.

The third map is similar to the second map but it includes the major international logistics hubs such as the City Deep - OR Tambo International Airport complex. This makes a big difference for the Gauteng region. Freight transportation costs are considerably lower in Gauteng as well as directly around Gauteng. This is an indication of the positive impact inland intermodal solutions can have on a region.

Map 4 shows the combined costs as a result of calculating the average cost of a road freight trip to the three types of destinations giving equal weight to each. The lowest cost areas are located near the coasts of South Africa. This supports the claim made by Saxton in his book that Gauteng is located too far away from our ports. Currently Gauteng freight transportation costs are medium cost areas. Saxton recommends that Gauteng and more specifically Johannesburg should rather focus its operations on different markets limiting logistics costs involved. Another alternative should be investigated. This option entails the development of a logistics hub inland, albeit in the Gauteng area or in Harrismith to alleviate the congestion caused on South Africa's main corridor (CSIR, 2006).

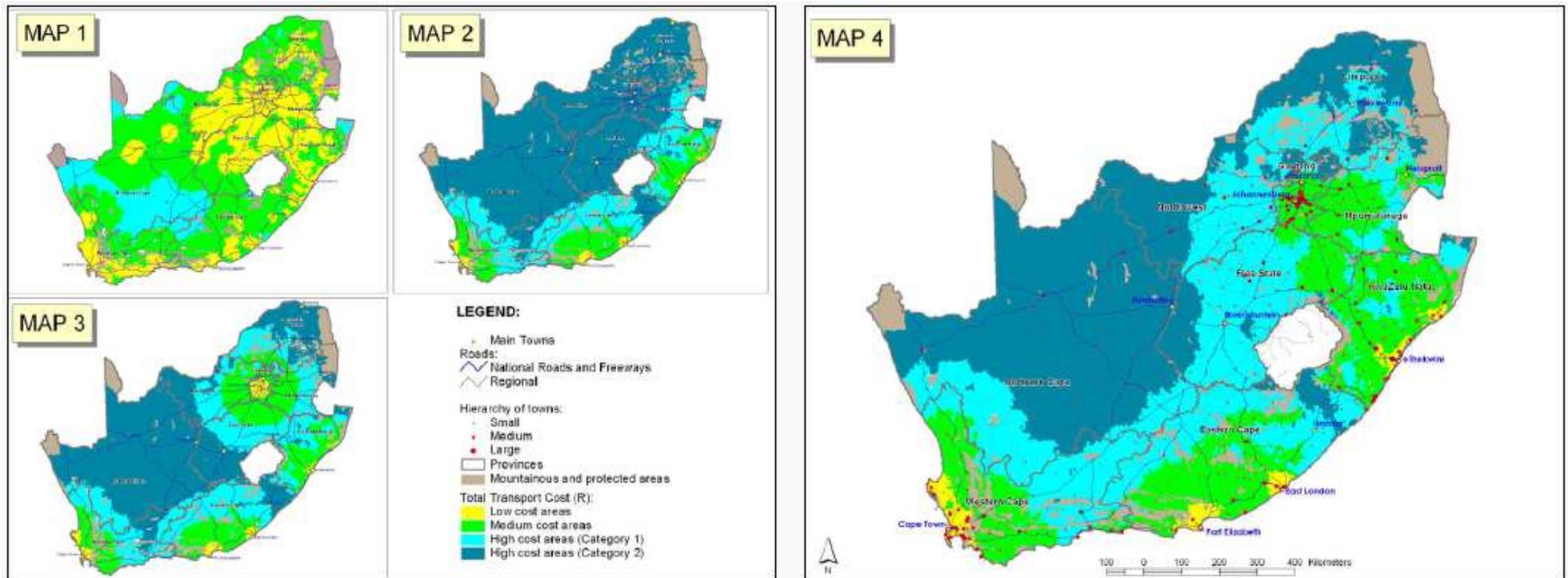


Figure 9: Transportation Costs to the Nearest Market Town, Port and International Logistics Hub

(CSIR, 2006)

## 4 INTERMODALISM IN SOUTH AFRICA

Customarily there is a spatial gap between where natural resources for production occur and where most people live. Another gap exists between where production is feasible and when people need or desire to use and consume products. This gap can be bridged by efficient and effective logistics, which aims to get the right product, at the right place and in the right quantity, giving it time and place utility. Furthermore, sustained economic growth and development is dependent upon regional specialisation and division of labour and skills, as well as the exchange of goods, services and information which results from this economic growth.

In South Africa the primary sector is production and the secondary sector is manufacturing and together they comprise the physical components of the country's gross domestic product (GDP). These two sectors account for approximately 745 million tons of goods to be carried annually, and are divided as follows:

**Table 8: Physical Components of South Africa's GDP**

| SECTOR                         | TONNAGE (MILLION) |
|--------------------------------|-------------------|
| Mining                         | 370 (50%)         |
| Agriculture                    | 45 (6%)           |
| <b>Subtotal Primary sector</b> | <b>415 (56%)</b>  |
| Manufacturing                  | 330 (44%)         |
| <b>TOTAL</b>                   | <b>745 (100%)</b> |

(Source: Vogt, Pienaar & De Wit, 2005)

If South Africa should improve their logistics efficiency by a mere 1%, the country has the ability to save R1.79 billion per annum (in 2003 terms). Efficient and effective intermodal solutions are seen as a means to an end to achieve this goal.

(Source: Vogt, Pienaar & De Wit, 2005)

In South Africa traditionally there has been increased modal competition with little co-operation. Intermodal transport has become a major area of growth during the last

30 years and as a result, transport costs have decreased and logistics have become more efficient and effective. Even though intermodalism is not a new concept it has not yet been refined in South Africa. Generally speaking, intermodalism utilises international standard containers and first revolutionised the transport interface between the maritime and overland modes of transport. Yet a new trend has developed where intermodal systems have been applied between rail and road modes to generate benefit for both.

## 4.1 MODAL COST STRUCTURE

### 4.1.1 ROAD TRANSPORT COST STRUCTURE

Road transport has the lowest ratio fixed cost to total cost of any mode of transport. This is mostly given as the reason why it is easy to enter the market, as well as adjusting in the market when already established in the market. The high proportion of variable cost in road transport is attributed to three factors, namely:

1. Road infrastructure is public property and authorities retrieves the cost of maintaining the roads through levies and taxes included in the supply of fuel, which results a fixed cost being converted into a variable cost.
2. Investment in terminal facilities is very small compared to rail transport.
3. Vehicles making use of road transport are relatively fuel inefficient and as a consequence, fuel is a large variable cost component.

### 4.1.2 RAIL TRANSPORT COST STRUCTURE

Rail transport has a very high ratio of fixed costs to the total cost. This is as a result of the high cost in investment (ex. rail tracks and terminal facilities) and the durability of rolling stock. The decreasing unit cost when rail transport increases enables rail transport to gain the benefits of economies of scale when utilisation increases. This is achieved on a larger scale in the case of double-track operations with long trains.

The consequence is that rail has a cost advantage over road transport over longer distances and with bulk freight.

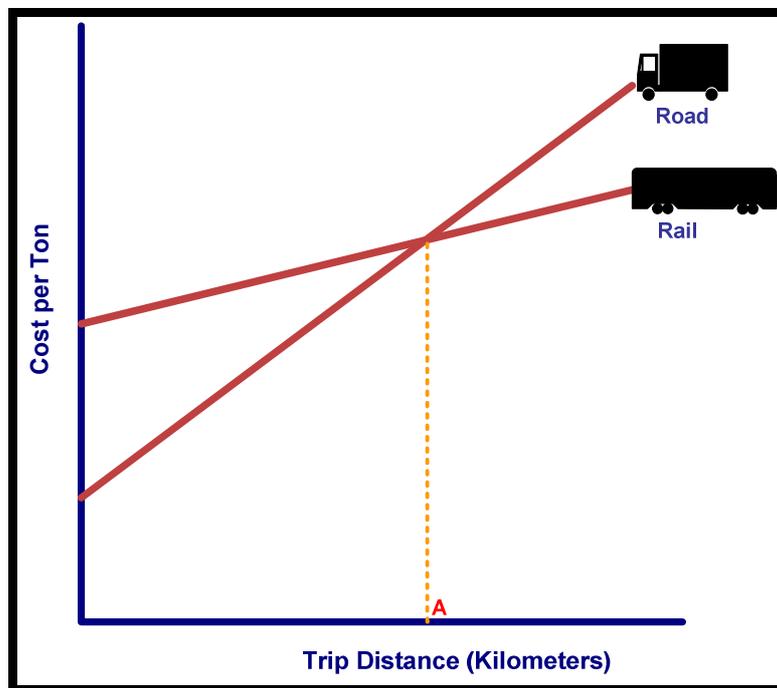


Figure 10: Comparative Road and Rail Cost per Ton Freight

(Pienaar, W.J. 2007)

In Figure 10 point A represents the distance of equal road and rail transport cost per ton of freight. For any distance shorter than point A, road is recommended, and for distances greater than point A, rail as a mode of transport is suggested. For South Africa, point A is estimated at around 540km. From this it can be derived that it is usually cheaper to carry equivalent loads of palatalised freight and containers over short distances by road rather than rail, and vice versa with long hauls. This is seen as the rule of thumb but does not always hold true in all instances. A study conducted identified the following instances where road, rather than rail will be used as the preferred mode of transport, although rail might be the cheaper mode of transport. These are:

- When goods are:
  - Perishable
  - Subject to ageing (ex. newspapers)
  - Needed on short notice

- Valuable in proportion to the mass thereof
- Expensive to handle or stock
- When the demand of goods are:
  - Unpredictable
  - Inconsistent
  - More than the local supply over short periods
  - Season
- When one of the following problems occur during distribution:
  - There is a risk of pilferage, breakage or deterioration
  - High insurance- and/or interest costs for long in-transit times
  - Heavy or expensive packaging is needed for rail transport
  - Special in-transit care is needed.

(Pienaar, W.J. 2007)

## 4.2 CONTAINER MOVEMENT IN SOUTH AFRICA

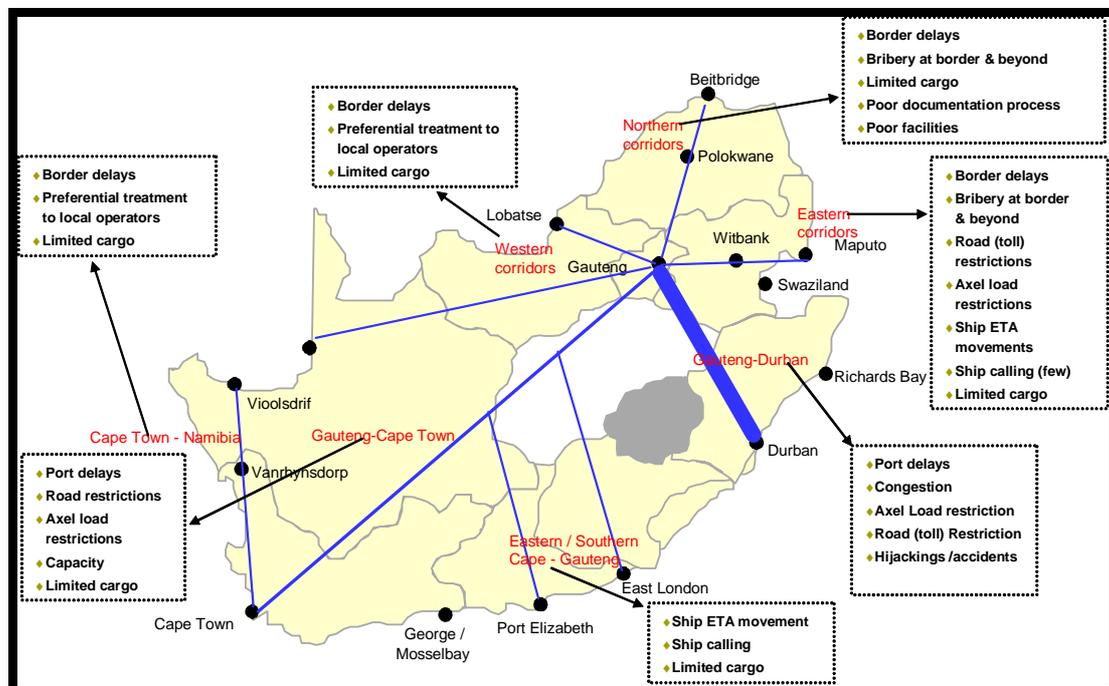


Figure 11: Road Container Freight Movement and Corridor Issues

(CSIR Built Environment, 2007)

The figure illustrates the movement of containers in South Africa by road. The main corridor is Gauteng - Durban and is followed by the Gauteng – Cape Town corridor. In 2004 the total number of containers on the Gauteng – Durban corridor, was an estimated 1 603 924. Of these, 1 465 053 were transported by road and only 138 871 by rail. Road outweighed rail by approximately ten to one. This scenario is inexcusable, seeing as the rail line between Gauteng and Durban is only utilised to around 30% of its total capacity.

Issues on these corridors are universal, especially when considering the rest of Africa. Road issues can be managed by making a modal shift from road to rail where possible. This does not suggest that all container movements should be done by rail, rather that where the capacity is available and it is moved over longer distances, it should be investigated. One of the concerns in shifting goods to rail is that the door-to-door delivery capability is influenced as rail transport is not a flexible mode of transport. This is one of the main reasons for investigating logistics hubs as a means to overcome this limitation of rail transport.

According to Pienaar (2005) typical strengths of road transport makes it a highly flexible and versatile form of transport, and includes:

- Door-to-door service: Road transport is not limited to a fixed route.
- Accessibility: Road networks are directly accessible
- Freight protection: Handling and transshipment of freight is limited through the door-to-door delivery ability.
- Transit time: Short door-to-door transit times, especially over short distances. In the case of congestion, it is possible to follow an alternative route.
- Capacity: Carrying capacity is adaptable and can be readily increased.
- High frequency: High service frequency can be maintained as a result of the small carrying capacity and high speed of road vehicles.

There are a number of limitations associated with road transport. These are:

- Limited carrying capacity: Although the capacity is adaptable, it is also limited to the dimensions and gross mass of road vehicles, as well as limited through legislation.
- High Environmental impact: Noise- and air pollution are just two of the externalities caused by road transport which has a negative environmental impact.
- Vulnerability to external factors: It is easily influenced by bad weather or congestion, to name a few.
- High energy consumption: To convey one unit of freight, road vehicles consume more energy or fuel than any other mode of surface transport.
- Shared right of way: Freight operators share the right of way with other users such as passenger vehicles. This results in additional safety and security concerns such as high accident risk, as well as the risk of theft and hijacking.

(Pienaar, W.J. 2005)

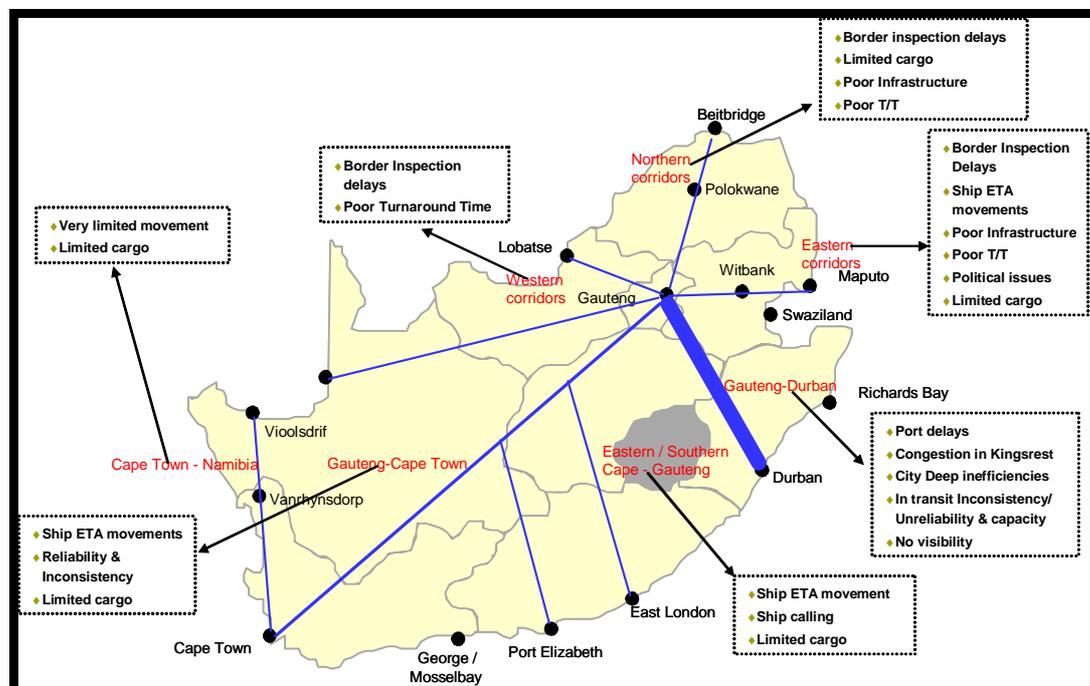
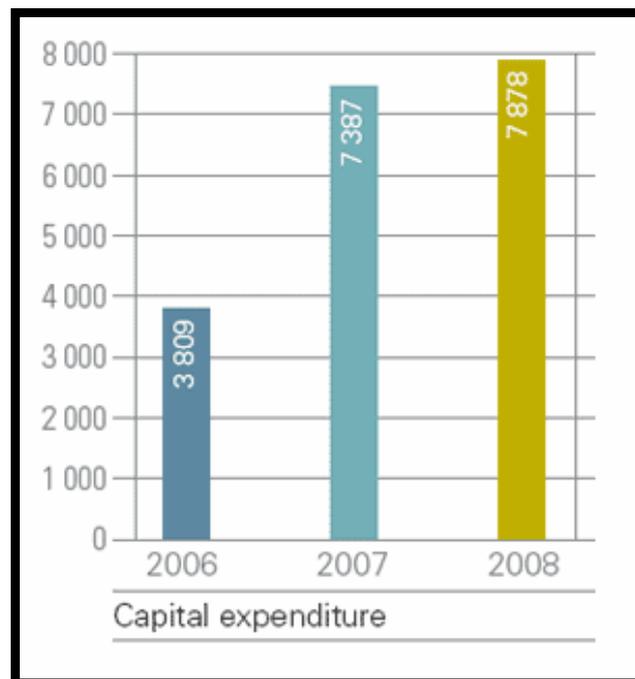


Figure 12: Rail Container Freight Movement and Corridor Issues

(CSIR Built Environment, 2007)

When it comes to moving containers by rail, the major corridors remain the same as when it is moved by road. The challenges when moving the containers by rail seem to intensify though. Some of the major challenges are infrastructure inefficiencies, in-transit inconsistencies as well as unreliability. These concerns are however set to be addressed with Transnet Freight Rail implementing an R24 billion capital expenditure plan over the next five years, starting in 2007. Figure 13 shows a graph of the capital expenditure of Transnet Freight Rail over the years 2006 to 2008.



**Figure 13: Transnet Freight Rail Capital Expenditure**

**(Source: Transnet, 2008)**

The strengths of rail transport include:

- **Commodity flexibility:** Almost any type of commodity can be conveyed by rail and in special train compositions.
- **Large volumes:** Bulk loads can be carried over longer distances, the carrying capacity is not as limited as road transport.
- **Low cost:** Generally it's cheaper than road freight transport, especially over longer distances.

- Congestion: Rail transport is not subject to traffic congestion.
- Weather: Rail transport is less affected by inclement weather than other modes of transport.
- Safety: Rail wagons are not as easy to hijack as road vehicles.
- High speed: Average trip speeds over long distances can be very high, especially if shunting and the special composition of train sets are not required.
- Private sidings: This gives customer the ability to load and unload at their facilities when convenient.
- Cost and energy efficient: When utilisation of carrying capacity is high, both energy and costs are efficient over long distances.
- Accident safety record: It has a very good record, especially with hazardous materials.

There are a number of limitations associated with rail transport:

- High capital investment: This creates a barrier to market entry.
- Fixed route: This along with the specific terminals creates the need for feeder and distribution services to supplement it.
- High freight damage: Packaging cost is high, seeing as rail transport has a high risk of damaging freight.
- Customer perception: Due to the damage of freight along with the inconsistent service provided by Transnet Freight Rail, customer perception towards rail transport is not good.
- Empty running: Demand and Supply imbalances result in the return leg often being run empty and resulting in cost not being covered.

### 4.3 INTERMODAL TRANSPORT POSSIBILITIES

According to the Railroad Association of South Africa (2007), the country's rail and road infrastructures have deteriorated at a time when efficient and cost-effective transport is required to maintain South Africa's competitive position in the global market. In many other countries government and the private sector act together to institute an intermodal support policy. In these instances the government promotes and underwrites part of the cost of infrastructure provision, while the private sector funds operating equipment.

In general there are three main intermodal systems in use world wide. They are:

1. Piggybacking

A standard container is placed on a flat-car which is fitted with securing twist-locks. The cargo travels part of its way via truck and the rest of the way by train. Cargo containers provide more flexibility for piggybacking, since they can be loaded onto water carriers as well as flatcars and flatbed trucks. It was first introduced in the 1970s in South Africa to coincide with the introduction of containerised maritime transport.

2. Trailer on flat-car

It was the first to be developed and used in the USA. The road vehicle drives onto a flat-car and is secured, either with the prime-mover in place or being driven off.

3. Roadrailer

This system is in use in the USA, New Zealand, Australia and throughout Europe. It operates with a standard closed road trailer fitted with retractable road axles and having end coupler points. This is reversed onto a special rail bogie. This system can accommodate an entire train of up to 130 units being assembled in this manner. This eliminates the need for expensive materials handling equipment. It is highly cost-effective when compared with simple over-the-road hauling.

According to APICS (2005), other forms of intermodal transport are fishyback services and birdyback services. Fishyback service can also be known as “trainship” and “containership”, but all of these refer to transport which includes water carriage. The cargo is loaded into a truck trailer (fishyback), a railroad car (trainship), or a container that also spends part of its shipment time on board ship or barge. Another possibility is the “land bridge” which combines rail and sea transport. An example of the latter is a shipment from the coast of Asia to the U.S west coast by ocean vessel, from the west to east coast on rails, and then from the Atlantic coast to Europe on another ship. A “minibrige” occurs when the shipment stops at a city within the United States instead of continuing on its way to Europe. Should the shipment be a door-to-door delivery from city to city with a portion of the shipment carried out by water transport along the coast, it is referred to as a “microbridge”.

“Birdyback” services refer to shipments which has air travel as part of its modes of transport. Air transport generally requires some intermediary surface travel, since airport terminals are not usually located near manufacturing, harvesting or extraction sites, and those sites are in general not equipped with their own private airstrips. Intermodal air-truck shipments are often seen as merely formalising the process and putting it under unified management. Such services are often rendered by small package shippers such as DHL, UPS, and FedEx, but they are not the only ones relying on truck-plane services. Commodities making use of this mixture of modes include those that originate or conclude in smaller cities or towns not served by major airports and large planes. This results in the need for road or rail transport to complete the journey. (APICS, 2005).

There are two intermodal agricultural transport systems currently in operation in South Africa, namely the Umfolzi Sugar Mill at Mtubatuba and the Port Shepstone & Alfred County Railway (ACR). Spoornet introduced the “Narrow Arrow” piggyback train several years ago. ACR is a 610mm-gauge line and its wagons are ramped onto a Spoornet train at Port Shepstone and run 71km to a major pulp mill. This system is very successful. The Umfolzi Sugar Mill works similar to a system in Queensland Australia. In the sugar producing areas of Queensland, some 3 600km of 610mm “narrow-gauge” lines service 28 sugar mills and move over 32 million tons of cane every six-month season. Intermodal baskets equipped with wheel-sets are rolled on and off between road and rail systems. It is considered the most cost-

effective system of the industry. The rolling terrain between Durban and Gauteng and also the overhead traction cables and tunnel heights also influence the double stacking capabilities. Roadrailer systems do however have potential to be developed in South Africa and is currently under investigation.

#### 4.4 WHY INTERMODALISM?

According to the National Ports Authority's Development plan (CSIR, 2007), container volumes in South Africa are set to grow massively, as shown by the table below:

**Table 9: Container Cargo Forecast**

| PORT             |               | 2005      | 2020      | 2035      | 2050             |
|------------------|---------------|-----------|-----------|-----------|------------------|
| <b>DURBAN</b>    | <b>TEU</b>    | 1 690 000 | 5 363 000 | 8 065 000 | <b>8 065 000</b> |
|                  | <b>Berths</b> | 8         | 20        | 20        | <b>20</b>        |
| <b>CAPE TOWN</b> | <b>TEU</b>    | 609 000   | 1 933 000 | 2 742 000 | <b>2 742 000</b> |
|                  | <b>Berths</b> | <b>4</b>  | <b>6</b>  | <b>6</b>  | <b>6</b>         |

(Source: CSIR, 2007)

With these forecasts it is of the utmost importance to act now and be able to accommodate the growth in container freight movements. Government must promote intermodalism if the country is to reap the benefit of the best of both rail and road, rather than to witness the destructive competition which currently exists. For this to succeed rail should once again be seen as an efficient and effective mode of transport. Rail transport is essential to intermodalism, particularly for inland movements; on the other hand, air transport can be seen as value added service. The benefits of promoting rail in the country and intermodalism are:

- Energy costs will be reduced as rail transport is more energy efficient.
- Air pollution will be reduced, particularly since most main line rail traffic is handled by electric locomotives. In the current power crisis of South Africa,

this may in fact not be seen as a benefit, but rather as a hindrance the promotion of rail transport.

- Noise levels are much less for rail transport, particularly those trains which are electrically powered.
- Hazardous chemical transport by rail is much safer.
- Road traffic congestion in urban and rural areas will be reduced.
- Road accident and related costs will be greatly reduced.
- Law enforcement costs will be reduced as there will be fewer trucks on the roads.
- More effective use of scarce infrastructural development resources will result if rail is revitalised.
- Rail, when properly utilised, is much more cost effective than road transport.
- The cost of road maintenance will be greatly reduced.
- It has been estimated that every fully loaded truck (a 36ton payload) travelling between Durban and Gauteng costs the country over R3 100 in road damage costs.
- The only direct contribution made is less than R400 in toll road fees, since fuel tax is a general tax which rail operators pay as well.
- This results in an under recovery of over R2 700 per trip. At current traffic volumes, the total cost is over R1.25 billion per annum.

(Jorgensen, 2007)

The development of intermodalism in South Africa is thus clearly a matter that deserves priority when developing government transport policy. A logistics hub should at least comprise of two modes of transport, although a third mode, air transport, will be extremely beneficial. The following section investigates a potential site earmarked for possible development into a logistics hub against guidelines retrieved from similar international developments discussed in Chapter 2.

The CSIR was approached by the City of Tshwane Metropolitan Municipality to conduct a pre-feasibility study to the validity of building a logistics hub in the City. The remainder of this study is based on this pre-feasibility report, the interviews conducted for the study and the research done. The aim of the pre-feasibility report was to determine, from a logistics point of view, whether a logistics hub is a viable option to promote and develop the northern part of Tshwane and in doing so, contributing to the region and establishing South Africa as a regional logistics hub.



## 5 TSHWANE LOGISTICS HUB CASE STUDY

### 5.1 GEOGRAPHICAL POSITION

The City of Tshwane is situated to the north-east of South Africa in the Gauteng Province. Gauteng is the most populated province in South Africa despite the fact that it is the smallest. This is verified by the fact that approximately 13 480 921 people live within a 200 km radius of the proposed site of the Tshwane Logistics Hub. This is illustrated in Figure 14. The figure also shows the major roads leading into the site. This area accounts for 30.7% of South Africa's total population. Table 10 gives a breakdown of the demographics for this region. These figures were calculated through Geographic Information System (GIS) data obtained through the South African Census.

**Table 10: Demographics of Region in a 200km Radius around Tshwane**

|                 | Amount            | Percentage  |
|-----------------|-------------------|-------------|
| <b>Black</b>    | 10823013          | 80%         |
| <b>White</b>    | 2090599           | 16%         |
| <b>Coloured</b> | 341651            | 2%          |
| <b>Indian</b>   | 225581            | 2%          |
| <b>Total</b>    | <b>13 480 921</b> | <b>100%</b> |

In comparison to Duisport International Inland Port and logistics hub, the population distribution of the region 200 km around the City of Tshwane is not as favourable. Duisport is located in an area which has 30 million people in a 150 km radius. It has to be acknowledged that South Africa is known for being spatially challenged and this is seen as probably one of the best location anywhere in the country.

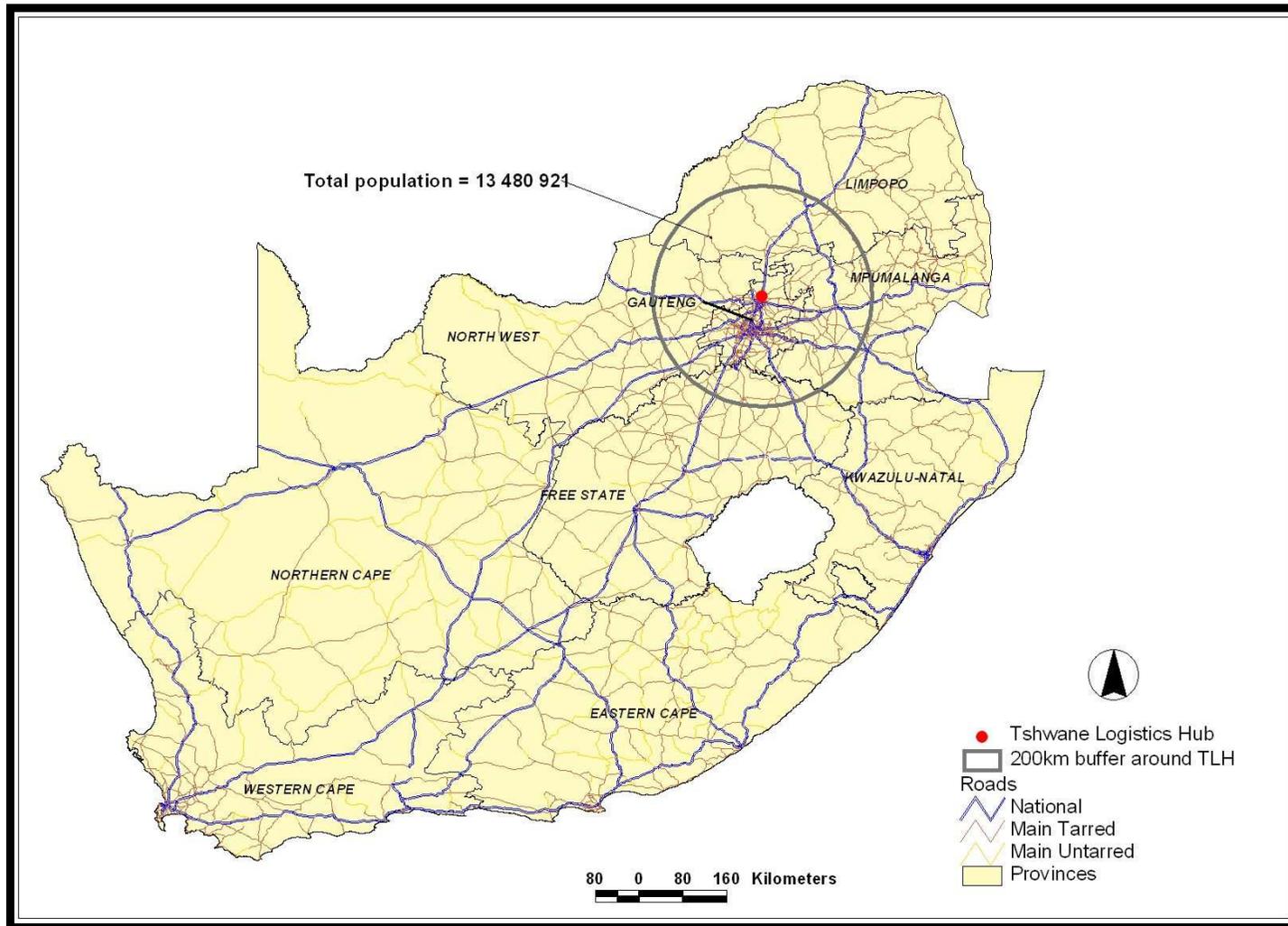


Figure 14: Geographic Positioning of Tshwane Logistics Hub

To the north of the City of Tshwane is an area adjacent to where the N1 and N4 national roads meet and intersect (see Figure 17 at the end of the chapter for the location of the study area), which has been earmarked for the possible establishment of a logistics hub. The focus of the study is on the establishment of a logistics hub and therefore in essence on whether the location is suitable as a hub from a logistics point of view. It has to be emphasised that the research done is only focused on logistic aspects. As will become apparent from this research there are still many other aspects and issues apart from logistics that will require much more in depth study and analysis. To ensure that the area is indeed suitable for the development of a logistics hub it is critically important to be sure and convinced that from a logistics point of view, this area is suitable for the establishment of such an envisioned logistics hub.

## 5.2 CITY DEVELOPMENT STRATEGY

The City of Tshwane has been working on developing a long-term action agenda for the city since 2003. It is very much transport driven or transport dependant and comprises of eight lead initiatives earmarked for implementation. These initiatives are:

1. Creating an International Logistical cluster
2. Completing a Metropolitan Mobility Ring
3. Developing the Zone of Choice
4. Connecting Tshwane to the Knowledge Economy
5. Working Infrastructure Programme
6. Moving Tshwane Initiative
7. Vibrant Capital Programme
8. Quality Public Places Programme.

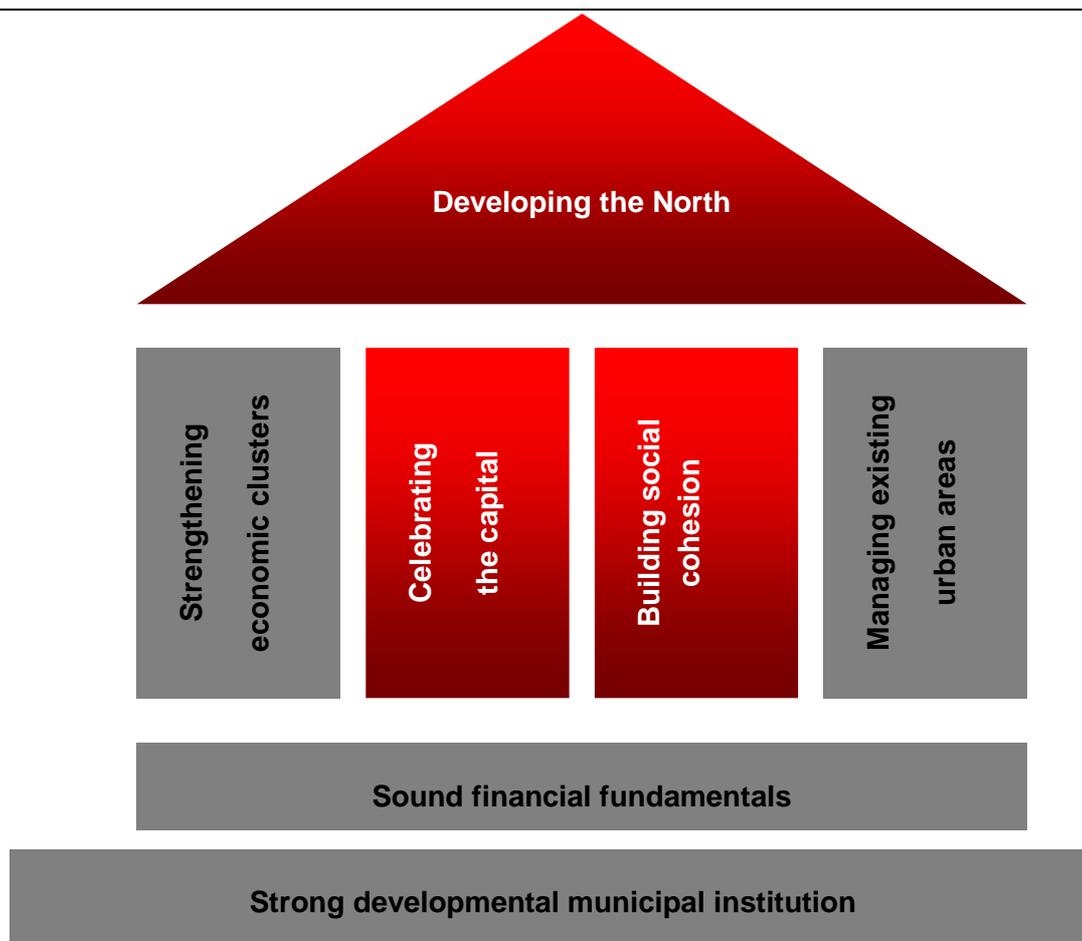


Figure 15: The Tshwane City Development "House"

(Krynauw, 2007)

The first initiative speaks for itself. Tshwane Metropolitan Municipality has identified an opportunity which is leveraging off a sub-continental location. The development of the Tshwane Logistics Hub would thus fit perfectly into this profile. This development is already mentioned in the City Development Strategy (CDS) as well as the additional possibility of developing an airport alongside the Logistics hub. It lies within the Zone of Choice which will further support the third initiative.

Further motivation for the development of the logistics hub, can be found in the Tshwane City Development "House" as illustrated in Figure 9. The figure shows the importance of developing the North of Tshwane as opposed to the traditional East and South. Job opportunities to the North of the Magaliesberg only account for 21.2% of total job opportunities in Tshwane. However, 46.8% of the population reside

there. This phenomenon is captured in Figure 16, with the population percentage accompanied by the labour opportunities in brackets (Olivier, 2007).

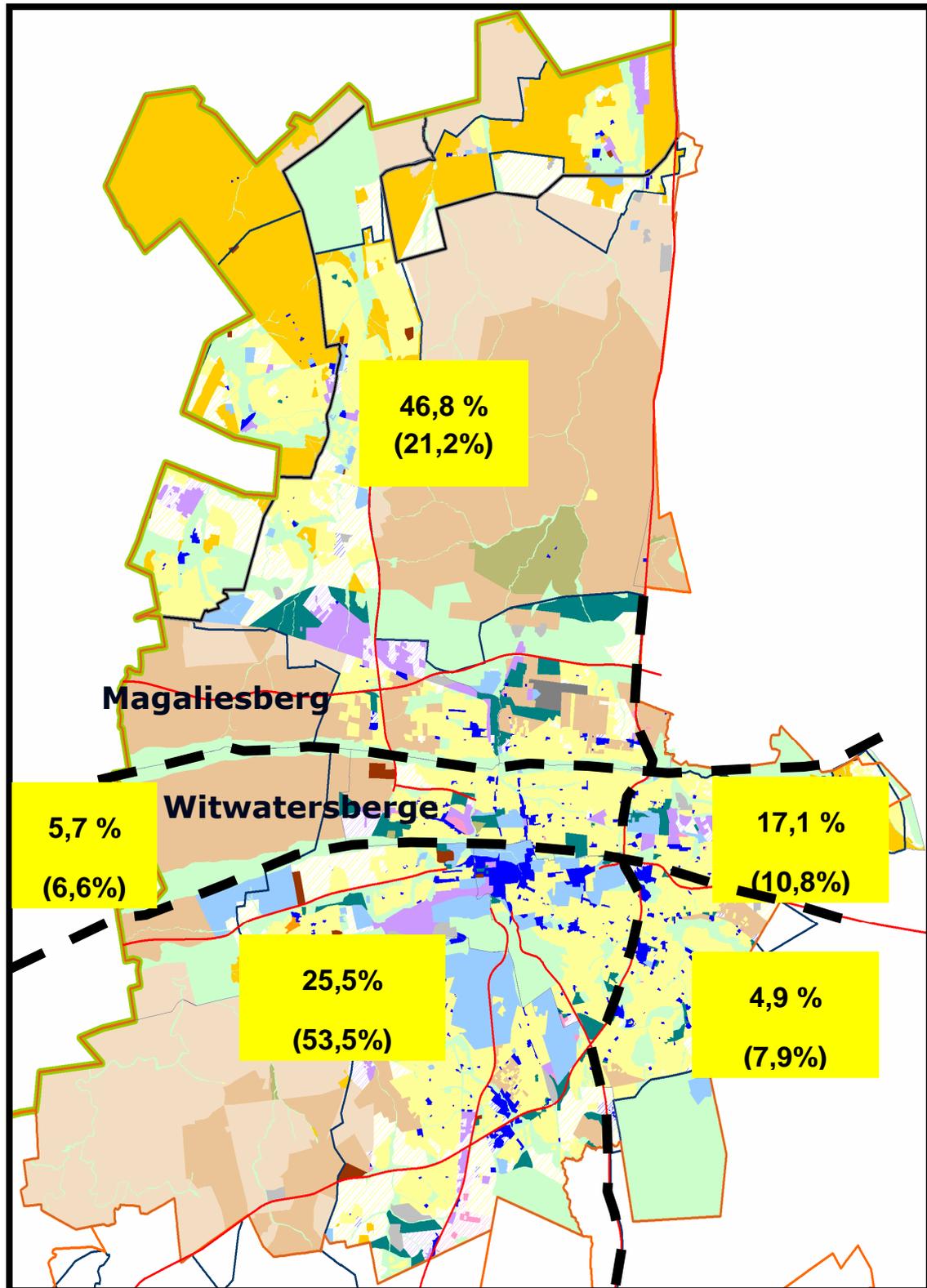


Figure 16: Population Distribution of Tshwane

(Olivier, 2007)

The scenario above is sketched to emphasize that the development of the Tshwane Logistics Hub, albeit two or three modes of transport, aligns itself perfectly with the City Development Strategy of Tshwane. An in depth study into the specific farm identified for the development of such a hub follows below.

### 5.3 STUDY AREA

Figure 17 indicates the area being studied with all the major infrastructure that feeds into it. The area lies north of the City of Tshwane immediate to the east of the N1 national road that links Tshwane to the north and the south of the country. The N1 stretches north into the northern neighbour of South Africa namely Zimbabwe but from there it links with a number of our northern SADC neighbours. At the same time the location of the area of study is also immediately north of the N4 platinum highway that runs west to link South Africa with Botswana and east to link the country with Mozambique. Through Botswana the road runs into Namibia and within Namibia the road links with roads into Angola. These two roads, i.e. the N1 and the N4, both currently for significant lengths double-lane highways in both directions, provide ideal access to the economic hinterland of South Africa, i.e. the Gauteng Province, and link this area directly to the north and the east and west. The N1 also provides access to the south of South Africa through Johannesburg and further south while through the R21 there is also an almost direct link to the east of South Africa namely Kwa-Zulu Natal and thus Durban and Richards Bay, and even to Maputo in Mozambique. From a roads point of view the study area is therefore very well positioned.

Where the N1 and the N4 meet there is, over and above the link between the two roads that are currently being used, a fly-over from the N4 over the N1 that exists which was built when the N4 was constructed, but that is not currently being used. This is a great asset for an envisioned logistics hub since it could provide the feeder road into the hub implying that no additional cost will be required to build such a fly-over. There is also a railway line that runs through, as well as a small train substation currently in this area. Trains run from here to the east linking the area with Kwa-Zulu Natal and Mozambique while the railway line links directly with Pretoria and from

there towards the north, south and the west. The substation is not suitable to be used in its current form as a logistics hub while it also does not have container facilities. In discussions with Transnet Freight Rail they were very open to suggestions on what could be done regarding rail in this area. Currently it is not on their priority list for further development. However, from a rail point of view the study area is being served by rail and it would not require major investment to upgrade the current rail infrastructure to be suitable for a logistics hub.

Other basic services, such as sanitation and telecommunications are already provided in the study area. Electricity is available in the area – in fact an ESKOM line runs across the area and there should be the possibility of tapping into this electricity line to provide the area with what is needed as far as power provision is concerned. There may be a need to change the way in which the electricity line infrastructure runs currently seeing as it runs across the proposed runway for the possible development of an airport, and it is envisaged that there will be some deviation changes required. It will not be a major deviation but this will be dependent on the ultimate development that takes place within this area. There is also water available in the area. Additional basic infrastructure that will be required is road infrastructure around the logistics hub, sanitation services as well as other services that is required when an area is developed such as telecommunication services that will have to be extended into this area.

The land of the study area is currently owned by First Land Developments Limited. They are very keen to see this area being developed further. Various options and possibilities have been investigated by this company. One is the establishment of a logistics hub with the possibility of building a new international airport that will provide a third mode of transport to the area. Other alternatives are the establishment and development of new residential areas in this area but also in extended areas around the study area. First Land has conducted various feasibility studies within this study area while they have also commissioned environmental impact assessment studies (EIA's) on different aspects within this area.

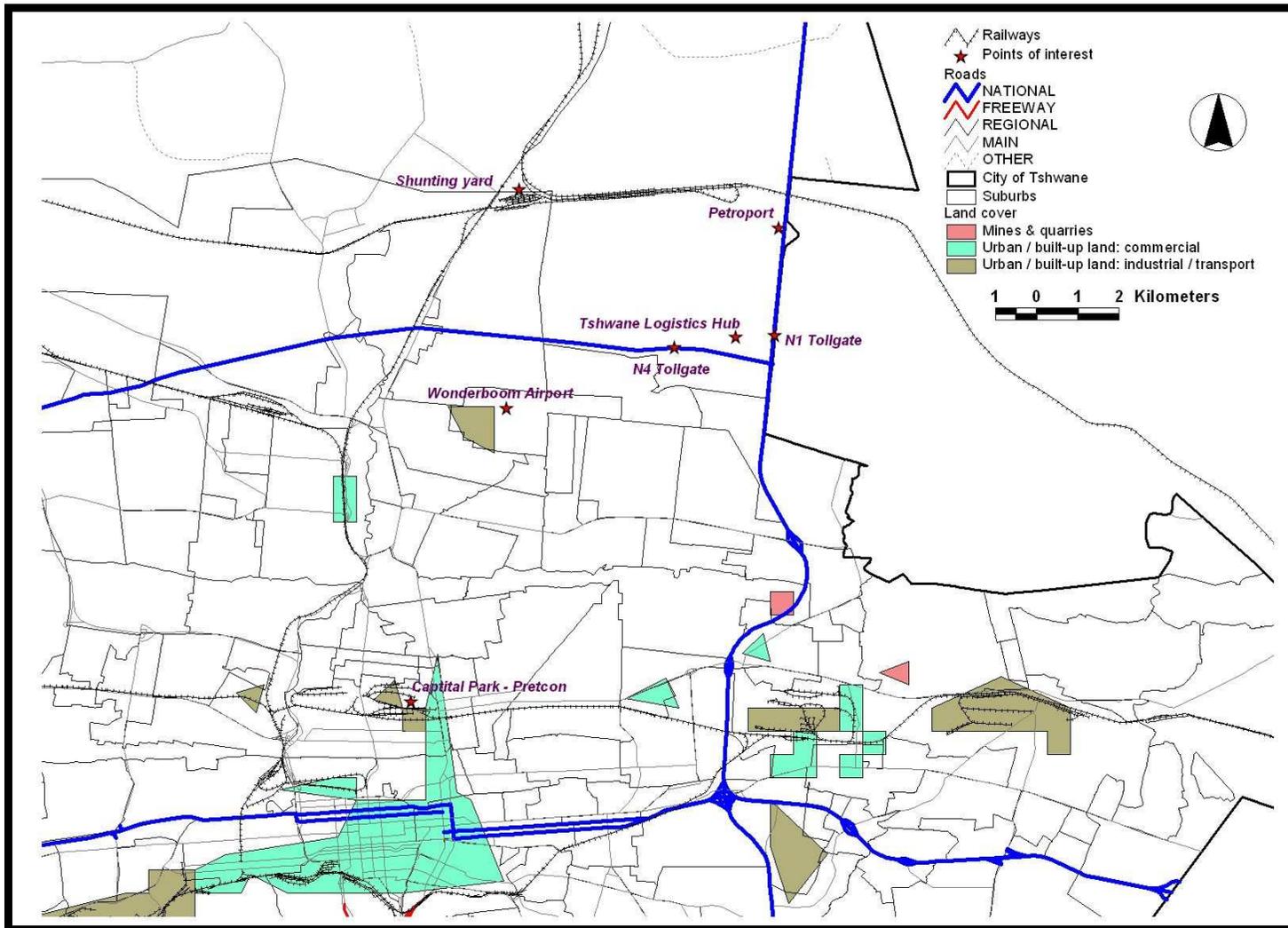


Figure 17: Location of Proposed Tshwane Logistics Hub

## 6 METHODOLOGY OF STUDY

When comparing possible South African infrastructure with already established international logistics hubs, there is one major difference which needs to be taken into account. In South Africa we do not have any inland waterways to make use of as a mode of transport. Throughout the rest of the world but especially Europe, logistics hubs have been established at the ports of inland waterways to access another possible mode of transport. The question arises whether South Africa should invest in such developments and optimise existing infrastructure in parallel with creating new and advanced infrastructure, or whether it is better to not invest in the development of logistics hubs.

The methodology used to address this question would be evaluation research. A case study will be researched with the help of both qualitative and participatory methods of observation such as semi-structured interviewing. Firstly, the case study's site will be measured against physical attributes of other similar logistics hubs around the world. Secondly, the site will be investigated in detail with the help of semi-structured interviews.

### 6.1 PHYSICAL ATTRIBUTES

There are a number of successful logistics hubs elsewhere in the world and based on these, criteria for the establishment of such hubs have been developed. Baluch (2005: 159) lists the following mix of ingredients for a successful regional logistics hub. These factors will be considered in relation to this study. These assume that there is also a water port involved which does not necessarily hold in all cases:

- **Adequate multi-modal transfer systems**

It is important for a logistics hub to be able to accommodate multi-modal solutions. Transfers between different modes of transport should be seamless and uncomplicated.

- **Good telecommunications systems**

Technology is essential to the success of supply chain processes as well as a logistics hub. It is crucial to have adequate telecommunications systems either already in place, or capable of being put in place.

- **Reasonable port charges**

Another vital element which should be investigated before deciding on a location of a logistics hub is whether charges to be levied are reasonable. These include toll charges for road transport as well as docking charges at ports where applicable.

- **Adequate cargo and container handling facilities**

Container transport is fast growing all over the world. It is thus of the utmost importance to accommodate this growth in container and cargo traffic.

- **Numerous berths and container terminals of varying sizes, capable of handling various commodities, including dangerous goods**

Specialised handling facilities have to comply with numerous safety regulations. It is not only specialised handling, but also different sizes and requirements which should be kept in mind.

- **Available rail and road connections to link the hub with local consumer and industrial areas**

Market demand is still the major contributor to the success of a logistics hub. The link to these markets is of cardinal importance.

In addition King & Keaton (2006) suggested that any logistics infrastructure such as a logistics precinct can be examined using a number of major categories, namely:

- **Transportation and warehousing industry**

This category looks at the depth and strength of the regional distribution industry, including the number of companies in the area engaged in transportation and warehousing.

- **Workforce**

Workforce examines the depth, availability and cost of the local logistics work force.

- **Highway access**

The focus of this category is on the highway infrastructure and includes the number of highways that pass through the area, as well as the number of highway auxiliary routes (i.e. bypasses).

- **Road and bridge conditions**

In this category, the average roughness of the area's roads as well as bridges is inspected.

- **Road density and congestion**

Whether or not a metropolitan area has adequate roads depends on the amount of traffic using those roads. Clearly, what is considered an adequate infrastructure for one town or city may be insufficient for another town or city. It has to relate to the accessibility of the hub and the mobility around it. This category studies the factors impacting on road density and congestion.

- **Road infrastructure**

This category considers the future in terms of maintaining adequate road infrastructure to give access to the hub and acceptable mobility both in the hub and around it. It includes public roads network, capital investment for roads and bridges, highway maintenance and highway law enforcement.

- **Vehicle taxes**

User taxes as well as fuel excise taxes will be discussed under this category.

- **Railroad infrastructure**

Intermodal transport has become an integral part of today's commerce. Capacity to accommodate rail as a mode of transport will be considered as well as the possible growth of rail as a transport mode in the area.

- **Proximity to market and market need**

Any logistics hub will serve a number of markets and the question then is the location of the markets, how many are there, what commodities are traded, as well as the needs of these markets.

- **Location away from residential areas**

This is a very obvious criterion, also in terms of access to work force.

- **Developed at a reasonable cost**

Cost will be a critical determinant of any developments.

- **Water port infrastructure**

Shipping is seen as the most efficient mode of transport for container cargo. Water port infrastructure is thus a necessity in logistics operations and will be evaluated.

- **Air cargo infrastructure.**

Just-in-Time delivery is an important aspect of cargo delivery. Air transport is seen as the safest and fastest mode of transport for cargo and will be examined.

In addition to all the above there will be specific requirements that freight logistics providers will have as well. One of the major requirements in this regard will be securing freight within the facility, but also the controlled movement into and out of the facility.

## 6.2 INTERVIEWS

Apart from the physical attributes of the proposed site, there are further aspects which need to be investigated to determine the feasibility of the development of such a logistics hub. These additional facets are best investigated through extensive interviews with the key role-players. A number of areas were identified with this specific aim in mind and are listed below:

- Rail road infrastructure
- Market need
- Ownership of the land
- Existing airports influenced by possible further developments
- Provincial government having jurisdiction over the areas of the proposed developments
- Local government having jurisdiction over the area of the proposed development.

The entities with which interviews were conducted as well as the main aim of each of interview are indicated below. These interviews were conducted with the intent to address the above-mentioned issues with regard to the case study to be undertaken. Personal structured interviews were held with the different representatives of each of the entities identified as role players and are listed in the following section.

**City of Tshwane Metropolitan Municipality – 13 June 2007**

**Dr. A Gouws: Manager – Policy and Information**

**Mr. H Kleynhans: Manager – Industrial Development and Investment Promotion Economic Development**

A development of this enormity should be done to the benefit of all of the residents of the city in which it is developed, albeit economic prosperity or infrastructural affluence. To ensure that this does in fact hold true, the local government entity should be involved right from the beginning of the development. The metropolitan municipality has a city development strategy in place and the development of a logistics hub should form part of this plan.

(Gouws & Kleynhans, 2007)

**RMB First Land Development – 25 June 2007**

**Mr B Frigenge: Managing Director**

**Mr D Hill: Project Manager**

First Land Developments are the owners of the farm Doornpoort 295-JR which will be used as a case study. They are property developers but are not familiar with developments of transport infrastructure such as a logistics hub. The aim of the meeting was firstly to establish acquaintances, but also to establish whether they are in fact willing to develop the land into a logistics hub. The fact of the matter remains that the farm is the property of First Land Development and if indeed anything should be developed on it, the company should be compensated accordingly and to their benefit.

(Frigenge & Hill, 2007)

**Automotive Industry Development Centre – 2 July 2007**

**Dr P Fernandes: Managing Director**

**Mr. Z Jansen: Supply Chain Development Manger**

For a logistics hub to be successful, it has to attract major markets and industry. One such an industry is close proximity to the proposed site for the case study is the Automotive Industry Development Centre, also known as the AIDC. The automotive industry's supplier park is located close to the farm Doornpoort 295-JR. The objective of conducting an interview with the AIDC was to determine if the AIDC could see the benefit of having a logistics hub located so close to their site, seeing as at the supplier park the AIDC has their own established container yard. It was also used as an occasion to establish what requirements they would have of the logistics hub.

(Fernandes & Jansen, 2007)

**Gauteng Department of Transport – 4 July 2007**

**Mr S Mbele: Director – Transport planning**

**Mr V de Abreu: Contractor to Gautrans**

A development of such magnitude affects local, provincial and national spheres of government. It is necessary to investigate whether such a development will align itself with the long term strategies of the three spheres of government. An interview was conducted with this specific goal in mind, to establish if a logistics hub will be supporting strategic developments in infrastructure in the future.

(Mbele & de Abreu, 2007)

**Transnet and Transnet Freight Rail – 4 July 2007**

**Mr F Meyer: Senior Manager – Strategy (Transnet)**

**Mrs D Strydom: Senior Manager – Strategy (Transnet Freight Rail)**

It is clear from the research done in the literature study that rail as a mode of transport plays a cardinal role in the success or not of a site. Therefore it was necessary to interview the strategic managers of both Transnet and Transnet Freight Rail. Issues regarding rail infrastructure are more complex than any other, bearing in mind that infrastructure is not owned and managed by central government, but by a commercialised public entity. Although rail infrastructure is already in place, there are concerns that need to be taken into account when evaluating the rail infrastructure. A shunting yard is of fundamental importance for a logistics hub to either load or unload freight. The lines leading in and out of such a yard should have the same frequency so that a switchover of power supply is not needed. Other aspects under consideration should be the proximity to other shunting yards or container depots. Lastly, but most importantly, is whether any development is in line with the strategic goals of Transnet, especially with Transnet planning its multi million rand capital expenditure plan.

(Meyer & Strydom, 2007)

The following chapter will take a look at the site under investigation in the case study, its attributes and limitations. Chapter 7 measures the case study against the above mentioned requirements. The methodology of the research is thus implemented in the following two chapters to reach a conclusion, from a logistics perspective, as to whether logistics hubs in South Africa should be developed as a viable intermodal solution.



## 7 EMPIRICAL STUDY

In conducting a comprehensive evaluation two alternatives need to be considered, namely, where only two modes are involved and where three modes are involved. In the case of two modes these modes would be road and rail while a third mode, air transport, could be added if the possibility of the establishment of an airport in the area is considered. Air transport as a third mode will add additional functionality and viability but will also lead to an increase in the cost to such a logistics hub, whilst it will incorporate all the aspects associated with only two modes. The fourth mode namely sea together with a port, is obviously not relevant here. Although pipeline as a mode of transport might in this case prove to be viable in the long run, the success or development of the logistics hub does not depend on it.

There are many issues that need to be considered in detail in such an evaluation and what this study is focusing on is the logistics aspects while highlighting issues that will require much more investigation. In addition it is recognised that decisions related to such facilities are politically sensitive and in some cases those involved react emotionally rather than factually. The aim is to focus on facts and not to allow politics and emotional issues to distort the study.

In South Africa the concept of a logistics hub is not a very familiar concept. This complicated the study in that there are no established South African –specific criteria to measure the site against. However, there are several logistics hubs, logistics precincts, intermodal ports or inland ports in use around the world. Best practice from these sites was used to compile a number of key areas that should be studied to estimate the suitability of the Doornpoort 295 JR farm for the development of such a logistics hub. These areas were discussed in Chapter 5. It is emphasised that this list is not at all exhaustive and is only used as a guideline to investigate the logistics aspects. A recipe does not exist to establish the perfect logistics hub and the areas should each be applied to the specific circumstances of the site under study.

## 7.1 ALTERNATIVE 1 – TWO MODES: RAIL AND ROAD

This study is aimed at determining whether a logistics hub is a feasible development at the proposed site. There are currently no logistics facilities, all these will have to be erected and the assumption is that, at least, the minimum freight cargo and container handling facilities will be built as well as minimum warehousing where applicable. In addition it is assumed that for a start there will also be adequate multi-modal transfer systems between the different modes be they road and rail or road, rail and air. Various other considerations will now be dealt with in more detail.

---

### 7.1.1 INFRASTRUCTURE

If a logistics hub is developed in the designated area it is ideally located in terms of available rail and road connections that will link the hub with local consumer and industrial areas. The N1 and N4 national roads will be the access and service roads to the hub and these link this hub in the best possible way to the areas it will be serving. In addition there is a current rail link which Transnet Freight Rail intends to maintain. A logistics hub will require changes and additions to the current rail facility. One of the requirements will be facilities to handle containers and provision from a rail point of view will have to be made around this.

---

### 7.1.2 BASIC SERVICE

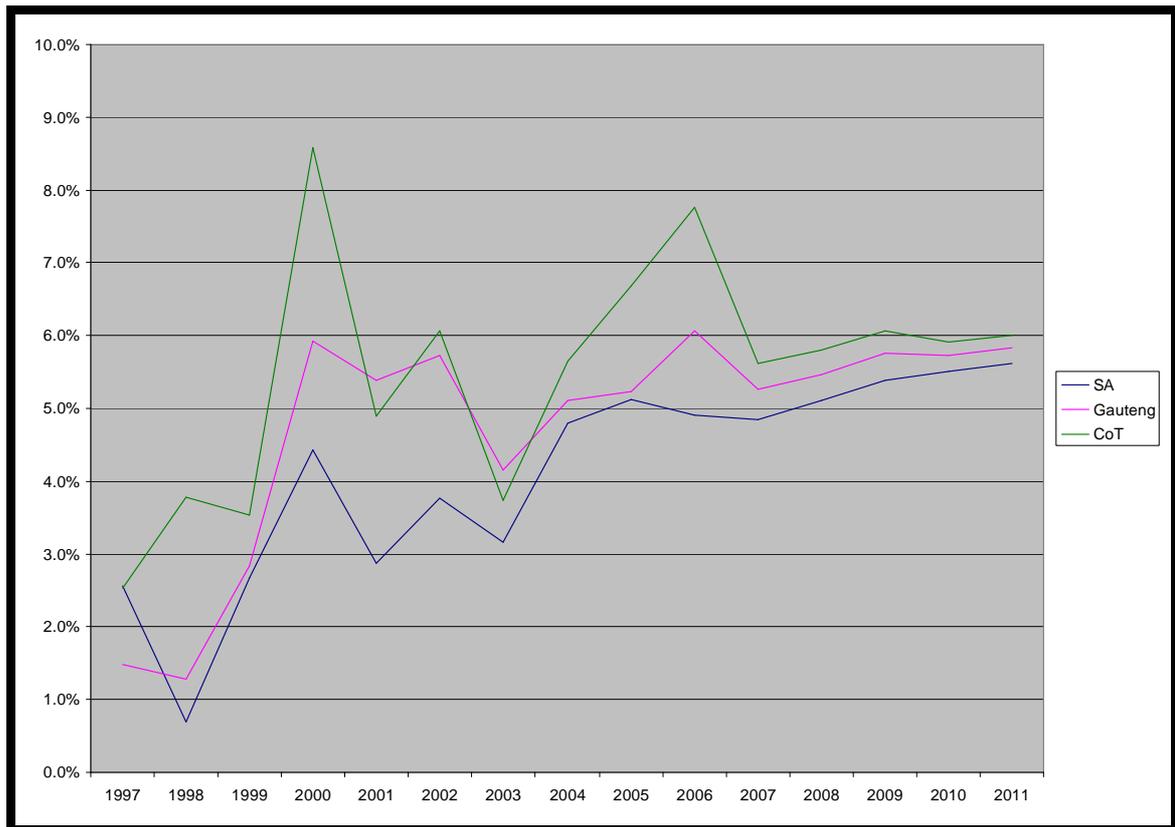
Any development requires basic services such as water, electricity, sanitation. There are such services already available or it will not be difficult to obtain these services into the area to comply with the standard required by the hub as an operating facility. All of these will be provided by the City of Tshwane. As for electricity, there are ESKOM power lines that run across the area. This is where the electricity would come from although the line will have to be moved, or re-routed, depending on the design, and layout of the development. This should however be further discussed with ESKOM.

### 7.1.3 ECONOMIC DEVELOPMENT/ACTIVITIES

The Growth and Development Strategy for the City of Tshwane, (Krynauw, 2007) published in October 2006, outlines a very positive and rosy picture for Tshwane. International trade is an important driver of the Tshwane economy both in terms of tangible exports and in terms of tangible imports. These two contribute 45% and 22% respectively to the Gross Geographic Product (GGP) of the City. The annual average growth in imports and exports over the period 1995 to 2004 has been the largest in the City of Tshwane, compared to the other large metros in the country. This average annual growth rates are 17.56 for imports and 21.5 for exports for the City of Tshwane. The main contributors to this growth are the Motor Vehicle Parts and Accessories sector followed by the Basic Iron and Steel sector. In addition the services sector contributes strongly to the economy while it also employs large numbers of people.

All of the above adds to illustrates strong economic growth in the City of Tshwane. In addition the Growth Strategy also highlights plans to commit significant resources to economic development strategies to even further strengthen this growth and transform the City to an even stronger global player. Another aspect in favour of economic growth in Tshwane is the Gauteng City Region initiative which aims to establish Gauteng as the “smart province” and ensuring that all economic activities in Gauteng complement each other.

The City of Tshwane’s economic growth exceeds both that of South Africa and the Gauteng province as indicated in the figure below. It is predicted that this trend will continue in future. The annual economic growth for the city of Tshwane in 2006 was 7.8% in comparison to that of South Africa which was 4.9% and Gauteng province which was 6.1%. For the period 1996 to 2006, the annual economic growth for the City of Tshwane was forecast at 5.3%. The forecast for the period 2006 to 2011 is forecast at an increased annual economic growth of 5.9%. This forecast still exceeds the expected growth of both South Africa (5.3%) and the Gauteng province (5.6%).



**Figure 18: Annual Economic Growth for South Africa, Gauteng and the City of Tshwane**  
(Gouws. 2007)

A major contributor to the economic growth of the City of Tshwane is the growth in exports for the city. Figure 19 illustrates the immense growth in exports for the City of Tshwane over a ten year period from 1996 to 2006. Exports for the City of Tshwane far exceed that of the Gauteng province and is very similar to that of South Africa.

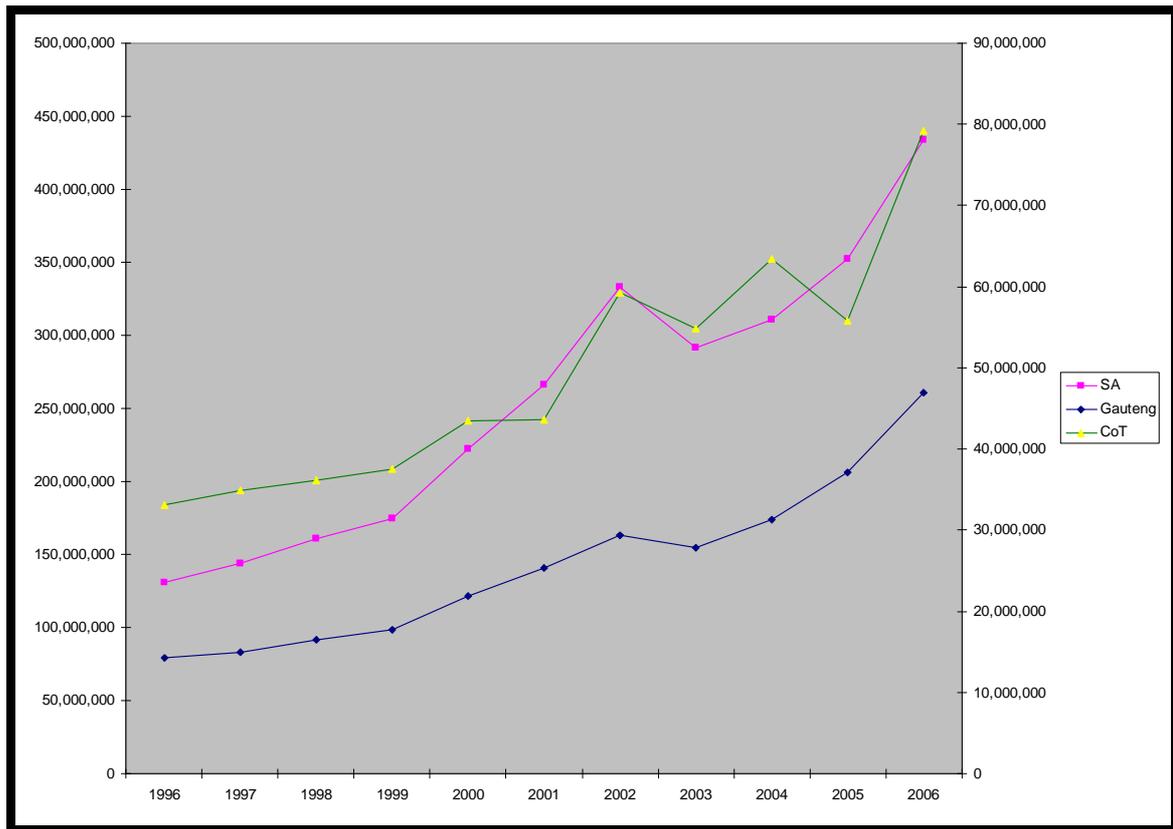
On a local level, exports from the City of Tshwane to other municipalities are indicated in table 11 along with the exports to its neighbouring provinces. It is depicted in Rand value, and the exports to the different municipalities are only approximations.

**Table 11: Exports from the City of Tshwane**

| <b>Metropolitan Municipality</b>          | <b>Amount<br/>(2005)<br/>R '000</b> |
|---|-------------------------------------|
| <b>Ekurhuleni</b>                         | R 21 742 081 791                    |
| <b>City of Johannesburg</b>               | R 106 074 004 536                   |
| <b>City of Tshwane (locally consumed)</b> | R 55 145 669 300                    |
| <b>Provinces</b>                          | <b>Amount<br/>(2005)</b>            |
| <b>North West</b>                         | R 15 034 716 495                    |
| <b>Gauteng</b>                            | R 203 643 446 217                   |
| <b>Mpumalanga</b>                         | R 6 180 390 474                     |
| <b>Limpopo</b>                            | R 3 611 261 986                     |

(Gouws. 2007)

The steady growth in both the economy of Tshwane, as well as the exports of the city, should be seen as an indication of the expected growth in freight transport. It is necessary to plan to facilitate such growth and a logistics hub will do just that. The economic growth forecast as well as the trend in export growth is a clear indication that there is in fact an already established market in proximity to the proposed site, which has a great need for the development of a logistics hub. All further discussion in this chapter will aim to support the proposed site as the best possible site for such a development. (Gouws. 2007).



**Figure 19: Annual Exports for South Africa, Gauteng and the City of Tshwane**  
(Gouws. 2007)

#### 7.1.4 TELECOMMUNICATION SYSTEMS

Within the City of Tshwane there are adequate telecommunications services that will be available for any developments in this area. The services are the same as the best that can be provided in South Africa. The City of Tshwane is also focussing strongly on developing the City as a Centre of Telecommunications. This will obviously benefit any developments especially where there is a strong reliance on good and adequate telecommunication systems.

#### 7.1.5 TRANSPORTATION AND WAREHOUSING INDUSTRY

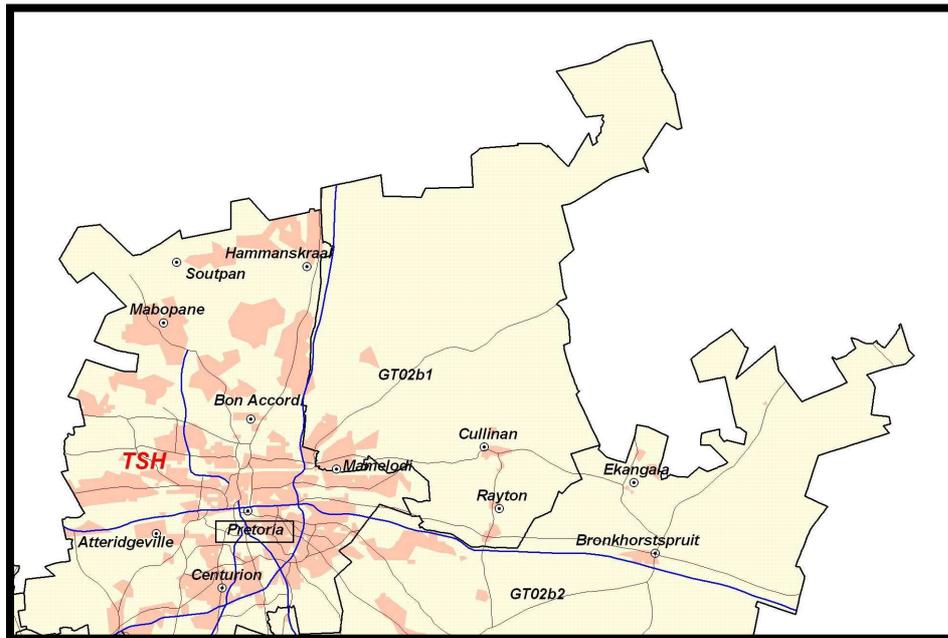
A major key to success of the Tshwane Logistics Hub will be getting transportation and warehousing industries on board and established on the new site. An example of this is UTi, a third party logistics company that is located on site at the Automotive

Industry Supplier Park in Rosslyn. On the other hand many companies have located their warehouses in the Midrand area and it would be difficult to convince them to relocate to the site. They may consider this an ideal location for expansion if it makes financial sense. Warehousing will most probably have to be provided for companies who do not have any or have limited warehousing facilities in the larger Gauteng region. With the establishment of a new site, the site in itself will attract various industries as well as different operations. Examples elsewhere in the world have illustrated this especially if the site is ideally located and positioned with strong economic growth and activity in the region. Ideally one would like to gauge the industry about their views of such a hub and their willingness to locate here. The AIDC was used as an example to test the notion.

---

#### 7.1.6 WORKFORCE

South African cities have a unique problem with regard to their major source of workforce. Figure 18 (residential areas indicated by the salmon colour) illustrates the problem that residential areas are mostly situated outside city centres, and the residential areas which have easy access to these areas are in fact high income residential areas. This can be used to the advantage of the development of the logistics hub. It is clear from the figure that there is major labour force available just to the north of the site as well as to the east in the Mamelodi Township. This will result in the less privileged commuters travelling to work at lower costs than travelling to the traditional work location seeing as work will be created closer to the lower income community. Access to the site for the workforce is readily available. A major advantage will be the fact that the foremost cause of road congestion is to the south of the city. The development of a logistics hub to the north of the city will thus be outside the major congested areas, which will benefit the workforce in their daily commute to the hub. From Figure 18 it appears that lower income groups reside to the north of the city, giving direct access to cheaper labour on the one hand, but on the other hand it also benefits the workforce in saving money on the commute to their place of work.



**Figure 20: Residential areas in Northern Tshwane**

#### 7.1.7 HIGHWAY ACCESS

The focus of this category is on the highway infrastructure and includes the number of highways that pass through the area, as well as the number of highway auxiliary routes (i.e. bypasses).

It has to be recognised that the majority of freight in South Africa is still transported by road. Intermodal freight transportation is also based on final road delivery. The farm Doornpoort 295-JR has unparalleled highway access leading into the farm. The N1 highway is situated east of the farm; but there is no direct access into the farm from the N1. Nevertheless, this problem may be overcome with an interchange leading the N1 directly onto the N4 platinum highway, which has direct access to the farm via the Dr Swanepoel (K99) interchange.

Highway access creates major possibilities for both North-South transport as well as East-West movements. To the north of the site, direct access into Africa can be gained through the N1 highway. Export as well as import opportunities arise by the development of a logistics hub at this site. Another major factor that needs to be taken into account is the possible improvement of Humanitarian Logistics into Africa. This possibility is discussed in Chapter 8. To the south, the N1 highway runs all the

way to Cape Town, which poses an opportunity for major economic benefits by the development of a logistics hub on the site.

The location of the farm identified for possible development is clearly unprecedented with regard to highway access. Figure 19 is an illustration of the highway access of a similar logistics hub in the United Kingdom, namely Hams Hall. Hams hall has similar favourable highway access, though it is debateable whether the site in Tshwane has not got more direct highway access.

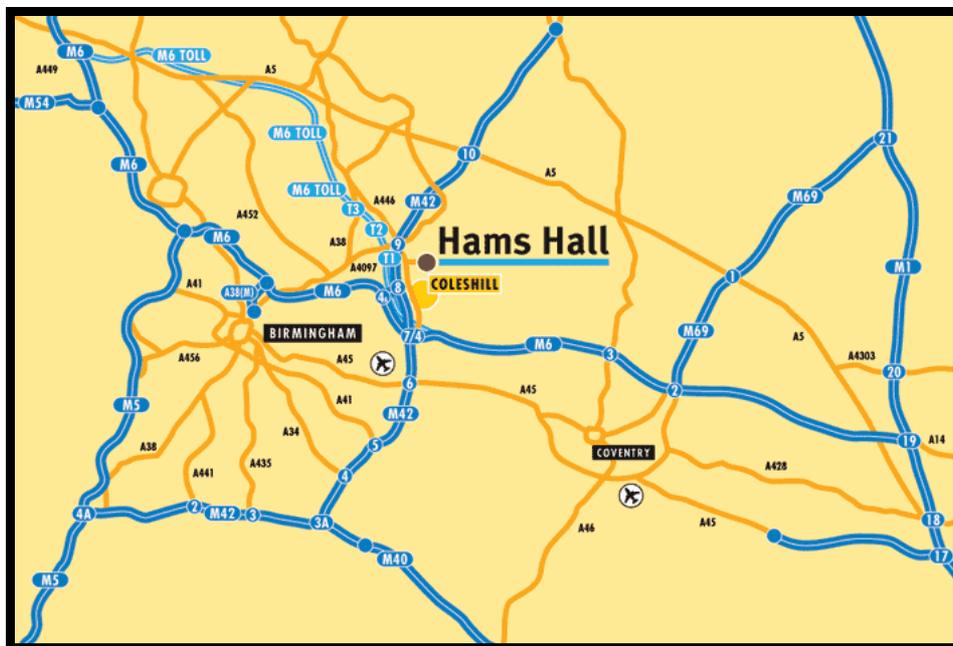


Figure 21: Highway Access into Hams Hall logistics hub

(Hams Hall, 2007)

#### 7.1.7.1 The Platinum Highway

The N4 platinum highway is located at the southern end of the farm. It runs from the intersection with the N1 for 380km westward through Akasia, Brits, Rustenburg and Zeerust to the Skilpadhek border post with Botswana. The aims of the project are:

- to develop the link between the economic centres of Gauteng and the North West Province;

- to connect the countries of Namibia, Botswana, South Africa and Mozambique with a high standard, economically significant corridor;
- to support the growth and export markets by providing a more efficient transport system for the western parts of South Africa;
- the completion of a significant SADC link; and
- the creation of new empowerment, employment, development and training opportunities.

All five of the above aims can further be supported and enhanced by the development of a logistics hub/precinct. The development of such a logistics hub would in fact further promote all of the above aims. An economic link between the provinces of North West and Gauteng will be strengthened by such a development as a result of the ability to deliver value added services such as specialised container- or intermodal services. The standard of the connection between Namibia, Botswana, South Africa and Mozambique will in fact become much higher, thus developing the economic significance a great deal. South Africa's major export activity is to the east of Gauteng; however the opportunity to develop an export route to the west of the province is surely a prospect which should be explored. Value will be added to the SADC link, and multiple job opportunities will arise from the development, apart from the job created by the highway itself. Though, the latter should be examined in depth in further studies.

(Bakwena, 2007)

---

#### 7.1.7.2 THE MAPUTO DEVELOPMENT CORRIDOR

To the east of Tshwane another development is taking place, namely the N4 Maputo Development Corridor (N4MDC). The location of the development corridor is from the Gauteng border on the N4, 27km west of Witbank in Mpumalanga, all the way to Maputo in Mozambique which accumulates to a 504km stretch of road. The economic aims of the project are:

- fostering trade between South Africa and Mozambique;

- creation of a new export and import thoroughfare between the two countries and with the rest of the world via the Maputo harbour;
- development of trade and tourism;
- creation of scope for further development of major exporting industries;
- reduction in the cost of transport; and
- fostering the development of downstream economic activity, empowerment and development of communities.

Developing a logistics hub which can have an impact on the Maputo Development Corridor will enhance all the set economic aims. It could broaden the possible trade activities between the two countries and open up the Maputo harbour for use by South Africa. The scope for further development of major exporting industries will receive a major boost with development of the hub. An example of this is the flower industry. The export of flowers will become more efficient and practical through specialised facilities such a cooler warehousing in conjunction with improved transportation systems. A major benefit which will be derived is the development of downstream economic activity.

(Trans African Concessions, 2007)

---

#### 7.1.8 ROAD AND BRIDGE CONDITIONS

The study site is ideally located with two major highways feeding into it, namely the N1 highway and the Platinum N4 highway. The N1 highway to the south of the site carries extremely high volumes of traffic. According to 2004 traffic counts, south of the N4 crossing, the average number of truck traffic per day is 4 260. North of the N4 crossing, the average number of truck traffic per day is 2 150. To the south, the highway mostly has at least two lanes in each direction. The platinum highway is a new highway built to accommodate East/West traffic.

According to the September 2007 publication of the road conditions by SANRAL (2007), the condition of the N1 road is “good” between Johannesburg and Bela Bela. The 84km stretch between Johannesburg and the N4 in Pretoria is described as a four-lane dual carriageway freeway from Soweto to Roodepoort changing into a six-lane dual carriageway freeway from Roodepoort to Pretoria. There is however construction works currently underway on the N1 between the R21 interchange and the Atterbury interchange which will be completed in December 2008. The construction being undertaken will however benefit the logistics hub, seeing as the N1 highway will be improved with the aim to reduce congestion. The N1 North does not have any construction works up to Bela Bela and is in a good condition. It comprises a six-lane dual carriage freeway from Pretoria (Proefplaas interchange) to Zambesi interchange changing into four-lane dual carriageway freeway to Bela Bela. The N1 highway passing by the possible site for the logistics hub thus consists of a four-lane dual carriageway.

The N4 highway from the Botswana border post to Brits (R512 Interchange) is in a good condition with no construction. The N4 West Magalies Toll Road is a mixture of two-lane dual carriageway and two-lane single carriageway freeway in good condition and with no construction. From Pretoria to Hans Strydom Interchange is a 13.6km piece of road comprising of a 6-lane dual carriageway road up to Simon Vermooten Interchange, thereafter a four-lane dual carriageway in good condition and no construction. The remainder of the N4 highway, from Hans Strydom Interchange to Mozambique is a four-lane dual carriageway from Hans Strydom to Van Dyk’s Drift. Thereafter the highway comprises a four-lane undivided road to Wonderfontein, then two lanes undivided to the Mozambique border. This 304km section is in good condition; however a rehabilitation and improvement project is underway between Wonderfontein and Belfast.

To the north of the farm, there is a completed bridge which is currently not in use. The bridge needs regular maintenance and the on- and off-ramps to the bridge can be completed as planned for direct access to the site from the N1 highway.

### 7.1.9 ROAD DENSITY AND CONGESTION

Whether or not a metropolitan area has adequate roads depends upon the amount of traffic using those roads. Clearly, what is considered an adequate infrastructure for one town or city such as Naboomspruit may be insufficient for another town or city such as Pretoria.

Traditionally the more congested roads are south of the city. This is a major advantage for the development of the logistics hub under consideration. Normal peak hour traffic does occur in the areas to the north of the city, but is not nearly as extensive as to the south of the city. Figure 20 illustrates the distribution of road density. This illustrates mainly the passenger transport, but it gives a clear indication of vehicular movements in the city and indicates the areas most prone to congestion.

The N1 to the south-east of Pretoria clearly has the most traffic, but it is also currently under development and improvement. This leads to the infamous Ben Schoeman highway between Pretoria and Johannesburg, or as commonly referred to, the biggest parking lot in Africa. It is estimated that approximately 160 000 vehicles daily make the trip on the Ben Schoeman highway between Pretoria and Johannesburg. The congestion caused by this massive exodus accumulates to a total annual cost of around R933 million as a result of loss in work hours by commuters. Motorists have taken evasive action to try and avoid the congestion by leaving earlier for work. Traffic on this particular highway has increased by 20% between 5 am and 6 am since 2000. (Bday 2007) The figure above illustrates that nearly 60% of traffic to the north of the city is as a result of passenger movements. Surely this can be converted into an advantage for the city if a logistics hub is developed in this area.

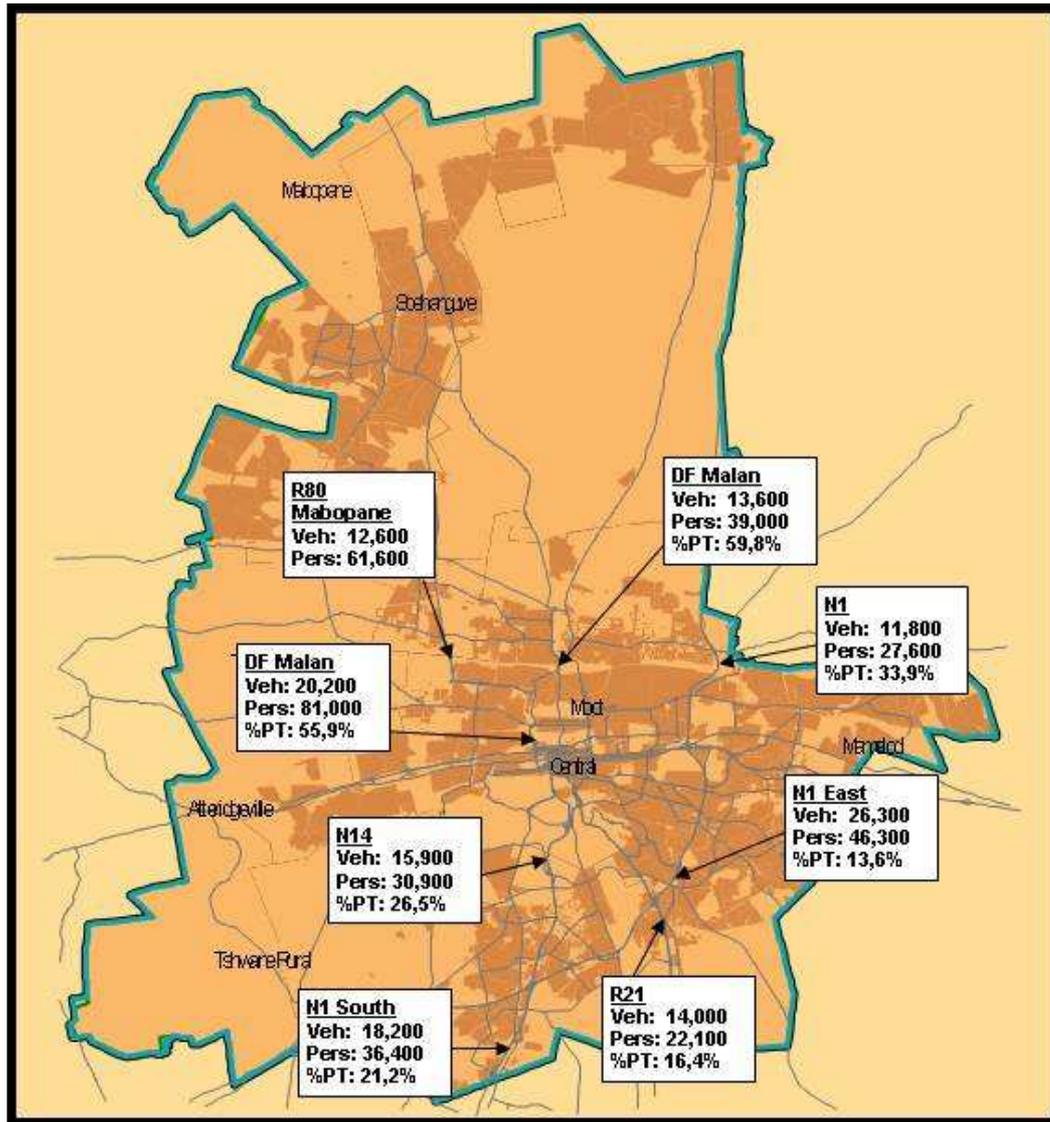


Figure 22: Road Density and Congestion in Tshwane

(Olivier, 2007)

#### 7.1.10 PLANNED ROAD INFRASTRUCTURE

Figure 21 illustrates the entire freeway improvement program for Gauteng as prepared by SANRAL. However there is only one which has a significant influence on the development of the logistics hub. It is the development of the K99 freeway which gives direct access to the site. The K99 also links Zambesi Road (K14) with the site. Another road which will have an impact on the logistics site is the PWV9 which is part of the Maputo Corridor development.

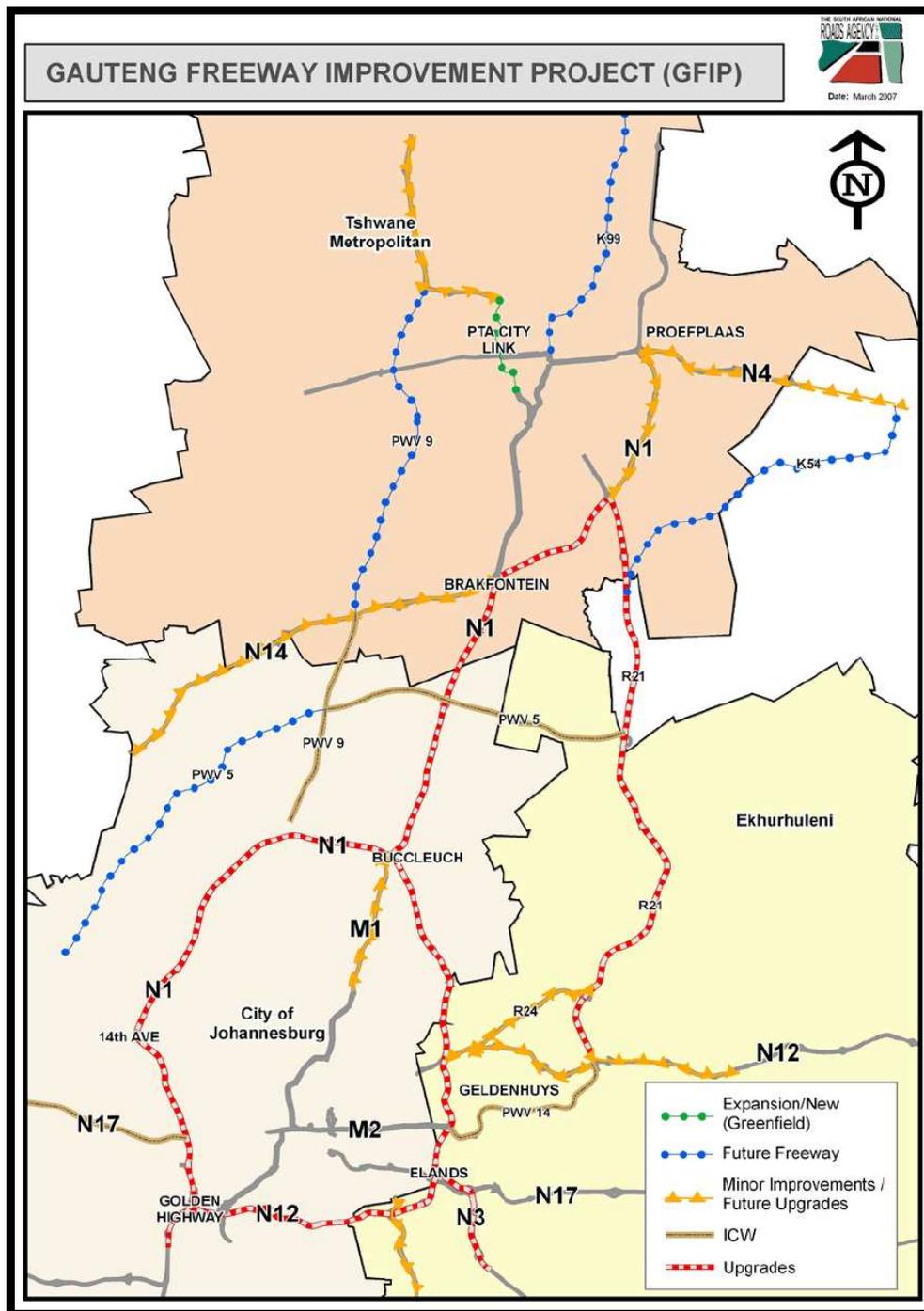


Figure 23: Planned road infrastructure in Gauteng

(SANRAL, 2007)

It is clear from the illustration that the planned future freeways would benefit the proposed Tshwane Logistics Hub. The PWV9 future freeway is to the west of the logistics hub and is aimed to improve the link between Mabopane and Centurion. The north of Tshwane is separated from the southern parts by the Magaliesberg and

this creates a geographic problem which needs to be overcome. Future developments should always keep this in mind seeing as movements between the north and the south are becoming increasingly more complex.

It is also worthwhile to mention the proposed tolling of the Ben Schoeman highway. This is planned road infrastructure but can also be discussed under the next topic namely vehicle taxes. The aim of the toll will be a congestion charge as such to try and manage road volumes on the N1 highway. It will aim to make use of the “user pays” principle to create an incentive for road users to make use of car pooling and ride sharing.

---

#### 7.1.11 VEHICLE TAXES

Both the N1- and N4 highways are tolled. No additional charges or taxes are currently levied. The site is not accessible without paying a toll which might have an influence on driver behaviour. On the other hand, tolling has a positive impact on road maintenance. The concept of user pays is thus applicable. Direct cost recovery is an important aspect of government’s land transport freight strategy and while it was a major issue concerning freight transport, users have already been sensitised to paying for well maintained road infrastructure. Tolling on the N1 and N4 can therefore in fact be seen as a positive aspect.

---

#### 7.1.12 RAILROAD INFRASTRUCTURE

Railroad infrastructure is of cardinal importance for the success of any logistics hub. A railroad (Pyramid South) runs to the north of the site, which gives direct rail access to the possible logistics hub. Capital Park Station is situated in the CBD of Tshwane and operates as a very small container depot. This is not the ideal, and the opportunity arises to rather expand it into low income high density residential housing and develop the Pyramid South railroad to accommodate the higher rail transport volumes of Tshwane. It is ideally situated with existing infrastructure linking it to Tshwane CBD as well as to the north, east and west. In a meeting with Meyer & Strydom (2007) from Transnet and Transnet Freight Rail, it was mentioned that possible adjustments will have to be made and they are more than willing to further investigate the option. According to Meyer & Strydom (2007) an adjustment to the

frequency of the power lines will have to be made, seeing as the Pyramid South railroad is currently operated as a switchover yard and not a shunting yard. This is a possibility which Transnet will investigate once the all clear is given to develop Tshwane Logistics Hub.

According to an assessment study done on the possibility of a rail freight terminal at Corby in the United Kingdom (MDS Transmodal Ltd, 2004) suitable rail access covers three main factors which will have to be covered in the future:

- Operational flexibility;
- Having a sufficient loading gauge; and
- Having available capacity;

A short extract of these factors is given below:

### **Operational flexibility**

Train operations to and from an intermodal terminal ideally should be direct in all directions, both in terms of the final access from the mainline into the terminal (and vice versa) and the approach routes utilised from the main trunk rail routes. Similar to some highway interchanges, access between different railway lines at junctions can be restricted to certain directions due to the layout or alignment of the tracks together with the number or type of crossovers and chords installed at the junction. If direct access is not possible, it results in freight trains having to pass a junction and then change direction (by means of a locomotive “run round”) so that they can enter the junction from the right direction. Alternatively a train could take a long diversionary or circuitous route so that the junction is approached in the right direction. These add both time and costs to a rail freight service and, in addition there are also capacity issues if a main line has to be used for a locomotive run round.

### **Loading gauge**

The physical definition of the maximum height and width in cross section of a railway line is called its loading gauge. The size of the loading gauge of a particular section of track will determine the size of rail freight wagon (or combination of intermodal platform wagon plus intermodal unit) that can be conveyed on that section of line. The size of the loading gauge is determined by lineside features such as overbridges, tunnels, overhead power lines, signal gantries and platform edges. The physical dimensions of a rail freight wagon or intermodal wagon/intermodal unit combination must be within the loading gauge profile to ensure that it will not collide with any of these lineside features.

### **Available capacity**

Clearly there has to be sufficient train path capacity available so that freight train service providers can operate trains to serve rail freight terminals. This includes available capacity on the final access from the mainline into the terminal (and vice versa) and the approach routes utilised from the main trunk rail routes.

Track capacity of a particular section of railway line will normally be determined by a combination of the following factors:

- The number of tracks on a particular section of line. In general the greater the number of lines the more train paths will be available.
- The signalling system in operation and therefore the headway allowed between trains.
- The speed, acceleration and braking characteristics of trains which use a particular section of line.
- The availability and length of passing loops. Passing loops allow slower moving trains to take “refuge” off the mainline while faster trains can pass.
- The design and layout of junctions between lines. In general, junctions where trains have to cross two or more tracks “at grade” to reach

another line results in fewer train paths availability. Single line chords between lines at junctions also results in fewer train paths being available.

(MDS Transmodal Ltd, 2004)

---

#### 7.1.13 PROXIMITY TO MARKET AND MARKET NEED

This section should be considered with the section on economic developments and activities. Within the City of Tshwane and in the wider area there has been significant economic growth over the last number of years. This together with urbanisation, the proximity of neighbouring countries and economic growth in these countries indicate that there are markets close to the proposed Tshwane Logistics Hub. With the various government initiatives to stimulate economic growth further, the markets close to the hub are going to grow even more. From the imports and exports sectors one gets an idea of the current significant sectors in the City of Tshwane area:

There are some key distribution centres of major retailers situated in Midrand just south of Tshwane. The logistics hub could be used to the benefit of these retailers. The retailers include Shoprite, Woolworths and L'Oreal. Easy access can be gained to the distribution centres by using the N1 highway and driving south. However, the N1 is renowned for its heavy congestion which might be a problem for road transport. Other markets that are in close proximity are the South African Breweries, Lion Matches and the Automotive Industry Development Centre. Lion Matches are by far the most predominant manufacturer of matches in South Africa and the factory in Pretoria is the only factory in the country. Tourism is also a thriving business to the north of the city and can utilise the logistics hub with numerous game farms situated in the area, should an airport be part of the developments, tourists can easily make use of it to gain access to these farms and other tourism facilities.

Motor cars are seen as one of the main commodities that should be shifted from road transport to rail transport. With an automotive supplier park located in close proximity to the site in the Rosslyn area, the development of the logistics hub would surely benefit the automotive industry. The benefit would be mainly around the import and export of spare parts and automotive components. The AIDC would support the

development of a hub, with specifically an airport; however, they did indicate that there is already a container depot on the supplier park site. The airport could be used to fly in sub-assembled parts, but a logistics hub with just two modes of transport would not be of much use to them, seeing as it would complicate their operations, rather than simply using their own on-site facilities.

---

#### 7.1.14 LOCATION AWAY FROM RESIDENTIAL AREAS

The Doornpoort farm is located on the outskirts of Tshwane, with the closest residential area the greater Doornpoort area and is situated approximately 3km south thereof. Another positive in this respect is that Hall's hills are situated on the farm between the site earmarked for the development of the logistics hub and the residential area. This helps to limit noise pollution created by the logistics hub.

---

#### 7.1.15 DEVELOPED AT A REASONABLE COST

A major concern with the development of the logistics hub is the costs associated with it. However, the economic gain that can be achieved by such a development can be used as an incentive to attract private investors. It should however be kept in mind that all infrastructure such as warehousing and other similar facilities will have to be built from scratch as there is currently no infrastructure at the site.

---

#### 7.1.16 AIR CARGO INFRASTRUCTURE

Currently there is not an airport at the site identified for the Tshwane Logistics Hub. The closest airport is Wonderboom Airport; however, Wonderboom has extreme limitations with regard to air cargo. Three of the main concerns with Wonderboom airport are its location, the accessibility and the length of the runway. The airport is located in a residential area, with houses surrounding the entire airport, as well as an air force base. Access to the airport is also limited with only two roads leading to the airport and none of these two roads being highways. The last limitation arises out of the previous two limitations. The runway of Wonderboom airport cannot be extended to accommodate the landing and take-off requirements of larger aircraft. This

automatically limits the type of aircraft that can make use of Wonderboom airport and thus also limiting the optimal air cargo capabilities.

Despite these limitations, there is a proposed alternative to overcome the restriction namely the development of the Tshwane International Freight Airport. This development will be discussed under the second alternative (7.2). The development of such an airport has been mentioned as an opportunity for development in the Zone of Choice Environmental Management Framework Report (City of Tshwane, 2007):

*Most of the site of the Wonderboom Airport can be retained for its current use and also be developed further or be used for alternative land uses.*

*The designated location of the proposed new international freight airport to the north of the norite hills is in an area where the vegetation, hydrology and the landform has been transformed by past activities (borrowing of soil for the railway line). A large part of the area consists of a “wetland” caused to a large extent by the embankments of the railway line. The airport is also in a better location in respect to noise impacts than the current Wonderboom airport*

(City of Tshwane, 2007)

---

#### 7.1.17 JOB CREATION

The establishment of a logistics hub will lead to new jobs and will also have a multiplier effect. What the extent of this will be is very difficult to determine and it was not part of the scope of this study. The extent of job creation will have to be studied from an economic point of view and should consider not only the direct jobs which will be created, but also the indirect job creation.

This scenario brings us to our second alternative:

## 7.2 ALTERNATIVE 2 – THREE MODES: RAIL, ROAD AND AIR

With this alternative the possibility of adding a third mode of transport is investigated. This will be achieved by building an international airport which will be able to accommodate the most modern and largest aircraft, at the location that is earmarked for the logistics hub. This airport will add a great additional dimension to the hub although with huge additional cost.

All the factors for two modes discussed under alternative 1 still hold for this alternative. Only those aspects that relate to air will be discussed in this section.

---

### 7.2.1 FEASIBILITY OF AIRPORT

The current owners of the land, First Land Developers Ltd, have conducted various feasibility studies around the location of an airport in this area. From a logistics point of view the developers have shown that an airport can be built here. The airport will have a runway that will be able to cater for the largest and most modern freight aircraft as well as passenger aircraft. The long runway will enable aircraft to use the airport during summertime with extreme temperatures. The east/west directional runway will be suitable for the typical wind direction in this area for most of the year. Studies regarding the noise levels that are associated with the airport have been undertaken and these indicate that noise levels will be within the level specified for such airports.

Such an airport will be very costly and there is no indication at present where the funding will come from or who will be responsible for this investment. Since the City of Tshwane is the local authority they can make use of this prospect as a major development opportunity for growth in the city and could be used as the major contributor for such an investment. However for now the question of who will provide the investment needs to be raised. For the present any suggestion around possible investors will only be speculation.

There is also the aspect of who will be responsible for managing the airport. Again this is an aspect that will need to be decided on at a different level although it is commonly believed that it should not ultimately be the responsibility of the local authority. The Airports Company of South Africa (ACSA) should be a favourite contender, but it may not see the benefit of managing another freight airport which can be seen as competition for OR Tambo International Airport (ORTIA), especially when ACSA is busy improving the freight facilities at ORTIA.

---

#### 7.2.2 IMPACT AND EFFECT ON WONDERBOOM AIRPORT

Wonderboom Airport (Wonderboom) is located north of the centre of Pretoria and will be hugely impacted by an airport in the designated area. The question should then be raised whether two airports can be located this close to each other. The City of Tshwane recently commissioned a project to look at the future of Wonderboom. This is an indication that there is no certainty around what will happen to Wonderboom in the future.

Wonderboom is 70 years old and is the 2<sup>nd</sup> busiest airport in South Africa. The airport handles some 11 000 passengers annually and a fair amount of freight. In addition Wonderboom is one of the main airports used for civilian pilot training in South Africa. In 2004 a development plan was requested for this airport. A number of EIA's were requested to look at the extension of two of the current runways while plans were drafted for the extension of the current airport building. These few facts illustrates that this is a significant airport and any decision around Wonderboom will have to be considered very carefully.

Many companies use Wonderboom to operate from both in terms of passenger transport and freight. Many of these companies have expanded their operations using this airport and have invested in infrastructure both within the premises of the airport or within very close proximity of the airport. Any changes to the airport will affect these companies significantly and these will have to be considered very carefully in terms of the future of this airport.

### 7.2.3 IMPACT OF PROXIMITY TO OR TAMBO INTERNATIONAL AIRPORT

If the option is to also built an airport to add the third mode of transport to this envisaged logistics hub the impact and proximity of the international OR Tambo airport will need to be taken into account. Currently there are huge developments taking place at OR Tambo to expand the airport and to increase the ability of this airport to handle more passengers, especially international passenger, and also international air freight. The last issue is critical for any other airport that hopes to rely on international air freight and in essence build its future on handling air freight both in terms of receiving air freight from especially Africa and then freighting that elsewhere in the world and vice versa. The question is: Will the growth in international air freight justify an additional international airport in Gauteng? This we believe is going to be a crucial aspect when a decision about a new airport north of Pretoria is made. At present not enough information is available in this regard to make recommendations seeing as ACSA's long term strategy is not public knowledge.

### 7.2.4 MOVING WONDERBOOM

Many of the stakeholders that were interacted with suggested that Wonderboom should be moved to the proposed new airport. On the face of it this is definitely a possibility but again it is an aspect that will require much more detailed investigation. The question is would it be that straight forward to just relocate an airport that has been at it present location for 70 years, what are the implications, what would be required, what would the costs be to do this and what happens to Wonderboom if it is moved? These are but a number of the questions that need to be answered if this is a feasible option.

Relocating to the new location would immediately make the new airport more viable especially in the short term as it works towards being financially sustainable and in the process of marketing itself as a facility of choice.

#### 7.2.5 EXCHANGING THE LAND

Another suggestion was to exchange the land that includes Wonderboom, therefore Wonderboom airport plus some of the surrounding area, with the designated area for the logistics hub. What land exactly will be involved will have to be determined, is this actually feasible, does it make economic sense, is it possible to do an exchange, given the current owners of the land who would then be the owners. Again there are many diverse aspects that will have to be considered before such an exchange can take place.

#### 7.2.6 AIR MANAGEMENT AND REGULATION

In the event of building a new airport and Wonderboom stays where it is or if Wonderboom disappears with the establishment of a new airport various air space management issues as well as air regulation aspects will have to be investigated. From an air space point of view an initial question will be whether it is possible and feasible to safely operate two airports so closely located to each other.

#### 7.2.7 POLITICAL SUPPORT FOR THE AIRPORT

Any decision about a new airport will require support from the Department of Transport at national level, the Gauteng Province at provincial level as well as local government. It seems as if there is at least interest from the City of Tshwane but for the other two levels there is no indication of what the reaction would be. In addition the assumption is that the new airport would have international status – this will have to be discussed, clarified and approved by Civil Aviation within the Department of Transport. The owner of the airport and the organisation that will be responsible for managing the new airport will also have to be decided and agreed on. ACSA is an obvious candidate in this regard but there has been no discussion with this organisation around this issue. An example of an airport owned by the local authority is Lancaster Airport in the United Kingdom.

#### 7.2.8 PROXIMITY TO MARKETS AND MARKET NEEDS

With an airport that will be reliant on moving freight and the growing annual tonnage moved, the proximity to different markets will be critical. At present the one existing need is from the automotive market in terms of sub-components. Currently sub-components are moved via OR Tambo and with an airport close by, one would expect this to change. The current volumes may not be sufficient, and other market sectors that will use this facility will have to be identified. Agriculture is one market sector that could benefit substantially. Fresh agricultural products from the northern area of South Africa and the entire Southern Africa could be exported via such an airport.

A new international airport could have a big influence on, and it could stimulate the tourism market sector, substantially. There are numerous game farms to the north of the city, which would be mutually beneficial, both for the game farms as well as the airport, should it be developed.

A number of people interviewed mentioned that this airport could be the catalyst to move the African Parliament to Pretoria and all the government representatives involved in this parliament can then use this airport instead of OR Tambo. As it is, Pretoria currently hosts most of the embassies of foreign countries, and since many of these are from Africa, diplomats and politicians would be able to use this new airport.

As indicated under alternative 1 a new airport will, by the fact that it exists, generate economic activity and growth given the right environment. However, Wonderboom Airport is situated in a residential area which both limits the expansion possibilities of the airport itself, as well as access to the airport. There are no major highways feeding directly into Wonderboom. Furthermore there are environmental limitations to the expansion of the airport. This leads us to consider the option of the proposed Tshwane International Freight Airport.

### 7.3 COST OF DEVELOPING AN AIRPORT

According to Development Management and Engineering Consultants (2006) the proposed airport runway and taxiway is located across the existing Montanaspruit. An attenuation reservoir will have to be constructed to control the discharge of stormwater onto the airport site. The controlled discharge from the attenuation reservoir will be accommodated in stormwater culverts to be constructed under the runway and taxiway area. The stormwater culverts will discharge on the Northern boundary of the airport site into the existing stream bed. Dissipating structures will be provided at the discharge point to prevent erosion and disruption of the outlet area.

Should the airport be developed, there are a couple of existing services which will be affected, namely:

1. An existing outfall sewer traverses the site from South to North. This is an underground service and the construction of the airport will not affect the functionality of the service.
2. An overhead powerline is located towards the Eastern side of the development. It is proposed that it should be replaced by an underground cable to be located inside a 2m x 2m concrete culvert.

In addition to the two existing affected services, the following services should be developed to attain maximum efficiency for the airport development:

1. The K99 route (Dr. Swanepoel Drive) should be extended to give direct access into the site. It is located South of the N4 highway and it's proposed that the K99 be extended North and constructed as a dual carriageway from kilometre 7.100 to kilometre 14.037. The K99 route should be revised to accommodate the current development as it did not form part of the initial planning. Provision should be made for the installation of stormwater culverts and other service crossings as required to accommodate stormwater and services along the route.

The estimated cost of the access road excluding the bridges is R 17 350 000 (Excl VAT).

2. The existing 315mm diameter water main located at the intersection of Dr. Swanepoel road Airport road will be extended to provide a link service to the proposed airport. This water main will be designed to accommodate future development of townships located to the North of the N4.

The estimated cost of this service according to Development Management and Engineering Consultants (2006) is R 2 300 000 (Excl VAT).

3. It is recommended that the extension of the K99 road be fenced with concrete palisade fencing. The fencing should be 2m high and precast palisades.

The estimated cost excluding VAT is R 1 965 000.

4. An area will be allocated for the construction of a stormwater attenuation dam. The attenuation dam will be designed to control the discharge of stormwater which has to be accommodated under the runway and taxiway.

The estimated cost of the attenuation dam including flow control structures is R 7 300 000 (Excl VAT).

5. On the road leading into the airport bridges will have to be constructed and will be designed to accommodate the post development run-off from the catchment area. The bridges will be designed for a single carriageway road and there will be two bridges located on the road leading into the airport.

The total estimated cost as determined by Development Management and Engineering Consultants (2006) is R 8 370 000 for both the bridges.

6. 2m high concrete palisade fencing will be erected around the parameter of the airport.

The estimated cost of the boundary fence is R 4 120 500 (Excl VAT).

7. Existing overhead electrical cables traverses the airport. These cables will be relocated below surface in a 2mx2m concrete culvert 1 070m long. 11 Access chambers will be provided at 100m intervals.

It is estimated that this will cost R 8 200 000 (Excl VAT).

8. The existing canal from the Bon Accord dam traverses a portion of the airport site. This canal will be accommodated in a 1 350mm diameter pipe which will be 2 470m long

The estimated cost of this culvert is R 6 669 000 (Excl VAT).

9. The airport runway and taxiway will be constructed over the Montana Spruit. The Montana Spruit will be accommodated in a series of culverts over a distance of 500m.

This will account for approximately R 34 500 000 of the total cost (Excl VAT).

10. A 5m wide gravel patrol road will be constructed along the perimeter of the airport site.

The estimated cost of the patrol road is R 1 353 000 (Excl Vat).

11. An existing outfall sewer traverses the Western portion of the site. A sewer pump station with a rising main will be installed to collect sewerage generated from the airport facilities and discharge into the existing rising main.

The estimated cost of the sewer system is R 396 000 (Excl VAT).

(Development Management and Engineering Consultants, 2006)

All of the above accumulates to a total cost for development of R 95 553 500 (Excl VAT). This amount excludes the engineering fees and any contingencies. It is estimated that the total cost of development of Tshwane International Freight Airport will be close to R 130 500 000 including all of the above. Table 11 shows how this cost was calculated.

**Table 12: Summary of costs**

| <b>Item</b>      | <b>Description</b>                                 | <b>Amount</b>       |
|------------------|--|---------------------|
| 1                | <b>Northern extension of the K99 route</b>         | R 17 350 000        |
| 2                | <b>Extension of water main</b>                     | R 2 300 000         |
| 3                | <b>Precast concrete palisade fence</b>             | R 1 965 000         |
| 4                | <b>Attenuation dam</b>                             | R 7 300 000         |
| 5                | <b>Construction of bridges</b>                     | R 8 370 000         |
| 6                | <b>Concrete palisade fencing airport perimeter</b> | R 4 120 500         |
| 7                | <b>Concrete culvert for cables</b>                 | R 8 200 000         |
| 8                | <b>Concrete culvert for canal</b>                  | R 6 699 000         |
| 9                | <b>Stormwater culvert under airport site</b>       | R 37 500 000        |
| 10               | <b>Perimeter patrol road</b>                       | R 1 353 000         |
| 11               | <b>Sewer system</b>                                | R 396 000           |
| <b>Sub-total</b> |  | <b>R 95 553 500</b> |

|                            |                      |
|----------------------------|----------------------|
| Estimated Engineering Fees | R 8 500 000          |
| <b>Sub-total</b>           | <b>R 104 053 500</b> |
| + 10% Contingencies        | R 10 405 350         |
| <b>Sub-total</b>           | <b>R 114 458 850</b> |
| + 14% VAT                  | R 16 024 239         |
| <b>Total</b>               | <b>R 130 483 089</b> |

(Development Management and Engineering Consultants, 2006)

The above costs are an estimation of what the total cost of development will be. It should again be reiterated that the ideal way of constructing an airport is through public-private partnerships. This simplifies the process of generating the funds required for a development of this magnitude.

## 8 RESULTS

### 8.1 BENEFIT TO SOUTH AFRICA

It is concluded that the establishment of logistic hubs, not only in the study area, but also in other areas that comply with the requirements for a logistics hub as discussed, will support the aspects indicated below.

#### 8.1.1 ECONOMIC COMPETITIVENESS

South Africa is currently competing with other developing countries such as India, Brazil and China for their share of the world market. Geographically these countries are further from the major developed countries such as the United Kingdom and the United States of America than South Africa. This is one of the reasons why the development of logistics hubs is so important to the improvement of a country's logistics. Countries such as China and India have really low minimum wages with which South Africa cannot compete. A positive indication is that all of these countries are like South Africa, separated from the world market, so if South Africa can manage its transport costs, it could favourably compete with the other developing countries.

In 2005 total logistics cost was R223 billion and accounted for 14.5% of the total GDP of South Africa. It shows a relative 9% increase from 2004. This is illustrated in the figure below. It is also clear that the biggest component of the country's logistics cost is transport costs. It amounts to 63.1% of the total logistics costs.

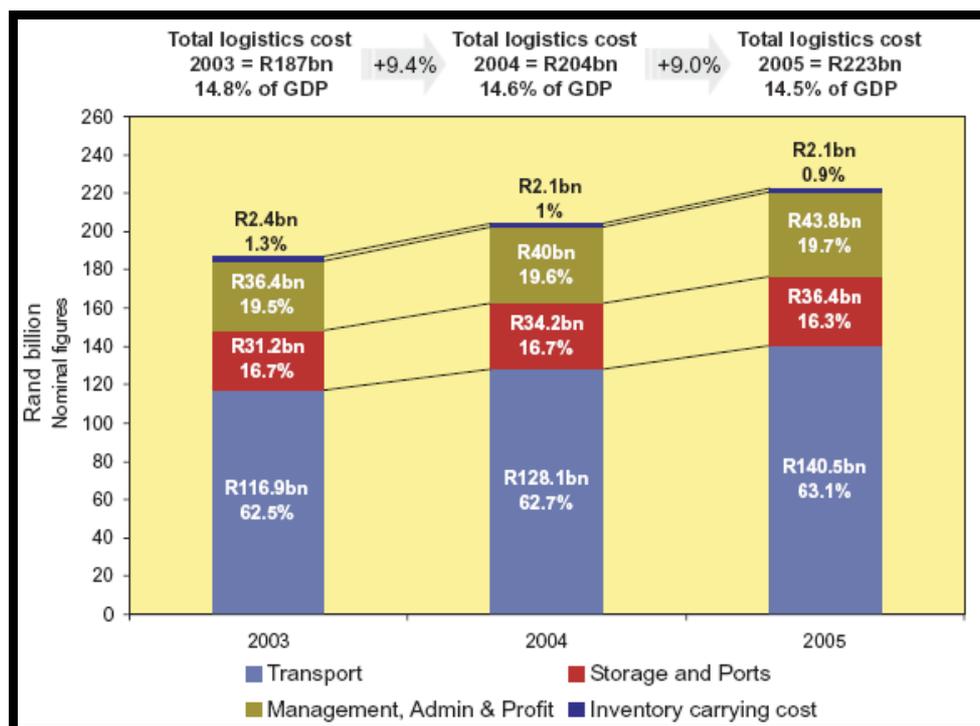


Figure 24: South Africa's logistics cost stack elements

(CSIR, 2006)

In comparison to this, the total logistics cost of the United States is US\$1 305 billion and is the equivalent to 9.9% of the GDP in 2006. The total transportation cost for the US was US\$365 billion which comprise 27.97% of the total logistics cost (CSCMP, 2007). This should be an indication for our country that there is indeed room for improvement. Seamless freight movement is a step in the right direction. Logistics hubs, logistics precincts, transshipment facilities or inland ports are methods to obtain this goal. For South Africa to be competitive in the global market, it has to improve their cost of transport operations thus lowering the total cost of logistics. To obtain this goal, it is necessary for the country to manage current existing transport infrastructure optimally and to invest in strategic new infrastructure.

### 8.1.2 SOUTH AFRICA IN THE SADC REGION

Figures indicate that South Africa is the leading economy in the SADC region. South Africa's GDP is by far the more superior to name just one facet. From this the opportunity arises for South Africa to establish itself as the region's logistics hub.

Although this one aspect is of great importance, probably the thing that sets South Africa apart from the rest of the countries in SADC is the opportunities which come to pass from being the leading economy, and geographically a natural “port of entry” for international ocean transport.

These opportunities should not only be beneficial to South Africa, but when managed correctly, it could benefit the entire SADC region. With projects currently under way such as the Maputo Corridor Development as well as the N4 platinum highway giving direct access to Botswana and Namibia, South Africa already has the infrastructure and capabilities to operate as a regional logistics hub. Further developments can be made to enhance the competitive advantage of the entire SADC region in the global market.

---

### 8.1.3 HUMANITARIAN LOGISTICS

One such opportunity which could benefit the entire region is Humanitarian logistics. It refers to the management of aid processes especially in a crisis situation such as the tsunami in Asia in 2005 or the floods in Mozambique. Humanitarian logistics start with the assessment of aid required, the physical movement of aid personnel and aid into the affected disaster area and then employing it in the most efficient and effective way to help relieve the effected disaster areas. Although humanitarian logistics utilises the same principles as conventional logistics, there are a number of additional obstacles that need to be overcome, none more so than the fact that it usually takes place in disaster areas with limited access as well as other physical impediments and requires immediate and in certain cases instantaneous action.

The Asian tsunami of December 2005 taught the logistics community a number extremely important lessons. Critical gaps in the coordination of aid were highlighted as well how spontaneous aid could block the entire supply chain. Aid should be well coordinated with local expertise. But the most important lesson learnt from the tsunami is the realization that there is a desperate need for regional aid hubs. Most aid agencies’ primary warehouses are in Europe close the agency’s headquarters. Although these warehouses are of the highest logistics and warehousing standards, the fact of the matter remains its physical location away from disaster areas are far

and transit times long. One example of such a development is the International Humanitarian City (IHC) in Dubai:

The first humanitarian hub of its kind, IHC enables humanitarian organisations through its global reach, infrastructure and custom designed services to facilitate aid and development efforts across the globe.

Acting as both an operational platform and a physical and virtual meeting place, IHC provides non-profit organisations, companies, donors, volunteers, governments and those striving to save lives with a common ground for collaboration (Dubai Humanitarian City, 2007).

IHC is an independent free zone authority created by the government of Dubai. It concentrates humanitarian aid in a secure environment which fosters partnerships and improves coordination. Further benefit can be gained by locating private sector in the same vicinity as humanitarian aid, the enables operational efficiencies and encourages the sharing of best practice.

Logistics hubs offer humanitarian agencies the opportunity to pre-position aid for a region. Africa as a whole is in desperate need of such a solution. The disaster areas in Africa are not necessarily natural disasters (ex. the floods in Mozambique) but famine, war and disease. With the pre-positioning of humanitarian aid comes increased efficiency of humanitarian logistics. Logistics hubs present an opportunity for further value added processes, such as consolidation and shared transport to name but a few. South Africa as a regional logistics hub is the ideal location for a humanitarian logistics hub (Maspero, 2008).

---

#### 8.1.4 IMPROVEMENT OF INTERMODALISM IN SOUTH AFRICA

A major barrier to the improvement of the South African logistics cost, is the limited and inefficient intermodal solutions currently in use. For South Africa to optimize its container operations the transport industry should increase modal cooperation, not modal competition. The most important intermodal solution which could be

incorporated in South Africa is surely the amalgamation of road – rail systems. South Africa does not have inland waterways to integrate into intermodal solutions. The most obvious solution is thus managing current and existing infrastructure such as public roads and rail. This will inevitably lead to improvement of the major corridors in South Africa, none more so than the Durban – Gauteng corridor. There is a desperate need for the improvement for this specific corridor. There is even talk of creating a dedicated highway for trucks on this corridor. This is in an effort to elevate the heavy congestion on the N3. Rail on this corridor is used only 30% of capacity, this surely could improve enormously.

Logistics practice suggests that there are certain commodities which are better suited for transport by rail. These commodities can be generalised as commodities with high volume and low value and are among others cars, coal, grain and steel or iron ore. However, with Transnet Freight Rail's current bad reputation, even some of these commodities traditionally suited for rail are now transported on the roads. According to the Moving South Africa Project (Department of Transport, 1998), it is forecasted that freight movement between Gauteng and Durban will increase by 84% by the year 2020, the volumes to Maputo will increase by 177% and goods to Beitbridge by 72% over the next 20 years. These forecasts will have a vast impact on the available infrastructure. The ideal will be to invest in additional infrastructure as soon as possible (Corporate Planning Unit, 2002).

The latter is exactly what Transnet Freight Rail has vowed to do over the next five years with their capital expenditure plan. The plan aims to improve rail infrastructure and in doing so, making rail transport more efficient and effective. This incentive should be viewed in a positive light and as a motivation for private sector and government to cooperate in a productive manner. Even though it might not be feasible to change the gauge of the South African rail infrastructure, what the country has available to them should be optimised.

The container forecasts showed in Chapter 4 indicate a significant increase in container traffic at both Cape Town and Durban. The most significant increase is from 2005 to 2020. Container traffic at the Port of Durban is forecast to increase

from 1 690 000 TEUs in 2005, to 5 363 000 TEUs in 2020 (CSIR, 2007). It is thus of cardinal importance to invest in new solutions immediately. Containers are currently the main commodity that benefits most from intermodal integration. This should surely be motivation enough for South Africa to invest in intermodal solutions.

## 8.2 LOGISTICS HUBS IN SOUTH AFRICA

It is the conclusion of this study that logistics hubs are a very good intermodal solution to implement in South Africa. Should other logistics hubs be developed along with the Tshwane Logistics Hub, these different hubs should be viewed as complementary to each other and not in competition. It should be developed in collaboration with each other, local government, national government and the private sector. This last point can not be overemphasised.

All relevant sectors should have a shared vision as to the goals they want to obtain when developing logistics hubs. It should be seen as the optimisation of South African logistics and the creation of jobs as well as a competitive advantage in the global market. The world is getting smaller and South Africa as a country and SADC as a region should establish the role it wants to play in the global market place. From this position it should align all strategies to obtain the specific goal, not compete within the borders of the country and in the region.

One of the success stories in this regard is the automotive industry in South Africa. It has shown immense growth over the last couple of years as a result of coming to the conclusion that motor brands are not necessarily competing with each other in South Africa. Consumers already have a pre-established idea of what type of car they want to buy, so why not set up automotive garages in the same area, to simplify the experience for the consumer. Mercedes-Benz Menlyn is not competing with Mercedes-Benz Sandton, but rather with the Mercedes-Benz dealership in America as an example. This collaboration has benefited the automotive industry of South Africa immensely and as a result, exports have shown an increase over the last number of years. The figure below shows exactly what coordination from

government and collaboration from industry can achieve. Exports have grown on a per month basis especially in the first half of each year.

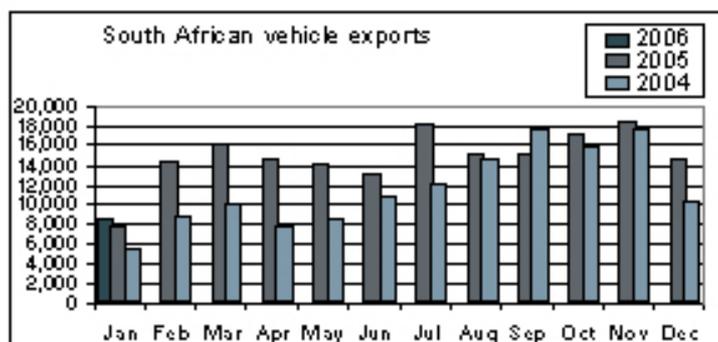


Figure 25: South African vehicle exports

(CSIR Built Environment, 2007)

### 8.3 AFRICAN RENAISSANCE

In May 1996 the then deputy president of South Africa, Thabo Mbeki addressed the constitutional assembly with the now famous “I am an African” speech (ANC, 1996). It calls upon the African people and nations to solve the many problems troubling the African continent. And thus the era of the African Renaissance was born (Wikipedia, 2008).

In April 1997, Mbeki listed the elements that would eventually be seen to comprise the African Renaissance. Among these elements were economic rebuilding and growth. Despite the criticism against the concept, no one person can deny the fact that renaissance entails a radical change in the systems of thinking. Collaboration, coordination and cooperation is indisputably a change in the system of thinking for South Africa, SADC and the African continent, but an omissible aspect for us to become globally competitive as well as locally efficient.

## 9 CONCLUSIONS

The location of the farm Doornpoort JR-395 which was earmarked for the purpose of the case study is ideal for the development of a logistics hub and it is suggested that such a logistics hub would indeed benefit the entire community and region. The most benefit would however be derived if an international freight airport forms part of the logistics hub. This reasoning behind this statement is the fact that at the AIDC's supplier park in Rosslyn, there is currently a container facility already in operation. The only reason the automotive industry will make use of another freight terminal, will be if the facility gives them a further value added service, such as an airport. From a pure logistics point of view, this location can be labelled as the gateway into Africa and gives an excellent opportunity to not only give a competitive advantage to only the City of Tshwane, but the entire South Africa.

### 9.1 SUMMARY OF RESULTS OF EMPIRICAL STUDY

**Table 13: Summary Assessment of Tshwane Logistics Hub**

| CRITERIA                                | RATING              | SUMMARY OF ASSESMENT  |
|---|---------------------|---|
| TRANSPORTATION AND WAREHOUSING INDUSTRY | Excellent potential | This site, should it be developed to its full potential will give any company an excellent competitive advantage, and can be used to attract industry.  |
| WORKFORCE                               | Good                | Informal settlements located in close proximity, has the potential to alleviate unemployment.<br><br>Workforce has lower pay rates compared to other parts of the city.   |
| HIGHWAY ACCESS                          | Excellent           | The N1 highway passes adjacent to the farm on the eastern side and joins the N4 highway south-east of the farm. The N1 creates north-south connection.<br><br>The N4 highway runs south of the farm and gives direct access to the site via the K99 (Dr Swanepoel) interchange. |

|                                     |                  |   |
|-------------------------------------|------------------|---|
| ROAD AND BRIDGE CONDITIONS          | Good             | <p>Potential for further bridge utilisation to the north of the farm.</p> <p>Roads around the farm are well maintained by SANRAL.</p> <p>Sufficient road capacity available.</p>  |
| ROAD DENSITY AND CONGESTION         | Good             | <p>Normal peak hour traffic is experienced, but is north of the renowned heavy congestion.</p>  |
| PLANNED ROAD INFRASTRUCTURE         | Excellent        | <p>The K99 extension has a direct impact on the logistics hub and is of cardinal importance to gain access to the site.</p> <p>The PWV 9 development which is key to the Maputo Corridor Development opens new opportunities.</p> |
| VEHICLE TAXES AND FARES             | Moderate – Good  | <p>Both the N1- and N4 highways are toll roads.</p>   |
| RAILROAD INFRASTRUCTURE             | Good - Excellent | <p>Pyramid switchover yard is adjoining to the farm at the northern border.</p> <p>Turnaround loop already in existence.</p> <p>Transnet willing to investigate the possibility of further development</p>                        |
| PROXIMITY TO MARKET AND MARKET NEED | Moderate – Good  | <p>Main industry not located north of Tshwane, however, there are multiple opportunities including the automotive industry, Lion Matches and the tourism industry.</p>  |

|                                      |                 |   |
|--------------------------------------|-----------------|---|
| LOCATION AWAY FROM RESIDENTIAL AREAS | Good            | Located away from residential area.<br>Able to operate 24 hours a day.  |
| DEVELOPED AT A REASONABLE COST       | Moderate – Good | Rail connections already in place.<br>Only small lengthening of the K99 required to gain direct access to the northern part of the farm.<br>Opportunity to attract private investors. |
| AIR CARGO INFRASTRUCTURE             | Potential       | First Land Development willing to develop farm into competitive international cargo airport.  |

## 9.2 ADVANTAGES OF AN AIRPORT

The potential to develop an airport in the Metropolitan Municipality of Tshwane is excellent, especially on the farm Doornpoort 295 JR. It is recommended that the development of such an airport will be to the benefit of the entire region around Tshwane as well as for South Africa. The advantages of the development of an airport are:

- Land is readily available for development.
- The site is nearby retail, industrial, residential and business nodes.
- Major transportation and development corridors such as the MCDC, the N4 Platinum highway and the N1 upgrades are in direct proximity to the site.
- The site displays suitable topographic characteristics conducive for the construction of runways and the acoustic and visual screening of the airport and its activities from surrounding urban areas.
- Engineering infrastructure is readily available with sufficient capacity to accommodate the development of an international airport.

- New and existing roads are in the process of being constructed and upgraded respectively. Direct access to the site, via the N4 Platinum highway is available.
- A functional hierarchy of roads that will feed directly into the site is being established. The roads that will provide such access directly or indirectly are the N4 Platinum highway, the N1 highway and the regional K14 (Zambesi Road) and the K99 (Dr Swanepoel Road) distributor roads.
- No negative effects are anticipated to affect the existing urban environment. The closest urban development in relation to the site is situated approximately 3 km south thereof.
- The perpendicular orientation of the airport in relation to OR Tambo International Airport will ensure that no conflicting air traffic movements will result between the two airports.
- No over flights of institutional centres such as the Onderstepoort Veterinary Research and Tertiary education facility or the Wonderboom Military Base will take place, as both institutions are situated approximately 5 km south-west of the proposed site.
- Low approach and departures over residential areas will be non-existent as the approach and departure courses will not traverse residential areas.
- Improved air traffic safety will be of the order of the day as new and internationally acknowledged equipment will be utilised, in conjunction with suitable infrastructure and facilities.

Apart from the definitive advantages of the site, it also poses a number of opportunities which should be exploited when developing the airport:

- The automotive sectors in Rosslyn as well as other industrial areas have a need for localised product and goods distribution to foreign export markets. Shorter travel and delivery times improve the profitability with national distribution and international export opportunities.
- Economic, physical planning and development initiatives will stimulate and be stimulated by the airport development.

- The airport will be a gateway, figuratively and literally to the City of Tshwane and its greater region for tourists and industrial products and goods.
- Labour will be readily available from the surrounding areas.
- The existing export of air-cargo originating from, inter alia, Rosslyn and the Onderstepoort Veterinary Institute can be accommodated locally.
- The airport site will have direct access off the N4 Platinum highway resulting in the ability to handle increased traffic volumes.
- The Pyramid South Switchover yard will ensure rail and cargo facilities with a potential of providing the airport with additional export cargo originating from decentralised industrial centres such as Brits.
- The development of a regional rail commuter and tourist node with associated industries at the airport is another opportunity.
- Selective urban development can be accommodated along the N4 and N1 highways, concentrating on commercial, office and clean industry sectors that focus on airport development and related industries. Hotels, residential villages and integrated open space areas can also be accommodated to provide a fully integrated and functional urban environment.
- The new airport will adhere to international standards and support new and technologically improved infrastructure and facilities to ensure safety, convenience and efficiency.

The biggest opportunity still remains the possibility to create a complete end to end solution, and in doing so, adding value to operators, manufacturers and the end users.

(De Bruyn, C. P. 2006)

### 9.3 CONCLUSIONS

The location of the farm Doornpoort 295 JR is excellent for the development of a logistics hub. There are two major highways leading directly into it, with minor roads feeding the highways. Apart from that, there is existing rail infrastructure which can be utilised for container- and freight movements. There is sufficient open space for development with an excellent opportunity for the development of a world class International Airport in Tshwane, as well as a container depot and warehousing. From a pure logistics point of view it is hard to imagine a more favourable location for the development of a logistics hub. Major infrastructure is already in place, and the opportunity arises to market a formidable economic prospect, thus attracting private funding.

A logistics hub with two modes of transport, namely road and rail, can be of benefit to the region; however the conclusion is that a logistics hub with an additional mode, namely air transport will be most beneficial. With this there are immediately additional issues which arise. These areas are briefly listed below:

- Moving Wonderboom Airport
- Should Government (local or other) manage the airport
- Impact of OR Tambo International Airport
- Exchanging the land of Wonderboom and Doornpoort 295 JR
- Air management and regulation
- Proximity to markets and market need

As mentioned previously, there is currently a study commissioned to determine the future of Wonderboom Airport. The result of this study needs to be taken into account when deciding on the development the Tshwane International Freight Airport.

Extensive Environmental Impact Assessment studies will have to be done on Doornpoort 295 JR to determine whether developing the site is an environmentally feasible option. Studies were done on the farm for the Zone of Choice Environmental Management Framework Report (2007) which concluded that the farm is indeed suitable for development, and First Land Development themselves have commissioned an in depth Environmental Impact Assessment on their farm exclusively. The results of the latter are not yet known.

Further studies are required on the development of a container depot on the identified farm. Currently, the AIDC has a container depot located at their supplier park; but, the Doornpoort 295 JR farm is more favourably situated for a container depot. General access to the farm is superior to the access to the supplier park. In this regard, studies will have to be undertaken on the technical side of rail transport, the movements at Pyramid South, the rail capacity as well as the feasibility of doing the switch over as mentioned by Meyer & Strydom (2007). This study will have to be conducted in close partnership with Transnet.

A last concern is that of the market size and job creation. Economic studies need to be undertaken to determine the actual market size in Tshwane that would benefit from such a development, as well as the jobs that will be created which will result in increased job opportunities to the north of the Magaliesberg. According to the City of Tshwane Revised Integrated Development Plan (2005) the city contributed 27.9% to Gauteng's Gross Geographic Product (GGP). The city showed an average annual economic growth of 5.1% from 1996 to 2002; however, it decreased to 3.8% from 2002 to 2004. The transport sector showed growth of 12.5% in the period from 1996 to 2002. Developing a logistics hub will attract unprecedented economic activity to the city once it is established and the opportunity arises to combine it with industrial parks. Lion Matches has its only factory located in Rosslyn, the AIDC developed their supplier park in Rosslyn and South African Breweries has a factory in Rosslyn. These are just three of the major potential beneficiaries of the Tshwane Logistics Hub. The key will be to obtain industry support from these institutions, and this will pave the way for additional companies to get on board and increase economic activity around the logistics hub.

Another obstacle is the power line running across the farm. It is proposed that the line be made either to run underground or to be rerouted around the site. In its current position, it will run across the optimal location for the airport runway.

#### 9.4 SUCCESS ELEMENTS OF TSHWANE LOGISTICS HUB

A very important aspect of the logistics hub will be its design and layout. Figure 24 gives a visual perception as to the exact location of the site as well as its features. The following are the recommendations with regard to the above.

---

##### 9.4.1 POSITION OF LOGISTICS HUB

On the farm there are small hills, namely Hall's Hills, which dissect the farm in two. It is suggested that the logistics hub be developed to the north of Hall's Hills. This will limit noise created by the hub and serve as a noise abatement barrel to the residential areas.

Another reason for developing it to the north is the location of the rail infrastructure. It is essential to develop the logistics hub for optimum use, and this will be obtained by positioning transport infrastructure in close proximity to each other. This enables efficient intermodal transshipment. Cargo moved from one mode of transport to another does not have to travel great distances to make use of another mode of transport.

---

##### 9.4.2 ACCESS TO THE LOGISTICS HUB

Although there is existing access from the N4 highway to the gate of the site, the road in the farm is not surfaced and is currently a dirt road. The K99 road is nonetheless part of SANRAL's development plans and will be completed and give direct access to the farm. It is however proposed that the existing bridge to the north of the farm be completed with the necessary on- and off ramps. The reason being, that this option will give a second alternative entrance or exit to the logistics hub.

This alternative also gives direct access from the N1 highway and is located closer to the rail road infrastructure, as well as the proposed Tshwane International Freight Airport.

---

#### 9.4.3 OWNERSHIP

The Private Public Partnership (PPP) is the most widespread and efficient organizational structure for companies managing logistics hubs. The share capital of such a partnership is owned by both public and private partners in different percentages. In most case Public Authority's owns the larger share. The reasoning behind this type of partnership is linked to financial, infrastructure and planning aspects. Huge investments are required when developing a logistics hub from the beginning. The investments spans from the warehousing infrastructure, to the provision of services. A logistics hub's size may reach millions of square meters and has a massive effect on the local economy. It becomes part of a greater local territorial development plan constituting the basis for all infrastructure and territorial implementation (Europlatforms, 2004).

---

#### 9.4.4 VALUE ADDED SERVICE

It is concluded that the logistics hub should create a total solution. For this to be viable, a customs checkpoint should be set up on site. This in itself would serve as a means to attract new investment through the fact that organisations can make use of a solution which reaches from origin to destination. Along with the customs checkpoint, it is also recommended that warehouses should be set up with the aim to accommodate freight which needs to be cleared by customs, either coming into the country or outbound freight. The logistics hub should be run with all the functionality of a port, but geographically distant from any ocean.

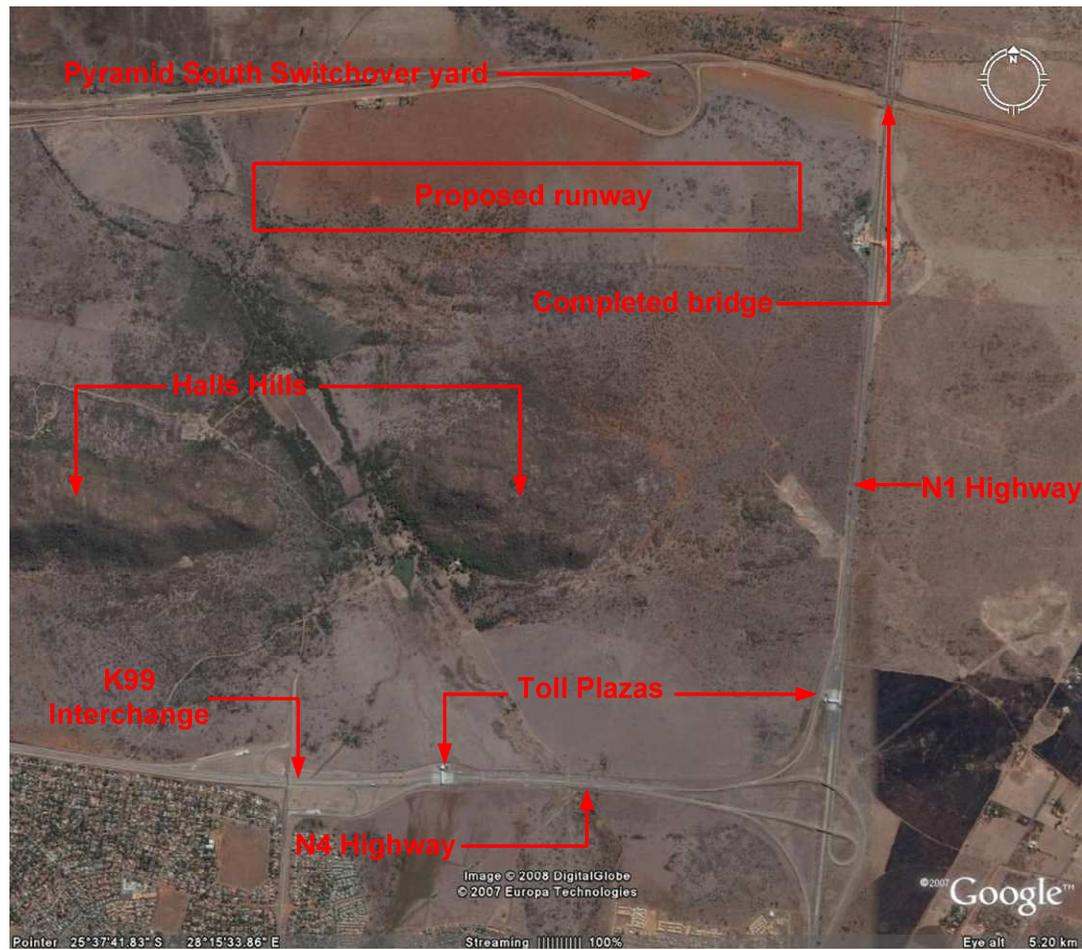


Figure 26: Proposed Location of the Tshwane Logistics Hub

(Google Earth, 2008)

#### 9.4.5 CITY DEEP

City Deep container terminal is situated in Johannesburg city centre. It is very difficult for any expansion possibilities of City Deep as a result of this. The infrastructure is surrounded by the City of Johannesburg. It is the recommendation that City Deep being operated in conjunction with the Tshwane Logistics Hub. This should result in a more efficient distribution network to the region in and around Gauteng. The capacity of City Deep by itself is not enough to accommodate the growth expectations from Transnet and it will need additional capacity to maintain expansion. This does fit into both Transnet and Transnet Freight Rail's strategic planning according to Meyer and Strydom (2007). They are investigating a massive development to the East of Gauteng, and a development such as the Tshwane Logistics Hub would serve the bigger facility well. The Tshwane Logistics Hub can, however, not be operated in along with the smaller Pretcon container terminal in Pretoria city centre. This facility is not ideally situated for a container terminal and it's suggested that the terminal be shut down and developed into low cost housing.

#### 9.4.6 RUNWAY OF TSHWANE INTERNATIONAL FREIGHT AIRPORT

To be able to distinguish the airport from both Wonderboom airport as well as OR Tambo International airport, it is necessary to have a runway which can accommodate larger aircraft. The size of the study area provides the possibility to accommodate a runway of 4 200m. This will be efficient to accommodate most if not all of the aircraft currently in the skies, as well as those in planning for the near future. A runway of 4 200m will be longer than that of OR Tambo International airport, while the location provides a more favourable height above sea level. The runway should be built in an east-west direction in line with predominant wind direction, and the farm and adjacent open land provide for all the necessary safety areas.

#### 9.4.7 MAINTENANCE FACILITIES

Another important facet of a logistics hub should be the on-site maintenance facilities. This would make the entire facilities' operations seamless. This will be another value added service which would attract companies to locate at the logistics hub. Should a truck, train or aeroplane require repair or maintenance, it should be readily available either on-site, or it should at least be able to be facilitated from the site.

It is difficult for aviation maintenance and repair, seeing as it should comply with a number of IATA standards and currently most aviation facilities are not located in Tshwane. Realistically it should then be investigated whether an expert should not be deployed to the logistics hub that can give maintenance and repair advice and then ensure the maintenance and repair process is indeed taken further.

#### 9.4.8 AIRPORT'S INTERNATIONAL STATUS

For the airport to be successful, it is a necessity that it should have international status. This aspect has to be cleared with the Civil Aviation Authority, seeing as they have already retracted Wonderboom's international status on the grounds that it is not one of the major airports in South Africa. It is reiterated that this is of the utmost importance. For the logistics hub to be truly thriving it should be able to either import or export goods and this would require customs clearance for at least 12 hours per day but preferably for 24 hours per day, depending on the operating hours of the facility.

#### 9.4.9 CENTURION AEROSPACE VILLAGE

Currently there are plans underway to develop the Centurion Aerospace Village (CAV) by the Aerospace Industry Support Initiative (AISI) in cooperation with the Department of Trade and Industry (DTI). It is a concept similar to that of the AIDC supplier park in Rosslyn. The facility is planned for development on the grounds of Aerosud, which is adjacent to the Waterkloof Air Force base in the east of Pretoria. The CAV is currently under development with the understanding that they may make

use of the runway at Waterkloof Air Force base to fly parts into the country. Even though the CAV has clearance to make use of Waterkloof Air Force base, there are bound to be additional air traffic requirements which will not be able to be fulfilled by Waterkloof as a result of its size and location close to a residential area. If Tshwane International Freight Airport is in fact developed at the proposed site, it seems that it would be able to accommodate most international requirements and it could thus benefit from the CAV.

---

#### 9.4.10 2010 SOCCER WORLD CUP

Wonderboom Airport forms part of the strategic plan for the 2010 Soccer World Cup. Currently the airport is under renovation to upgrade its terminal facilities. This is done with the aim to use the airport for the transport of the world's media. The goal is to lighten the load on the major airports such as OR Tambo and even Lanseria Airport. Wonderboom is not suitable for freight transport in the 2010 World Cup. The time frame for the development of the logistics hub is thus influenced by the soccer World Cup; however, this could also be seen as an opportunity to showcase initiatives and to attract further investment.

### 9.5 ACCESSING THE “PHYSICAL INTERNET”

The physical internet is described as the global network connecting firms, suppliers and consumers. According to the World Bank's Logistics Performance index (2007), the ability of countries to access this global network depends on the quality of its national infrastructure as well as the effectiveness of its policies and institutions. Expanded supply chains put a new premium on moving goods in a predictable, timely and cost effective way. Well connected countries can have access to many more markets and consumers. But for poorly connected countries, the costs of exclusion are considerable and growing, and the risk of missed opportunities looms large especially for the poorest landlocked countries, many of them which are in Africa. Organisation base their decision of in which country to establish itself on the performance of a country's logistics. High logistics costs are seen as a barrier to trade and foreign direct investment and thus to economic growth. The answer lies in better processes, higher quality services, and the operating environment. Seamless,

paperless systems should be the goal of each country to optimise logistics processes. (World Bank, 2007)

Some of the factors determining logistics performance include the quality of infrastructure of which IT and telecommunication systems are of the utmost importance. In the case where communication infrastructure is not up to standard, the freight forwarder's main concern would be a breakdown in the supply chain, and not on the service provided to the client. Transport infrastructure is fundamentally important and should be able to satisfy rapidly growing demands. The competence of private and public logistics service providers is another key aspect. The performance of the supply chain depends on the quality of service provided by private sector in collaboration with the proficiency and diligence of public agencies such as the border control. Corruption and transparency is cardinal in the overall governance of logistics systems, and when establishing logistics hubs, this issue should be taken into account and addressed where necessary. The last factor is the reliability of the supply chain. Quality of service along with reliability is the key in the age of globalisation. Customers tend to value the latter more than the cost of the service provided. (World Bank, 2007)

South Africa was rated a respectable 24<sup>th</sup> on the Logistics Performance Index (LPI), but the major area of concern is the high logistics costs where it was rated 124<sup>th</sup>. Through this an opportunity arises which South Africa should exploit. The development of Tshwane Logistics Hub addresses all of the factors which determine logistics performance, thus resulting in improved efficiency and effectiveness of the country's logistics system. Not only will it improve the South Africa's logistics performance, but it will also give the country the opportunity to access the "physical internet" which is the global market and in turn result in economic growth. Tshwane logistics hub poses a prospect which should be developed to the benefit of not only the City of Tshwane or South Africa, but to the entire Southern African region.

## 10 REFERENCES

African National Congress, South Africa. 1996. I am an African. Available at: <http://www.anc.org.za/ancdocs/history/mbeki/1996/sp960508.html> [2008, 4 January].

APICS Certified Supply Chain Professional. 2005. Building Competitive Operations, Planning, and Logistics 2. USA.

Arcus Gibb. 2007. Report: Gauteng Freight Implementation Strategy. Johannesburg.

Bakwena. 2007. N4 Platinum Highway. Available at: [www.bakwena.co.za](http://www.bakwena.co.za) [2007, 14 September].

Baluch, I. 2005. Transport Logistics: Past, Present and Predictions. Winning Books. Dubai. United Arab Emirates.

Barloworld Logistics. 2006. Report: Supply Chain Foresight. South Africa.

CIA. 2007. CIA Fact book. Available at: <https://www.cia.gov/library/publications/the-world-factbook/geos/xx.html> [2007, 7 December].

City of Tshwane Metropolitan Municipality. 2005. City of Tshwane: Integrated Development Plan. Pretoria. Available at: [www.tshwane.gov.za/idp.cfm](http://www.tshwane.gov.za/idp.cfm) [2007, 19 June]

City of Tshwane. 2007. Zone of Choice Environmental Management Framework Report. Pretoria.

Corporate Planning Unit, City of Johannesburg. 2002. Joburg 2030. Johannesburg, South Africa.

CSCMP. 2007. Report: The eighteenth annual State of Logistics. National Press Club. Washington D.C. USA.

CSIR Built Environment. 2007. Industry analysis. Pretoria.

CSIR. 2006. Third Annual State of Logistics Report. Pretoria.

CSIR. 2007. Fourth Annual State of Logistics Report. Pretoria.

Dallas Logistics Hub, USA. 2007. Available at: [www.dallaslogisticshub.com](http://www.dallaslogisticshub.com)

[2007, 11 November].

Daventry International Rail Freight Terminal, United Kingdom. 2007. Available at: [www.dirft.com](http://www.dirft.com) [2007, 31 October].

De Bruyn, C.P. 2006. Report: Tshwane International Airport. Pretoria.

Department of Trade and Industry. 2007. South African trade statistics. Available at: <http://www.thedti.gov.za/econdb/raportt/rapcoun.html> [2007, 6 December].

Development Management & Engineering Consultants. 2006. Report: Tshwane International Airport – Preliminary service report. Sandton, Johannesburg.

Duisport International Inland Port and Logistics Hub, Germany. 2007. Available at: [www.duisport.de/en/](http://www.duisport.de/en/) [2007, 6 November].

Dubai Humanitarian City. 2007. Available at: <http://www.dhc.ae> [2008, 3 January].

Europlatforms EEIG. 2004. Logistics Centres, Directions for use. Available at: [http://www.unece.org/trans/main/eat/docs/EN-REV-What\\_is\\_a\\_Freight\\_VillageFinalcorretto.pdf](http://www.unece.org/trans/main/eat/docs/EN-REV-What_is_a_Freight_VillageFinalcorretto.pdf) [2008, 1 April]

Fernandes, P., Jansen, Z. 2007. Personal interview. 2 July 2007. Pretoria.

Friedman, T L., 2005, The world is flat, Farrar, Straus and Giroux, USA.

Frigenge, B., Hill, D. 2007. Personal interview. 25 June 2007. Johannesburg.

Google Earth. 2008. Available at: [www.earth.google.com](http://www.earth.google.com) [2008, 23 January].

Gouws, A., Kleynhans, H. 2007. Personal interview. 13 June 2007. Pretoria.

Gouws, A. 2007. Presentation: The Economy in the City of Tshwane. June 2007. Pretoria

Hams Hall. 2007. Available at: [www.hamshall.com](http://www.hamshall.com) [2007, 31 October].

Haynes, A. 2008. Presentation: Intermodal Transport. 3 April 2008. Johannesburg.

Invest in Germany. November 2005. Germany: Europe's Logistics Hub. Berlin, Germany.

Jones, W.B., Cassady, C.R., Bowden, R.O., Developing a Standard Definition of Intermodal Transportation. Available at:  
[http://www.ie.msstate.edu/ncit/NCIT\\_WEB\\_UPDATE/Final%20Report%20Developing%20a%20Standard%20Definition%20for%20Intermodal%20Transportation.pdf](http://www.ie.msstate.edu/ncit/NCIT_WEB_UPDATE/Final%20Report%20Developing%20a%20Standard%20Definition%20for%20Intermodal%20Transportation.pdf)  
[2008, 3 April]

Jorgensen, A. 2007. Presentation: A perspective on freight transport in South Africa. 6 September 2007, Johannesburg.

Joynt, H. 2007. Personal interview. July. Pretoria.

King, B & Keating, M. 2006. The top 50 Logistics cities in the United States. Logistics Today. Available at:  
<http://www.logisticstoday.com/displayStory.asp?sNO=8267&pNum=2&OASKEY=CurrentIssue> [2007, 24 June].

Krynauw, M. 2007. Presentation: The role of Transport in Tshwane's City Development Strategy. 4 October 2007. Johannesburg.

Maritime Handbook Southern Africa. 2006. George Warman Publications. Cape Town.

Maspero, E.L . 2007. Telephonic personal interview. 26 June 2007.

Mbele,S., de Abreu, V. 2007. Personal interview. 4 July 2007. Johannesburg.

MDS Transmodal Ltd. 2004. Assessment of rail freight terminal potential at Corby. Corby Borough Council, United Kingdom.

Meyer, F., Strydom, D. 2007. Personal interview. 4 July 2007. Pretoria.

National Ports Authority of South Africa. 2004. The South African Ports Yearbook. Compass Publications Ltd. Norfolk, UK.

Olivier, K. 2007. Presentation: Transport Planning in the city of Tshwane – A broad perspective. 4 October 2007. Johannesburg.

People Daily. 2001. Available at:

[http://english.peopledaily.com.cn/english/200110/24/print20011024\\_83061.html](http://english.peopledaily.com.cn/english/200110/24/print20011024_83061.html)

[2007, December 8].

Pienaar, W.J. 2007. A proposed regulatory framework for road and rail freight transport in South Africa. South African Journal of Science and Technology. Volume 26 no 4. P256 – 287.

Pienaar, W.J. 2005. Aspects of the supply of rail and road freight transport and the choice of carriers in South Africa. Department Logistics, University of Stellenbosch. P 4 – 6.

Rail Road Association. 2007. Intermodalism. Available at:  
<http://www.rra.co.za/intermodalism.shtml> [2007, September 13].

Rohde, T.G. 2008. Presentation. 16 January 2008. Pretoria.

SADC. 2007. SADC vision. Available at: [http://www.sadc.int/about\\_sadc/vision.php](http://www.sadc.int/about_sadc/vision.php)  
[2007, 15 November].

SANRAL. 2007. Road Conditions. Available at: [www.nra.co.za](http://www.nra.co.za) [2007, 5 October].

Texas Transportation Institute. 2008. Safe and efficient shipping. Available at:  
<http://tti.tamu.edu/publications/researcher/newsletter.htm?vol=39&issue=1&article=12>  
[2008, 1 April]

Trans African Concessions. N4 Maputo Development. Available at:  
[www.tracn4.co.za](http://www.tracn4.co.za) [2007, 14 September].

Transnet National Ports Authority, Port Statistics. Available at:  
<http://www.transnetnationalportsauthority.net/documents/pdf/portStats/Calender%20Year%202006.pdf> [2008, 1 April]

Transnet. 2007. Available at: [http://www.transnet.co.za/AR\\_2007/or\\_rail.html](http://www.transnet.co.za/AR_2007/or_rail.html)  
[2007, 7 December].

Virginia Inland Port, USA. 2007. Available at: [www.vaports.com](http://www.vaports.com) [2007, 29 October].

Vogt, J.J., Pienaar, W.J., De Wit, P.W.C. 2005. Business Logistics: Theory and Practice. Cape Town: Oxford University Press.

Wikipedia. 2008. African Renaissance. Available at:  
[http://en.wikipedia.org/wiki/African\\_Renaissance](http://en.wikipedia.org/wiki/African_Renaissance) [2008, 17 January].

Wikipedia. 2008. Transportation Hubs. Available at:  
[http://en.wikipedia.org/wiki/Transportation\\_hub](http://en.wikipedia.org/wiki/Transportation_hub) [2008, 1 April]

World Bank. 2007. Developing countries statistics. Available at: [www.worldbank.org](http://www.worldbank.org)  
[2007, 3 December].

World Bank. 2007. Connecting to Compete – Trade Logistics in the Global Economy,  
The Logistics Performance Index and Its Indicators. Available at:  
[www.worldbank.org](http://www.worldbank.org) [2008, 31 January]