1. Introduction and Background

“Our next step is the future, but the future is here now.” – Jorgenson, A.A.

1.1. Points of departure

More than half of the world’s population are living in urban centres; the increasing concentration in urban centres is fuelling worldwide passengers and freight volumes (Atiya, 2011). Gauteng Provincial Government is busy developing a twenty five year Integrated Transport Master Plan for the Gauteng Province (Annexure A). Their aim is to facilitate approval of land-use applications, steer future land-use development, safeguard the strategic road network reserves and develop strategic road network (SA, 2011). This study will include information to give clarity on sustainable transport and intermodal transport solutions, which will form part as a guideline of the twenty five year developing programme. The following figure indicates the departure of the study:

Figure 1: Introduction diagram

Source: Own construction, 2012.
Transport creates 20% of the energy-related greenhouse gas emissions worldwide and our society’s mobility continues to grow. Cities in particular need integrated, efficient and affordable traffic solutions in order to ensure lasting mobility, attractiveness and competitiveness (Siemens, 2012).

The field of sustainable development can be conceptually broken into three legs: environmental protection, economic sustainability and social justice. The transport sector in South Africa runs at a significant cost to road infrastructure, resources and the environment. Due to the fact that the Gauteng 25 year Integrated Transport Master Plan is still in progress and have not yet been finalised, this study can be a seen as a guideline for freight transport with regards to the final integrated transport master plan.

Geographically, South Africa is well positioned to reach the SADC (Southern African Development Community) market with all major cities in the region within 3 500 km of Gauteng. Gauteng serves as the southern economic hub. The infrastructure quality is good compared to other SADC countries, and current investment in infrastructure will ensure this position is maintained in the future (which is what is needed to promote intermodalism). The one major inadequacy is the lack of intermodal facilities and integration between transport modes, which needs to be addressed before South Africa can be seen as a true regional logistics hub (CSIR, 2008).

Intermodal transportation is an increasingly important aspect of South Africa’s transportation system, one with the potential to boost the country’s economic development, sustain its environment and manage transport movements (BEBR, 2003). Intermodal transport has become a major growth industry during the last 40 years and has led to a reduction in transport costs and improved logistics worldwide (Railroad Association, 2012). Mobility enhances the quality of life in megacities, it strengthens global trade and it is a relevant issue for environmental protection (Atiya, 2011).
1.2. Problem statement

Highways are over capacity, freight traffic is exploding, and the financial resources to accommodate growth are limited. Sustainability tends to overlook many relationships between issues and opportunities for co-ordinated solutions (Litman & Burwell, 2006: 334). In order to make transport sustainable one has to look at elements that makes transport non-sustainable:

Table 3: Non-sustainable Elements.

<table>
<thead>
<tr>
<th>Economic</th>
<th>Social</th>
<th>Environmental</th>
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<tbody>
<tr>
<td>Traffic congestion</td>
<td>Human health aspects</td>
<td>Global atmospheric impacts (Air pollution- CO2 emissions)</td>
</tr>
<tr>
<td>Mobility barriers</td>
<td>Community interaction and liveability</td>
<td>• Habitat loss</td>
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<tr>
<td>Accident damages</td>
<td>Mobility gaps</td>
<td>• Noise</td>
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<tr>
<td>Infrastructure cost</td>
<td>Cost differences</td>
<td>• Water quality</td>
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<tr>
<td>Comparative advantages</td>
<td>Congestion</td>
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<tr>
<td>Large scale production</td>
<td>Accidents</td>
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<tr>
<td>Increases competition</td>
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<td></td>
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<tr>
<td>Increased land-use value</td>
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Source: Own construction from Rodrigue & Notteboom, 2009.

There is a need to maximize the use of all existing transportation facilities, including those privately owned (TRB, 2008). The greatest challenge facing intermodal transportation lies in the integrated development and maintenance between modes to realizing efficient and sustainable intermodal transportation systems.

Rail capacity in many parts of South Africa is stretched to its limits. The freight railroad industry is entering an era of new constraints on its financial performance. Intermodal traffic is the fastest growing component of rail freight traffic and has put considerable strain on the capacity of the existing infrastructure. Adding rail capacity provides
significant relief in the intermodal supply chain while relieving the need for enormous costs in highway construction and maintenance (TRB, 2008).

While developing the integrated transport master plan 2025, the following must be considered (SA, 2011):

- Functional transport areas (the whole Gauteng)
- Must give priority to public transport
- Must take into account the current and future land-use.

1.3. Research aims and objectives

With the above in mind, there may be some research objectives that can be made to promote effective research process. The ultimate objective is to increase the efficiency and competitiveness of intermodal transport in South Africa. Businesses rely on transport not only for work-forces and customers, but to ensure their goods can be transported quickly and cheaply. They want to be informed about problems on journeys, want predictable end-to-end journey times, and get good quality service and reliability of transport networks.

The goals and objectives of this project are to:

- Serve as a guideline for the Gauteng Integrated Transport Master Plan 2025;
- To understand sustainability and intermodal transport fully to recognise ways for improvement and conclude solutions;
- Seek solutions for South Africa’s social, economy and environmental issues;
- Find ways to improve growth and development by improving quality of transport and
- Maximise job creation, competitiveness and productivity by making best use of existing infrastructure.

To ensure sustainable mobility in the future, we need closely networked transport and information systems (Siemens, 2010).
1.4. Methodology

For the purposes of this study, existing information sources and literature will be used. The Gauteng Integrated Transport Master Plan 2025 will be the core of this study, due to the fact that this is a case study to help guiding the development of the programme in certain areas of their project. The database will be used to understand the local situation and problems will be analysed in order to formulate planning proposals and recommendations.

1.4.1. Literature study

All available and relevant theoretical information based on integrated sustainable and intermodal transport planning will be studied, that recommendations can be made and solutions can be concluded. Information was gathered in the following ways: local and international books, journals, theses and dissertations, study cases, policies and legislation, newspapers, study documents and information from the Internet.

1.4.2. Methods of investigation

By assessing planning legislation and policies, the information will be processed. Graphs and maps will be used to see the relations in terms of intermodal transportation in the study areas. As a response to the problem statement, the theoretical research and empirical investigation, suggestions to the problem, as in the problem statement formulated, will be addressed.

The concepts ‘sustainability’ and ‘intermodalism’ were specified in this document as the study aimed to involve both concepts, these are the core forces present in the present urban environment and part of the dimensions of transport growth and development within South Africa. To understand the integration between these concepts, the following methods were used in the study:
• Extensive reviews of literature with regard to sustainable transport and intermodal transport, internationally and locally.
• Reviews will include international case studies, including those of Europe’s Best Practices.
• Structured policies and legislation will be viewed, in the fields of transportation, sustainability and intermodalism, to determine the current and proposed future value of sustainable intermodal transport in SA.

1.5. Delineation of the study area

The studies were based on national and international case studies, including case studies in Europe. The local case studies were undertaken in the Gauteng – Durban corridor and the Gauteng – Cape Town corridor, within South Africa. The Gauteng Integrated Transport Master Plan 2025 will be used as a guideline to help develop certain aspects of their programme.

1.6. Structure of the dissertation

The following is a summary of the structure and content of the remainder of the dissertation:

Chapter 2: The sustainable transport approach is described and placed in context, illustrating the linkages with the concepts of general information, freight transport, sustainable development, range of issues and influences.

Chapter 3: Intermodal transportation is analysed in terms of general information, urban freight transport, benefits, concepts and systems, characteristics, networks and terminals. These will all give a clear vision of where the future is taking this concept over all. Determining these aspects and relevant approaches will be the introduction of the empirical study.
Chapter 4: The case study of Gauteng – Durban and Gauteng – Cape Town are presented, as basis of the empirical investigation, describing the specific empirical approaches used, the details of the desktop studies and new data collection from policies and legislation, and the findings of the empirical investigation.

Chapter 5: With South Africa as the macro study case, a discussion on how intermodalism is already in progress and how SA will benefit from it.

Chapter 6: Conclusions are drawn, with specific reference to the Gauteng Integrated Transport Master Plan 2025, integrated sustainable transport and intermodal transport for growth and development were dealt with.

Chapter 7: Recommendations are presented, based on a few sources with solutions towards intermodal transport, in order to maximise competitive benefits of sustainable intermodal transport and guide long term strategy proposals.