Green Logistics in South Africa

A study of the managerial perceptions in the road transportation industry in South Africa

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Acknowledgements

We would like to thank everyone that has been contributing to this thesis. It would not have been possible without the support by several people. Furthermore, we want to acknowledge SIDA, the Swedish International Development Agency and Umeå University for giving us the opportunity to conduct this study in South Africa. Without the financial aid and the Minor Field Study Scholarship, it would not have been possible. The thesis has given the authors new perspectives and a greater understanding of the country South Africa.

We would also like to thank Lars Lindbergh, our tutor and Senior Lecturer at Umeå School of Business and Economics, for his dedication and tremendous help. To our opposition groups, for all the valuable and useful feedback that has strengthened our thesis.

A special thanks to:

- Mr. Karl Johan Bonnedahl, MFS Umeå School of Business and Economics.
- Per Nilsson, MFS Umeå School of Business and Economics.
- Mr. Gabriel Reeder, our contact person in South Africa.
- Mrs. Anneli Göransson, for all the efforts for our arrangements.
- Mr. Roger Göransson, for all the efforts for our arrangements.
- Miss. Rebecca Arklöf, for her continual support.

The authors wish to express a special thanks to all interviewees from the transportation industry in South Africa. For their contribution of valuable information about their perceptions of the current state of logistics in South Africa. Their help enabled us to conduct the research.

- Mr. Hans Ittmann, Logistic researcher, Transnet and HWR Consulting
- Mrs. Dawn Steenberg, DB Schenker
- Mr. Manager A, UPS
- Mrs. Liesl De Wet, Barloworld Logistics
- Mrs. Reetsang Mothibi, Imperial Logistics
- Mr. Peder Jensen, DHL Global Forwarding
- Mrs. Ursula Uys, Unitrans
- Mr. Marc Kröger, DSV

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2014-05-23
Abstract

The role of logistics has, over the last decade, evolved into a significant determinant in the operations of businesses. Increased efficiency and reduced operational costs can be established through a well-operated transportation system. Due to societies increased awareness for environmental issues, the logistics industry has been affected, which has led to a demand for development. Therefore, the concept of green logistics has become more common in the transportation industry. However, in South Africa this concept is less established and there is a need to investigate managerial perceptions further. This research investigates green logistics, as perceived by managers in the transportation industry in South Africa.

This thesis aims to study green logistics activities in South Africa at large transportation companies. The authors explore the current green logistic activities at the transportation companies, the managerial perceptions regarding green logistics, and their views of incentives and barriers to its implementation.

The literature review presents the major theories and concepts included in green logistics. This section will present the reader with a deeper knowledge of sustainability, the triple bottom line, green logistics, and strategic environmental environment.

Qualitative semi-structured interviews were used in this study. Six companies were interviewed and one South African logistical researcher. Secondary data was also used to get a deeper understanding of green logistics in South Africa. Interviews were held at the headquarters of the transportation companies, which were all resided in Johannesburg. Three international companies, three domestic companies (all with global operations), and one logistics researcher were interviewed. This gave the authors well-rounded empirical findings.

The results from the interviews were divided into three categories: responsibility, green logistics activities, and managerial perceptions. The analysis provided many incentives and barriers of green logistics in South Africa, as well as a deeper understanding of the managerial perceptions.

The study shows that green logistics is currently implemented, to a certain extent in South Africa. However, the paper identifies areas were it can be improved upon. The authors can conclude that the economical factor is a driving force within the triple bottom when implementing green logistics. Another interesting factor described in the conclusion is the importance of communicating green initiatives internally and externally. Conclusively, further recommendations regarding green logistic practices in South Africa are acknowledged.
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List of Abbreviations

**CSIR** - Council for Scientific and Industrial Research

**GDP** - Gross Domestic Profit

**ROI** - Return on Investment

**ISO** - International Organization for Standardization

**PPM** - Parts per Million, Diesel fuel

**LNG** - Liquefied Natural Gas

**CNG** - Compressed Natural Gas

**LPG** - Liquefied Petroleum Gas

**CO2** - Carbon Dioxide

**SEM** - Strategic Environmental Management

**RTMS** - Road Transport Management System

**GPS** - Global Positioning System

**ESKOM** - Electricity Supply Commission (South African Electricity Company)

**N1** - National Route 1, a major highway in South Africa

**CEO** - Chief Executive Officer

**SIDA** - Swedish International Development Cooperation Agency

**CSR** - Corporate Social Responsibility
1. CHAPTER ONE: INTRODUCTION

This chapter introduces the reader to the essentials of logistics as well as the concept definition of green logistics. Furthermore, the chapter provides insight in the problem background, the logistical situation in South Africa and states the research question. Finally the chapter shall acquaint the reader with the purpose, contribution and the limitations of this study.

1.1 Research Background

Throughout history, logistics has been necessary for the economic development and society’s prosperity. McKinnon (2010, p. 3) states that logistics has over the past 50 years come to be regarded as a key determinant in business performance. Logistics can be defined as “the part of supply chain management that plans, implements, and controls the efficient, effective forward and reverse flow and storage of goods, services and related information between the point of origin and the point of consumption, in order to meet customer’s requirements.” according to the Council of Supply Chain Management Professionals (2007).

To make sense of this definition, transportation is the operation that moves goods and products across and within a supply chain. According to Chopra and Meindl (2010, p. 68), a transportation network can be defined as the consistency of transportation modes, geographical locations and the existing routes of which goods can be shipped. The modes can be further explained as including air by aircraft, sea by vessel, land by pipeline, rail and truck. Using one form of transportation affects the speed of delivery, size of shipment and flexibility (Chopra & Meindl, 2010, pp. 68-69). It also affects the cost and logistic expenditure to a great extent. Today the transported goods vary in size from individual parcels to full trucks to entire ships. Also, the chosen transportation mode often has a great impact on responsiveness and efficiency. Chopra and Meindl (2010, p. 69) stress the trade-off between efficiency and responsiveness, which they state depends on the speed of the transport and the cost. Faster (and likely more expensive) modes of transport are more responsive due to the shortened delivery time. A responsive supply chain often results in reduced inventories and thus can cut other costs within manufacturing and warehousing, and hence a trade-off exists for transportation managers (Ibid).

A well-established transport system in the logistical activities could lead to increased effectiveness, reduced operation costs and promotion of the firms service value (Tseng et al., 2005, p. 1660). Achieving a superior logistic structure is thus a vital aspect to consider when striving towards a competitive advantage according to Mentzer and Williams (2001, p. 35). However, the need to continuously improve the supply chain by reducing costs and meeting the increased demand has led to larger environmental impacts. Economic growth as a result of industrialization, technology improvements and global access, are leading to large increases of air pollution, land degradation, deforestation and excessive amounts of carbon emissions. From the Logistics Operational Guide (2013) we can see that this leads to negative consequences that affect people’s health, the agricultural production and
accelerates the climate changes. With increasing globalization and international trade, logistics is becoming a major cost for companies around the world (Rodrigues et al., 2005, p.1). These impacts have resulted in logistics being an integrated part of a company’s endeavour to become further environmentally friendly. Due to this, managers need to be concerned with sustainability and comprehend what operations are affecting their company’s brand on an everyday level. According to Wu and Dunn (1995, p. 21) the choice of activity, especially within transportation and logistical operations, may contribute to increased amounts of carbon dioxide and greenhouse gases.

Murphy and Poist (2003, p. 122) points out that taking measures according to the environmental concerns in a socially responsible way has, during the past decades, become an important part of the modern company agenda. Since companies also strive towards cost objectives, the Triple Bottom Line theory is important as it includes a balance between environmental, economical and social factors in order to achieve sustainability (Markley & Davis, 2007, p. 765). One of the reasons leading to a change at companies’ agenda is the impact of the society’s environmental awareness and changing consumer demands. The effect of increased consciousness is forcing companies to revise its supply chain and act in a further responsible manner. Government regulations together with the implementation of international certifications such as the ISO standards are another catalyst to the transition according to Murphy and Poist (2003, p. 122).

Transports currently account for about 8 per cent of total carbon emissions in the world and are affecting the environment to a great extent (McKinnon, 2010, p. 4) The World Trade Economic Forum (2009; cited in McKinnon, 2010, p. 4) states that logistics account for about 5.5 per cent of the total greenhouse emissions on a worldwide basis. This includes not only the carbon dioxide emission but also all types of greenhouse gases. Out of these, two-thirds can be connected with road-transportations. By road-transportations, the authors means land based transportation by trucks. Ribeiro et al. (2007, p. 325) stress that transport emissions are increasing at a higher rate than any other sectors and are expected by 2030 to reach levels at 80% higher than presently unless a change occurs. Considering these high emission rates from the logistic sector, it is important to implement counteracting solutions. One of the frequently discussed approaches is the application of green logistics as a measure to minimize the environmental impact of logistic activities.

Green logistics became a popular concept during the 1980s and 1990s. As previously mentioned, peoples awareness grew considerably due to the increasing and staggering environmental problems and the industry’s depletion of natural resources (Chittyal et al., 2013, p. 81). It can be argued that this was a turning point of where the world started to suffer heavily from the expanding industrialization. Because of this, environmental sustainability received increasing publicity and public awareness in politics and in the economical area. Logistics was at the time considered a field of opportunity. Chittyal et al. (2013, p. 81) state that the logistic companies thus imported and transformed the “green” environmentally friendly approach into logistics, which lead to the foundation of the concept of green logistics. Areas that became of focus were efficiency and optimization, which for example came to affect the loading, packaging and choice of travelled routes (Ibid).
According to Xiu and Chen (2012, pp. 2767-2769) several countries around the world are already taking the necessary steps towards greener logistics, particularly in developed countries such as Germany, the United States and Japan. Xiu and Chen (2012, p. 2767) continue by stating that in these countries the carbon emissions are reduced due to greater infrastructure and higher usage of the railway and maritime shipping to a further extent. These three countries also apply green logistics tools such as collaborative transport modes and reverse logistics (Xiu & Chen, 2012, p. 2766). Emerging markets are under pressure to apply logistics practices if they wish to compete globally according to Green et al. (2008, p. 318). However, Zongwei (2011, p. 346) states that different priorities from stakeholders in emerging countries (due to factors such as poverty and inequality) leads to other priorities compared to those of developed countries. In emerging nations, low customer interest towards environmental issues decreases the desires to implement green practices (Ibid).

1.2 Problem Discussion

The Council for Scientific and Industrial Research (CSIR) finds that South Africa was during 2011, the 13th largest carbon dioxide emitter in the world, in their State of Logistics in South Africa from 2011 (CSIR, 2011, p. 11). The transport sector contributes with 10.5% of the overall emission (Ibid). From the 2012 State of Logistics report (CSIR, 2012, p. 20), it states that 70 per cent of all tonnage being transported in South Africa is carried on the roads, which is the least environmentally friendly option. The per capita carbon dioxide emission is at a staggering 9 tons per person, with the global average at 5.8 tons per person and the sub-Saharan average of 1.4 tons according to Pegels (2010, p. 4946). These emission rates are noticeably high. Applying green logistics could be a step in the right direction in reducing them.

Green logistical activities in South Africa are at present fairly undeveloped according to the logistical researcher Hans Ittmann. Furthermore, he states that the responsible managers have not acted as quickly as other parts of the world regarding the environmental sustainability of logistics. However, this issue requires serious attention and over recent years the concern is becoming more acknowledged in South Africa. The government has introduced two logistics awards given to companies that implement green logistics in the most effective manner (Ittmann & King, 2010, p. 9).

Bogetic and Fedderke (2005, p. 17) explain that the South African transportation sectors are lagging behind when comparing to similar countries and regions. In fact, the low amount of investments and the contribution of poor roads, leads to a high percentage of roads transport cost to Gross Domestic Product (GDP) at 4.7% (CSIR, 2012, p. 4). Low quality and maintenance of the infrastructure leads to increased logistical costs and could be a hurdle for the implementation of green logistics. Another logistical problem in South Africa is the remoteness between cities. With the largest cities all being far apart (Johannesburg to Cape Town approx. 1400 km), these distances can present severe logistical problems. This causes challenges for green logistics as longer transportation and extended supply chains are necessary.
The reason why we have specifically chosen South Africa is because it is the most developed country in Africa and has a large economy that is growing. However, green concerns are of low importance and this is reflected in their high carbon emissions. Therefore we, the authors, believe that it is important to investigate the current actions being undertaken within the logistics industry in South Africa and how it can be developed further for a more environmentally sustainable future.

As the authors identify the managers to hold key roles in the decision making process, we specifically target transportation managers in order to gain insight into their views of green logistics and its implementation. Wu and Dunn (1995, p. 36) state that logistics managers have several challenges to overcome regarding green logistics as they have to find good network designs that are able to fit into the company's structure, as well as having to address environmental concerns along with integrating green initiatives. Van Hoek (1999, p. 129) also argues that managers are able to use green logistics as a plan to reach economic objectives and reduce environmental impact. Since managers are able to have an influence on the implementation and decision making surrounding green logistics, the authors believe that it is meaningful to understand their perception of it and whether or not they consider it as a cost saving alternative.

Although much research has been done on the supply chain management in South Africa, few studies have looked at the managerial perceptions on green logistics in transportation companies within a developing country, such as South Africa. Secondly, the implementation of green logistics with regards to perceptive barriers and incentives are also rarely looked at. Most studies look at the current state of logistics in South Africa (Ittmann & King, 2010) or the trends of logistics (Cilliers & Nagel, 1994) or even the logistics costs (Havenga, 2010). However, there is a lack of research concerning the degree to which companies apply green logistics in South Africa, their manager’s perception of green logistics and the barriers they consider relevant to overcome.

A limited amount of previous studies have looked at green logistics at emerging markets. The authors have found previous studies regarding the role of green logistics/green supply chain’s in emerging markets such as: one articles looking at China (Zhu et al., 2005), two articles looking at Taiwan (Lin & Ho, 2008; Hu & Hsu, 2010) and one concerning Dubai, U.A.E (Brik et al, 2013). However, none of them have looked into the managerial perception of green logistics in emerging countries. Due to the lack of previous research and the noteworthy conditions of South Africa (large distances between cities with the main mode being road transportation), the authors believe that this study can provide theoretical as well as practical findings, which can contribute towards the understanding of managerial perceptions of green logistics. Hence, the ambition is to enhance the knowledge of the South African transportation industry from the view of logistic managers.

Within the field of managerial perception, there is one study concerning the impact of green implementation on the business functions in South Africa (Smith & Perks, 2010). That study only looks at the departments where managers believe green practices can be used and states that logistics/distribution is a division where green initiatives are implementable. However, it does not mention how managers perceive its implementation or the barriers they consider important. By looking at the incentives and barriers that are considered
important when implementing green logistics in South Africa we are filling a literature gap within green initiatives in the logistic industry.

South Africa is gradually moving towards greener logistics, but more needs to be done in ways that will affect the logistics chain. Finding appropriate solutions is, according to Ittmann and King (2010, p. 8); necessary to tackle the logistics management concern in South Africa is vital for future development. Further integration of green logistical activities should be high on the priority list.

1.3 Research Questions

*How do logistic managers perceive green logistics in South Africa and to what extent do transportation companies apply green logistics?*

*What are the incentives and barriers of implementing green logistics in South Africa according to transportation managers?*

1.4 Purpose

The main purpose of this study is to examine green logistic activities at major transport companies located in South Africa. Furthermore, the study aims to investigate the managerial perceptions of Green Logistics. This includes their view of barriers and incentives for implementation, as well as the cost perspectives for green transportation activities. The aim of this is to extend the theoretical knowledge of green logistics, based on managerial perceptions.

Consequently, the study will examine what their current operations are regarding green logistics and the managers’ recommended improvements to enhance their green activities. The authors’ ambition afterwards is to interpret the managers’ answers and advice, in order to point out areas of improvements and managerial recommendations for implementation. This may give practical value for new managers who wish to implement green logistics in South Africa.

1.5 Contribution

From an academic perspective, this thesis will contribute with further information within the green logistical concept. Findings will contribute with an understanding of the green logistics framework in South Africa. The thesis aims to be included among existing and future research in the area of green logistics and thus be important when investigating managerial perceptions behind green practices. This will provide further theoretical information and contribute to the area of green logistics.

Furthermore, the study can be relevant to companies looking to implement or expand on green logistic activities in South Africa. The results may also be specifically relevant to management within companies that take decisions on logistical structures. The study will
be able to demonstrate the incentives of implementing green transportation. Furthermore, the thesis will also be based on the barriers of implementation and the negative aspects providing further relevance to large transport companies in South Africa. Alternatively the results can be used for other developing/emerging markets with similar conditions South Africa, providing further practical contributions.

### 1.6 Limitations

- The study focuses on land-based transportation by truck because a large part of the goods in South Africa are carried with land-based trucks. In the literature review, the reader will be provided with more information regarding the current state of logistics in South Africa. This means that the study does not focus on shipping, airfreights or railway.

- The study will focus on investigating road transports from A to B. Therefore the overall supply chain will be excluded and will not be in focus. This means that the authors study the transport section exclusively out of the supply chain. Warehousing, manufacturing, etc. will not be of concern although it may warrant a mention.

- The focus is on road transportation and will therefore target any truck and bulk size. No preference was given for the type of goods and products being transported. This means that the type of cargo or what is loaded on the truck is not important and in focus. Instead, the authors perceive the emissions and the environmental impact from the truck itself as problematic and interesting for the study.

- The authors exclude small-to-medium sized transportation firms and target only major domestic companies and global actors operating on the South African market. The reason for this is because large companies have extensive operations that have a large impact on the environment.

- The study is focused not only on the environmental factor of the triple bottom line but also includes the economical and social factors into the study. When discussing sustainability, all these three factors are investigated and of importance.

- The authors relate to the thesis from a business administration perspective and hence the focus is on corporate managers perceptions. To the maximum extent possible, the authors try to avoid economics/political economy. Although these subjects may arise and at times be given relative importance, the focus of the thesis is in the field of business administration.
2. Literature Review

This chapter reviews the existing theories to our study regarding green and sustainable logistical activities. The chapter will provide a deeper understanding of the topics and theories relevant to the area.

2.1 Sustainability

The term sustainability and sustainable development became widely recognised as a concept and policy orientation after the publication of the Brundtland Commission’s (World Commission on Environment and Development) report in 1987 (Sustainable Development 1987-2005 an oxymoron case). In Carter and Roger’s (2008, p. 377) study, they find that managers are familiar with sustainability however, the managerial views of what it actually is differs. This study will use the definition by the Brundtland Commission's UN report, which states sustainable development as: “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (Brundtland et al., 1987, p.16). According to this, sustainability involves the current needs, welfare and well being of future generations. In particular, this concerns irreplaceable natural resources and environmental and social footprints from economic activities (Kuhlman & Farrington, 2010, p. 3441). Shrivastava (1995, p. 955) describes the contribution of sustainability as “the potential for reducing long-term risks associated with resource depletion, fluctuations in energy costs, product liabilities, and pollution and waste management”.

During the last years, research on different aspects of sustainability within logistics has increased. In a study made by Goldsby and Stank (2000; cited in Dey et al., 2011, p. 1239), logistics are interpreted to have a prominent role in firms strive towards a sustainable supply chain. Other researchers such a Hart and Milstein (2003, p. 56) even include equitable and prudent manners into a successful process of sustainable development. Researchers such as Brundtland et al. (1987), Kuhlman and Farrington (2010), Shrivastava (1995), and McKinnon (2010) have in common that they all say that the modern society creates the conditions for the future generations. Also, they highlight not only that sustainability is concerning our environment, but also the world’s natural resources. Depleting natural resources is a reason why sustainability is or should be a major concern for the industrial sector, including logistical companies. Sustainability can be implemented at several key activities within the distribution chain. According to Dey et al. (2011, pp. 1244-1245), key activities are critical for companies since it contributes heavily to the total logistic costs. From the study by Sarkis (1998; cited in Dey et al. 2011, p. 1238) managers are ideally positioned to implement sustainability initiatives in the facets of the business processes, including transportation. Transportation concerns obtaining and distributing goods to the right place at the desired time and in the optimal quantity, which also the authors consider as a key factor. The economical factor together with the environmental factor is the key focus for this thesis regarding green and sustainable logistics. Hence, we stress the importance of the concept of sustainability.
Sustainable development was originally perceived as the combination of environmental, economic and social dimensions (McKinnon, 2010, p. 4). This means that development is only sustainable when environmental and social aspects are combined with the economical development (Pazirandeh & Jafari, 2013, p. 890). Thus, a sustainable organization is often acknowledged as one that contributes to sustainability simultaneously as delivering economic, social and environmental benefits. McKinnon (2010, p.4) describes that these three elements are together referred to as the Triple Bottom Line theory, a concept that is often used to describe a three-way trade off.

2.2 Triple Bottom Line

Markley and Davis (2007, p. 7665) argue that a company that wishes to be sustainable should contribute to sustainable development by ensuring social, economical and environmental benefits. This has been termed the ‘triple bottom line’ by John Elkington in 1994 in order to establish sustainable conduct by enterprises in their pursuit for profit. The foundations of the Triple Bottom Line concept are the aforementioned drivers: social, economical and environmental (also known as people, profit, and planet). Bloemhof (2005, p. 12) agrees to this and argues that the triple bottom line is specifically focused within the forward logistics of a logistics chain i.e. from producer to consumer, and is therefore linked with the concept of green logistics. According to Porter and Kramer (2006, pp. 7-10), establishing social and environmental initiatives can allow managers to implement a strong strategic value. Furthermore, Wu and Dunn (1995, p. 20) argue that having such initiatives enable logistics managers to meet economical objectives, as well as environmental and social. In order to reach sustainable development, businesses need to reach a balance between the three components of the Triple Bottom Line, as exemplified in the illustration below.

Figure 1. The Triple Bottom Line and Sustainability
Source: Carter & Rogers, 2008, p. 365
As described in the text, the triple bottom line includes social, economical and environmental factors. In this illustration one can see how the different factors work together. The middle area indicates where sustainability is achieved as a common result.

Promoting the Triple Bottom Line shows all the shareholders and stakeholders that the purpose of the firm is not merely economical, but environmental and social matters are also taken into consideration (Markley & Davis, 2007, p. 765). A sustainable company according to the triple bottom line theory is one that accomplishes a balance between the three factors. However, there is a trade-off between these three factors and a decision that is environmentally friendly may not always be the most economically viable option in the short-run. An effective firm should, according to De Giovanni (2012, p. 266), have a sustainability strategy that takes the social, environmental and the economical performances into consideration.

In line with Triple Bottom Line and sustainability, green logistics has been introduced into the logistics industry as an environmentally sustainable initiative for the future. According to McKinnon (2010, p. 4) it is the research within the environmental and economical aspects within the logistics industry that has been labelled green logistics. Seuring and Muller (2008, p. 1700) state that these two elements (environmental and economical) are what most business research on sustainability has concentrated on. Logistics firms are therefore looking towards green logistics as a potential solution to sustainability and a balance within the Triple Bottom Line. Van Hoek (1999, p. 131) demonstrates that this new strategy (green logistics) is also emerging with managers and their approaches towards logistics, as a practice in which companies are able to reach their economic targets while also minimizing their carbon footprint. Abrie de Swardt states that reaching sustainability is not merely cutting down carbon emissions, but it is necessary to reach stability within the Triple Bottom Line and this starts within the organisational decision-making process (Focus on Transport and Logistics, 2011).

The elements of the Triple Bottom Line are difficult to measure, which provide challenges for companies. Measuring factors such as social and environmental impacts are more difficult than the traditional economical factor. The Fair Trade and Ethical Trade are two movements that are promoting sustainability as well as the three aspects of the Triple Bottom Line. In order for a company to be part of the Fair Trade or Ethical Trade trademark they need to fulfil sustainability through economical, environmental and social stability. Movements such as Fairtrade and Ethical Trade will encourage organizations to strive for a sustainable solution in the future.

### 2.2.1 Social

The social impact of a company can be measured by the employee and customer satisfaction (Markley & Davis, 2007, p. 764) and also by labour practices, community impacts, human rights and product responsibility (Savitz & Weber, 2006, p. 13). In essence, a sustainable enterprise will make decisions with regard to the community and their workers with the intention of contributing toward the growth of the society. The social element of the Triple Bottom Line is becoming a growing contributor to a company's
performance as consumers are becoming aware of its implications. A socially aware company is one that monitors labour conditions to make sure they are up to standard (Fair wages, safe working environments, decent working hours) and does not exploit labour in any form e.g. child labour. Exploitation of low cost countries that have low labour costs, bad labour conditions or who are involved in child labour is what Triple Bottom Line companies would avoid since these issues would be socially unethical. Within the logistics industry, looking at the social aspects of the Triple Bottom Line would include bearable driving hours with sufficient resting time or contributing towards the community through education or health care.

2.2.2 Economical

The economical factor within the Triple Bottom Line refers to the economic value and profits generated by a company. De Giovanni (2012, p. 266) describes the economical factor as the traditional measurement tool since it is the element of the Triple Bottom Line that is most widely used when evaluating a company's performance. Although the economical progress of a company is important, John Elkington’s Triple Bottom Line constitutes that if a company focuses on social and environmental issues then greater economical performance will come from it. This is due to the fact that it is able to provide advantages for the firm. For example, consumers are more willing to purchase a good from an environmentally and socially conscious company, which can provide it with a competitive advantage (De Giovanni, 2012, p. 266). The traditional financial measurement tools such as sales, profit, return on investment (ROI), taxes paid, and monetary flows measure the economical factor (Savitz & Weber, 2006, p.13). Exploitation of a country where labour costs are cheap but not of a high standard would be an example of an economical driven company but it is unlikely to be a sustainable one. Within the road transportation (the topic looked at in this thesis) companies are able to reduce costs and improve economic performance by collaboration, reverse logistics, or fuel and route optimization. However, when a logistics firm reduces its costs, it also reduces its environmental impact, as there is a lower level of emissions. This is why we the authors wish to take a closer look at the economical factor as it is closely linked with green logistics and its implementation.

2.2.3 Environmental

The third and final element of the Triple Bottom Line is the environment. This refers to the environmental performance of a company and the practices they have in place to reduce the impact on the climate. As consumers are becoming more environmentally aware, De Giovanni (2012, p. 266) explains that firms are becoming attentive and are introducing green programs within their businesses, which is in turn improving the organizations performance. These initiatives are reducing the impact on the environment but De Giovanni argues that to which extent is difficult to measure, unlike with economical measurements. The ecological impact can be measured by the energy usage, waste produced, and/or the air and water quality (Savitz & Weber, 2006, p.13). Being environmentally sustainable will be more profitable in the long run, which is why Triple Bottom Line companies often look to
avoid harmful and destructive practices and products. Logistics companies are able to reduce their environmental impact through activities such as fuel efficiency, route optimization and/or reverse logistics.

This paper will look at all three factors of the triple bottom line as they are linked within the green logistics concept. Optimizing the supply chain to reduce both costs and environmental impact is the theory behind green logistics, which indirectly has social benefits.

2.3 Green Logistics

Green Logistics is a relatively new concept and is therefore constantly evolving and changing. There are several definitions used and in some instances they have a large variation. McKinnon (2010, p. 3) define green logistics as the moving and delivering of goods so as to have as little impact on the environment as possible while keeping the cost as low as possible as well. Rodrigue et al. (2010, p. 2) defines green logistics as practices and approaches in order to reduce the environmental footprint that involves material handling, waste management, packaging and transport. Another definition by Mintcheva (2005, p. 717) states that green logistics comprises of economic, environmental and social elements. The authors of this paper will use a definition that contain a bit of each of these definitions. We define green logistics as ‘the practices used to reduce cost as well as the ecological impact of a logistics chain while keeping economical, environmental, and social aspects in mind.’ This includes practices such as fuel efficiency, route optimization, reverse logistics, packaging optimization and measuring carbon emissions which will all be explained further in the next sub-chapter.

The benefits from green logistics and a green supply chain can be several. In the long term it could lead to a lasting competitive advantage and improved efficiency according to Walker et al. (2008, pp.72). Improving the efficiency of logistical activities will also be able to reduce costs through cost savings due to reduced packaging waste, reduced health and safety costs, lower labour costs and shorter lead times resulting in lower costs (Carter & Rogers, 2008, pp. 370-371). Activities such as these are not only able to reduce the costs of the logistics operations, but Carter and Rogers (2008, p. 361) state that the activities also enhance the corporate reputation. Thus, there are major economic drivers behind the green logistic concept.

Bansal and Hunter (2003, p. 293) explain that the image of the firm and its Corporate Social Responsibility (CSR) reputation can gain positive benefits by a greener supply chain, which may strengthen its legitimacy. As firms strive to become more environmentally friendly, Wu and Dunn (1995, p. 22) state that managers have an increasingly important role to understand the impact that their activities have on the environment as well as the image of the firm. If companies have an ecologically positive image in the view of the consumer then they are able to use this environmental legitimacy as a competitive advantage (Bansal & Hunter, 2003, p. 292). “As a result, they may seek to reinforce their positive image further by being a first mover, allowing them to tout themselves as being first to certify in their industrial or geographic space” (Ibid).
Furthermore, they state that companies that perceive themselves as environmentally conscious and wish to show this to the consumers will be more likely to certify themselves in standards such as the ISO standards. Certifying themselves will emphasize their active environmental strategy (Bansal & Hunter, 2003, p. 291). Although Corporate Social Responsibility is important to the image and reputation of companies, we will not focus on CSR.

The green logistics solution can be implemented by redesigning the distribution system, measuring the pollution levels, habitat protection, environment restoration, using material and fuel substitutions and by improving the packaging design (Sharma 2000, p. 683). There are other opinions of how green logistics can be implemented and Martinsen and Huge-Brodin (2010; cited in Isaksson & Huge-Brodin, 2013, p. 219) actually suggest that there are nine categories in the environmental logistics and the path to greener logistics. These consist of: fuel alternatives, environmentally classified vehicles, documented emissions and energy data, a combination of transport modes, transport planning, the design of logistic systems, an environmental management system, eco driving, and choice of partners (Martinsen & Huge-Brodin, 2011, p. 128). These nine categories represent the options that companies have in order to implement green logistics. The activities that we will be looking further into with this research paper are fuel efficiency, route optimization, reverse logistics, packaging optimization, and measuring carbon emissions. Based on the theory, applying these categories should make organizations more environmentally friendly, and decrease their carbon footprint while also reducing costs. The paper will investigate these activities further, from the managers’ perceptions, as they have direct effects on the road transportation operations of companies. Smith and Perks (2010, p. 21) state that different stakeholders of the company (owner, managers, employees, etc.) have different views on green logistics implementation. Therefore, we believe that it is an important aspect to investigate the perceptions that managers have of green logistics. This will be explored further in this study.

2.3.1 Green Logistics Activities

There are several activities available within the field of green logistics, the activities presented below are the ones that this research paper will focus on and put extra emphasis on. These activities were specifically chosen as they have an effect on the road transportation industry and the way that their logistics operations are able to become greener.

Fuel Efficiency

Improving the fuel efficiency usage of the transport fleet is a tool that can be effective and environmentally friendly. Using alternative fuels, eco-driving techniques, and proper maintenance programmes all help increase the fuel efficiency. Switching to alternative or more efficient and eco-friendly fuels is an important aspect that is able to increase the ‘greenness’ of logistics. From Wu and Dunn’s (1995, p. 33) study, several alternative fuels were identified that are safer, cleaner and more accessible than diesel. They include
compressed natural gas (CNG) and liquefied natural gas (LNG) (Ibid). Wu and Dunn continue by arguing that CNG is in fact 40 per cent cheaper than petrol, and if logistic companies want environmentally sustainable futures, switching to alternative fuels should be a consideration.

Eco-driving is also a way to improve fuel efficiency. This is a driving technique that aims at reducing the fuel consumption. With this technique, you train the drivers to save fuel without losing mobility, and Janota et al. (2010, p. 59) state that it is possible to save up to 25 per cent of fuel consumption. Tracking systems are able to inform companies with an analysis of driving behaviour and fuel consumption of individual trucks. They are able to inform transportation companies of excess or unnecessary vehicle usage, unauthorized private vehicle usage, poor driving behaviours, mobile worker idling and speeding, and fuel wastage (Janota et al., 2010, p. 60). Implementing driver training and keeping track of driving behaviours and fuel consumption increase efficiency, decrease fuel consumption, and as an outcome reduces the environmental impact (Ibid).

Proper maintenance of the trucks is also a major environmental issue. Maintaining the vehicles in safe and efficient working condition is not only able to improve the vehicle efficiency, but also prolong the vehicle lifetime and reduce accident rates according to Wu and Dunn (1995, p. 33). Logistics companies are able to save operating costs through proper maintenance of their trucks as well as cutting down the amount of environmental impacts their operations have (Ibid).

Fuel efficiency is an important aspect when becoming green for two reasons. Firstly, it increases the efficiency of the vehicles that means that they are able to run better and for longer periods, which reduce the costs for transportation companies. Secondly, better fuel, eco-driving techniques and proper maintenance of vehicles will make the logistics operations cleaner and more environmentally friendly. This is why this activity is important to be recorded in this study, as it is a pivotal part when introducing green logistics.

**Route optimization**

Route optimization is to coordinate a fleet of vehicles with a fixed capacity in the most efficient way of routing. The most efficient way of routing a fleet is to find a solution that minimizes the amount of voyages, the total travel time as well as the numbers of vehicles being used. Logistics companies wishing to be environmentally responsible would utilize fewer shipments, less handling, shorter movements, more direct routes, and better space utilization (Wu & Dunn, 1995, p. 29). These factors lead to lower levels of pollution since vehicles travelling at the most efficient speed are more environmentally friendly and consume less amounts of fuel. Thus, the route optimization approach is also a cost minimizer due to the economical usage of vehicles and reduction of travelled distances.

Moreover, Sbihi and Eglese (2010, p. 170) point out that route optimization is achieved by ensuring that vehicles are directed from congestions, which means choosing faster and more efficient routes. Furthermore, Sbihi and Eglese (2010, p. 171) mention that this may sometimes imply that the preferred solution leads to an increase in the total travel length
instead of using a shorter but less efficient route. Much like with the fuel efficiency, Janota et al. (2010, p. 63) states that there are tracking systems for route optimization that are able to see if a vehicle goes off track. These technologies are able to foresee and avoid collisions, choose the fastest route and use traffic reports to optimize the route and minimize the truck's carbon emissions (ibid).

Route optimization is an important aspect to investigate in this study due to the fact that it has the potential to have a large impact on the carbon emissions. It is also a relatively easy activity to utilize in order to optimize the logistics chain as well as reduce costs and ecological footprint. Wu and Dunn (1995, p. 32) state that it is necessary to have a good information system as well as innovative management ideas to increase routing efficiency to be able to reduce carbon emissions. We believe that this is a vital aspect to examine for this study and route optimization has direct implications to both economical and environmental aspects.

**Reverse Logistics**

The reverse logistics concept refers to the movement of material from the point of consumption back to the point of origin. This differs from the forward logistics because forward logistics refers only to transports from point of origin to the place of consumption (Rogers & Tibben-Lembke, 2001, p 130). According to Rogers and Tibben-Lembke (2001, p. 130), reverse logistics could be described and compared with the flow of materials going the wrong way on a one-way street. Thus, the approach aims to fully use transports and reduces the amount of empty return freights. Furthermore, Rogers and Tibben-Lembke (2001, p. 131) state that the freights returning from the point of consumption are involved in recycling, remanufacturing and reusable packaging.

Figure 2. Reverse Logistics
*Source: Wu & Dunn, 1995, p. 34*
As described in the text, reverse logistics is the reverse flow of goods. In this illustration one can see how reverse logistics and the flow of goods fits into the supply chain. Forward logistics is from the point of origin to the point of consumption, whereas reverse logistics is the transportation back to the point of origin. An example would be the recycling of old and used computers through reverse logistics, after the forward logistics operation of delivering new model computers.

Two-way freights is increasing and will only increase more in the future due to reusable and returnable packaging, and logistics chains need to be able to adapt to this increase (Wu & Dunn, 1995, p.35). Although it is argued that reverse logistics increases costs due to extra handling and storage, Wu and Dunn (1995, p. 35) explain that the total logistics cost will actually be reduced. This is because the fact that manufacturers add the cost of the returnable packaging, so the disposal cost is minimized since it can be used many times (Ibid). Since reverse logistics involves recycling and reusable packaging, it has a direct effect on carbon emissions and is able to reduce the impact a transportation company has on the environment. A difficulty often viewed when using reverse logistics is the distribution of information, and a crucial aspect when implementing this activity is good management of information to facilitate managers’ decision-making process (Swafford, 2003; cited in Mihi-Ramirez & Girdauskiene, 2013, p. 267).

Although reverse logistics is a tool that can be implemented into a green logistics programme, it is not sufficient on its own. Reverse logistics is an important technique to use, as it makes sure that fleets are not going empty on the return, but instead the trucks will be used for both trips. However, according to van Hoek (1999, 130), reverse logistics is not enough by itself, as the whole logistical chain needs to be reviewed when implementing green supply chain initiatives. Although it is argued to not be sufficient on its own, the authors of this paper believe that reverse logistics is an important aspect to measure in South Africa. This since it is a component that is able to reduce costs as well as the environmental impact of logistics.

**Packaging Optimization**

Using techniques such as packaging optimization is crucial in order to reduce the environmental impacts of logistics. Decreasing solid wastes such as packaging, materials, metal scrap and organic waste is vital in an organization's implementation of an environmental program (Min & Galle, 1997, p. 11). According to Min and Galle (1997, p. 11) packaging materials account for 30.3 per cent of the waste stream and it is therefore fundamental to have a green packaging program in place to be able to effectively reduce a firm's carbon footprint. Packaging optimization also needs to increase, as returnable and reusable packaging is being demanded more and more along with two-way freight flows.

Optimizing packaging will directly translate into a reduction in ecological impacts as a result from less packaging waste and fewer vehicles used due to better space utilization according to Wu and Dunn (1995, p. 29). Min and Galle (1997, p. 13) provide examples such as of packaging reductions are to minimize unnecessary packaging, use more biodegradable or returnable packaging, recycling, and re-usage. Hence, there will be a
higher pressure to reduce packaging waste within the logistics infrastructure, as operations need to become more environmentally friendly. Wu and Dunn (1995, p. 36) show that this will present a challenge for logistics managers to integrate programmes and address environmental concerns. Implementing green packaging initiatives is able to bring down the overall costs of a company while also being vital to the overall reductions in environmental impacts which is why it is important to consider within this research.

Measuring Carbon Emissions

Measuring the emissions created by logistical activities is a tool that can, and maybe should, be used by transportation companies. Within the logistics industry, Wolf and Seuring (2010, p. 87) present that the transportation activities are the largest source of CO2 emissions. By measuring the emissions caused by the logistics chain, a company is able to reduce on costs as well as environmental impacts by seeing where they release emissions and unnecessary waste and reducing it. Pollution prevention is able, not only to bring down the overall environmental impact of a company, but also reduce costs as well as becoming more efficient and productive (Hart & Ahuja, 1996, p. 31). The transportation companies are able to do this by optimizing their operations and removing waste in their logistics chain. Hart and Ahuja (1996, 34) come to the conclusion that it does indeed pay off to be green since it is able to cut down costs and increase efficiency. Although there may be a starting investment needed, in the long run it is beneficial to be environmentally friendly.

Measuring carbon emissions is a process that all companies are able to do in order to monitor their environmental impacts. The ISO 14001 provides guidelines and standards that measure and monitor the environmental performance of companies and their impact on the environment and then certify companies if they comply with the guidelines (Mollenkopf et al., 2010, p. 32). By discovering and analysing their logistics chain, companies are able to receive knowledge of where they are able to achieve reductions in waste and inefficiency. Not only is it important to improve the logistics chain but also it is also important to measure carbon emissions to see the effects of the green initiatives and provide information about their effects.

The measuring of carbon emissions is usually a decision that is done above the managers and is a company policy. Although the study by Piecyk and McKinnon (2010, p. 34-35) confirm that managers are becoming increasingly aware of environmental issues, they come to the conclusion that the firms need to be able to understand how to measure and manage carbon emissions from road operations. We find it important to investigate whether or not the companies use this activity, as it can be used as a tool to measure the extent of successful application of the green initiatives. It is also a means to lower costs within the logistics chain and can also improve the environmental impact of the operations. This activity, as well as all of the above mentioned activities are effective methods to reduce the carbon footprint of a logistical company.
2.3.2 Green Logistics in South Africa

In the 2014 Logistics Performance Index, South Africa were rated 34rd out of the 160 countries registered, which is highly ranked in comparison with the GDP. Although a rather new phenomenon within South Africa, ‘Green Logistics’ is gaining momentum as companies as well as the government are increasing their efforts for a greener future. The high carbon emission rates in South Africa are making transportation companies’ look towards a sustainable and environmentally friendly solution; green logistics.

Although companies are becoming more aware of green logistics and its implementation, there are still several hindrances that affect the costs of logistics within South Africa. One of the obstacles is the implementation of a toll system in the Gauteng region, as the cost of transporting from there has increased. With reports of possible road tolls in other regions of the country, the cost of logistics could significantly increase (Olifant, 2014). The Council of Science and Industrial Research argue that the ‘E-toll’ will have significant effects on the costs of logistics from the Gauteng region, with the direct costs likely to increase as well as road congestions and road damages (CSIR, 2011, p. 6). With the increase in cost coming from the E-toll, implementing green logistics could be a solution in order to reduce the costs in the long run.

The bad maintenance of the roads is also an issue for logistics as they are increasing the costs of maintenance of the vehicles. The ‘7th State of Logistics in South Africa’ showed the extent that bad roads have on the logistical expenditures. They show that the effects of bad roads can have almost 10% higher increase in logistical expenses. (CSIR, 2010, p. 33) The poor road conditions have a negative effect on several of the logistics operations. As mentioned above, it increases the maintenance costs; vehicles may have to take longer routes to avoid bad roads, or have to go slower on a bad road. This decreases the efficiency and raises the logistics costs, as well as having negative effects on the environment.

<table>
<thead>
<tr>
<th>Road Condition</th>
<th>Average maintenance and repair costs R/Km</th>
<th>Average percentage increase in the truck maintenance and repair costs</th>
<th>Average percentage in company logistics costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>R0,96</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Fair</td>
<td>R1,24</td>
<td>30,24%</td>
<td>2,49%</td>
</tr>
<tr>
<td>Bad</td>
<td>R2,11</td>
<td>120,94%</td>
<td>9,97%</td>
</tr>
</tbody>
</table>

Table 1. Summary of potential increase due to worsening road conditions
Source: CSIR, 2010, State of Logistics – A review, p. 21
In this table we are able to see the extents that bad roads in South Africa have on the logistical costs. A bad road creates average maintenance and repair costs of 2,11 South African Rand (R), which is an increase of 9.97 per cent more than that of good roads. This is a significant cost for logistics companies in South Africa.

Factors such as the E-toll and bad roads (and low maintenance) will increase the amount spent on logistics within South Africa. Due to this, Ittmann and King (2010, p. 10) argue in their study that it is beneficial to apply green logistics without adding extra charges. Since these aspects increase logistical costs, the South African government is attempting to encourage the use of green logistics. They have been offering incentives programs in order to inspire companies to ‘go green’: the Eskom Integrated Demand Management program, and the Industrial Energy-Efficiency program (CSIR, 2011, p. 91). These enticements strive to make companies more willing to ‘go green’ and implement green logistics into their supply chain.

As well as the incentive programs, there are planned investments in order to shift the high road transportation to rail. At present, there is an imbalance as much of the transportation is done on roads instead of on railways, especially along the main transport corridors, as presented in the State of Logistics by CSIR (2011, p. 72). There are underdeveloped railway systems and the costs are higher, hence companies opt to use road transportation and trucks as a more cost effective method. By increasing the freights from road to rail, the road congestion and damage would decrease, and since rail is more environmentally friendly, it would also be a greener option. With increased investments in rail over a seven-year span starting in 2012, train usage is to be intensified (CSIR, 2011, p.74). Since the distances between the main hubs in South Africa are large, it would make sense and be much more environmentally friendly to move operations onto rail rather than road. The trucks used by many transportation companies in South Africa are not always of a high standard, and in many cases they are out-dated and old. These old trucks have a negative effect on the environment and can cause large amounts of carbon emissions. Janota et al. (2010, p. 60) state that new vehicles have decreased their emissions by 13%, whereas old cars and vehicles are continuing to be heavy polluters.

With the increased recognition from the public as well as the government, Ittmann and King (2010, p. 9) argue that companies are under more pressure to apply green logistics into their logistical operations. With green logistics gaining more momentum within South Africa, more companies are looking to implement it. It is pointed out in the State of Logistics from 2011, that these environmentally responsible companies are using greener measures throughout their supply chain in an attempt to fulfil the requirements (CSIR, 2011, p. 91). This has significance to this study as this paper wishes to investigate the environmental benefits as well as the cost benefits from implementing green logistics.

2.4 Strategic Environmental Management

Strategic Environmental Management (SEM) is a theory where environmental aspects and ecological impacts are used as a basis for uncovering business opportunities and unseen profits. According to Goldstein (2002, p. 496), this can be done by cutting costs and/or
increasing revenues. Goldstein (Ibid) continues by stating that SEM’s goal is to coordinate the environmental and bottom line goals through reducing impacts (on social and environmental aspects) into the companies’ core strategic visions. This goes hand-in-hand with Michael Porter’s (1991; cited in Goldstein, 2002, p. 496) hypothesis that tighter environmental regulations are able to enhance competitiveness by inducing innovation. Porter (1991; cited in Goldstein, 2002, p. 497) adds that heightened environmental regulations can reduce both environmental impacts as well as costs while increasing a company's competitive position. A voluntary environmental strategy can also, according to Sharma (2000, p. 683), be a cause for company actions to decrease the environmental impact, not merely to fulfil environmental regulations. Strategies such as the voluntary strategy may be important for development of environmental strategies within companies and managerial interpretations of environmental issues can influence a company’s environmental strategy (Ibid).

This is contradictory to the neoclassical view, which directly opposes Michael Porter’s hypothesis. This view states that the benefits of environmental operations will most of the time, not outweigh the costs. Although the neoclassical view admits that there are exceptions where environmental performance can simultaneously improve profits, their outlook is that environmental operations will increase costs and reduce revenues (Goldstein, 2002, p. 496). However, SEM clearly demonstrates that an impact reduction strategy is able to improve competitive strength. Goldstein (2002, p. 497) states that in many market the consumers had become sensitive to the sellers’ reputations for environmental performance. This further strengthens the view that successful SEM is able to open new revenue streams, and through green operations, is able to reduce costs.

An eco-conscious strategy can thus increase companies’ synergy between economic and environmental requirements, and to pursue ecologically friendly economic activities (Fülöp & Gall, 2011, p. 132). According to Fülöp and Gall (2011, p. 132), this aim is achieved by building the environmental requirements into the formation of the company’s economical and social goals in a way that does not interfere with business activities and competition. SEM directly complements the triple bottom line as all three factors (environmental, economic, and social) are taken into consideration. Sharma (2000, p. 681) states that organizational and managerial aspects may have an influence on a company’s choice of environmental strategy. Managerial values, according to Sharma (2000, p. 692), may have an affect on corporate identity as well as managerial interpretations of environmental issues, which directly impacts the environmental strategy of the company.

Fülöp and Gall (2011, p. 132) state that the condition for successful environmental strategy lies in eliminating the conflict between social and corporate interests and encouraging the two goals jointly. Introducing SEM into a company, and managers, could be a successful way of achieving sustainability through the three factors of the triple bottom line. As viewed by Goldstein (2002, p. 496), the costs can be reduced and the revenues increased through the use of SEM.
3. Methodology

This chapter discusses the various research strategies commonly applied in business scientific studies. Moreover, it describes the used framework, research approach and the methodology chosen to address this study. The methods selected for data collection as well as the research design will be described.

3.1 Theoretical Methodology

In this section we will go over the theoretical approach that was used towards the methodology. The research philosophy, approach and design of the study will be discussed and presented to the reader.

3.1.1 Research Philosophy

The philosophy that you select will have many key assumptions about your view on the world (Saunders et al., 2009, p. 108). These assumptions will be present throughout the research and determine the research strategy and the type of methods used (Ibid). In this section we will discuss the different ontological and epistemological philosophies and argue for the philosophical choices used in this research. Each choice has important differences that can affect the thoughts about the research process and we will therefore compare and argue for our choices (Saunders et al., 2009, p. 109).

Ontology

Saunders et al. (2009, p. 110) state that ontology is the nature of reality. The central question regarding ontology is, as described by Bryman and Bell (2011, p. 20), whether social entities are external to social actors or if they are built up from the perceptions of social actors. When considering the nature of social entities there are two positions that are treated as the central views: objectivism and constructionism (also known as subjectivism). Objectivism is a viewpoint where social phenomena are independent from social actors and no individual actor can influence it, according to Bryman and Bell (2011, p. 21). From an organizational and cultural point of view, objectivism states that these social entities come across as external to the social actor and are almost perceived as a tangible reality (Ibid). This view, according to Saunders et al. (2009, p. 110) states that organizations are structural regarding management and that management is similar in all organizations. Constructionism on the other hand, implies that social phenomena are constantly being altered and that social actors can influence the meanings of the phenomena (Bryman & Bell, 2011, p. 22). It argues that social entities do not have as high of a constraint and that both organizational and cultural aspects are in a continuous state of construction and reconstruction (Ibid). This study is concerned with the green logistical practices within companies and in particular their managers’ views and considerations of the barriers and incentives. Hence, we are looking at the social actors and their views on a particular social phenomenon. We will therefore need to explore the subjective meanings that are motivating
these actions of the social actors so that we will be able to comprehend their actions (Saunders et al., 2009, p. 111). An objectivist view would entail that this study would look at the companies as a whole and that the managers would not be able to influence the decisions. However, this study will be looking at the meanings of the social phenomena from the view of the managers and will therefore take the standpoint of social entities as constantly evolving. Since the emphasis of this research is on understanding green logistics from the perceptions of the managers, constructionism is a more appropriate ontological position.

**Epistemology**

Epistemological considerations are concerned with what is viewed as acceptable knowledge in a discipline as well as whether or not social studies can use the same principles as natural sciences (Bryman & Bell, 2011, p. 15). Furthermore, this is in alignment with Madill et al. (2000, p. 1) who states that epistemology is the study of objective truth through empirical findings. There are three views that form scientific knowledge and its acceptability: positivism, realism, and interpretivism.

Positivism is the view that the methods of natural sciences can be applied to the study of social reality and that the surrounding world is objective whereas the elements vary between authors (Bryman & Bell, 2011, p. 15). If a theory cannot pass the test of observation, then it is not considered truly scientific; they must be able to liable to observation (Ibid). The purpose of a positivism approach is to generate hypotheses that can be tested and explain theories. Assertions need to be confirmable or disconfirmable to an objective reality in a positivism philosophy (Rozeboom, 1960, p. 360). That is to say that the role of research is to test theories to be able to aid in the development of new laws (Bryman & Bell, 2011, p. 15). Realism is another view that is similar to positivism. Bryman and Bell (2011, p. 17) explain that the two approaches share two features: that natural and social sciences can apply the same data collection approaches and explanations, and that there is an external reality. However, Saunders et al. (2007, p. 84) state that realism is a view that reality is independent of human perceptions. They continue by stating that what the senses show us as reality is the truth and that objects are independent from the mind (Saunders et al., 2009, p. 114). Lastly, Bryman and Bell (2011, pp. 16-17) point out that interpretivism argues that the social sciences are fundamentally different from the natural sciences and the subjective meaning of social actions need to be understood. In other words, researchers need to understand the differences humans have as social roles (Saunders et al., 2009, p. 116). Bryman and Bell (2011, p. 18) continue by explaining that social sciences need to study human behaviour and the meaning for them, as well as interpreting their actions from their social world and point of view. In an interpretivist philosophy, Saunders et al. (2009, p. 116) state that it is crucial that researchers adopt an empathetic stance and understand the world from the point of view of the research respondents.

This study will use an interpretivism position since the knowledge and theory developed will be from interpreted social constructions. An interpretivist view is often viewed as highly appropriate in business and management research, especially in fields such as
organizational behaviour, marketing and human resource management (Saunders et al., 2009, p. 116). As we regard this research to fall under management research and organizational behaviour, we believe that an interpretivistic philosophy is the most appropriate for this study. Looking at the managers’ perceptions will allow this paper to see their social world from their point of view and attempt to understand their social actions. The personal interpretations and experiences of the respondents regarding green logistics will be the underlying purpose of this study, further inclining an interpretivist view as optimal to answering the research question.

3.1.2 Research Approach

There are two common views of the relationship between theory and research: deductive and inductive. Deductive reasoning is rationale where, if the hypothesis can be proven true, then the conclusion is that it is true in regards to a particular phenomenon (Bryman & Bell, 2011, p. 11). In a deductive approach, the gathering of data is driven from the theory and the hypothesis deduced from it (Ibid). Deductive reasoning, therefore, looks at a specific theory and tests it, and then revises the theory originally used and is therefore often associated with the natural sciences (Saunders et al., 2009, pp. 124-125). Whereas inductive reasoning, Johnson (1996, p. 5) states, is more complex and presents evidence to display that the conclusion is the most probable. An inductive approach believes that theory is an outcome of research according to Bryman and Bell (2011, p. 13). This type of reasoning attempts to find patterns to develop a hypothesis and further develop into general theories. Inductive reasoning is therefore generally associated with qualitative research whereas quantitative research usually follows a deductive approach (Ibid). Criticisers of deduction would argue that it has a tendency to have a rigid methodology that does not allow alternative explanations of the situation (Saunders et al., 2009, p. 126). Furthermore, Saunders et al. (2009, p. 126) argue that there are three reasons why your research approach is important. First, it enables you to make a better-informed decision for the research design. Second, it lets you think about the research strategies and choices that will work or not for the research. Lastly, they argue that it enables you to adapt your research design to allow for constraints (Ibid).

The approach used by this study will be of an abductive approach, which is a mixture of deductive and inductive. This was chosen due to the inductive characteristics, such as finding patterns from the results in order to further develop on the green logistics theory. However, we will also use deductive characteristics, as we will build the basis of the thesis on previous research and a theoretical framework. An abductive research approach emphasises the development of existing theory, according to Meyer and Lunnay (2013, p. 2), and includes potential new influences on the researched topic. The aim of this theory is to add to the established theory of green logistics by examining the managerial perceptions in an emerging market. The findings from the research will hopefully include new influences on green logistics in South Africa. With the choice of a qualitative research, using an abductive approach is both accepted and encouraged, and also appropriate in this case.
3.1.3 Research Design

There are two central types of research strategies that can be used: quantitative and qualitative. A quantitative study is “concerned with outcomes, generalization, prediction, and cause-effect relationships through deductive reasoning” (Yilmaz, 2013, p. 313). This type of study is primarily used in the testing of theories with the aim of disproving or failing to disprove an existing theory (Bryman & Bell, 2011, p. 27). Qualitative studies, as presented by Yilmaz (2013, p. 313), are used as an interpretative process and evaluate the meaning or understanding of the context through inductive reasoning. Interviews, literature reviews or close observations are usually used, with the intention to understand a phenomenon or generation of theory, according to Bryman and Bell (2011, p. 27).

According to Bryman and Bell (2011, pp. 26-27), data collection of a small number of respondents that will provide highly detailed information on a situation is best described as qualitative. A qualitative approach is seen as the better alternative as this research is based on the perception and views of a small number of individuals. We wish to understand the phenomenon of green logistics within South Africa through the companies and hopefully add to it. Dobrovolny and Fuentes (2008, p. 12) clarify that justifying the use of a qualitative interview approach is to get richer data to be able to answer the ‘why’ and ‘how’. In this study, we aim to investigate ‘How’ managers perceive green logistics in South Africa, which in accordance with Dobrovolny and Fuentes would justify the use of a qualitative interview design. With the use of constructionism and interpretivism, using a qualitative approach is the more sensible option and will add to the research area; green logistics. The study also intends to find the extent which logistics companies in South Africa apply green logistics, which needs a qualitative preference. The qualitative approach used will be semi-structured interviews as they will best be able to understand the managers’ views on green logistics.

3.1.4 Source Criticism

This study is based on previous data; hence the authors have based the paper on existing research and theories. The aim has been to describe the actual situation and compare it with scientific articles and course literature within the research field. These articles have been obtained from the data base EBSCO Business Source Premier and Google Scholar through the Umeå University Library website. Articles are very useful for projects, according to Saunders et al. (2009, p. 70), as they have detailed reports of earlier research. The authors believe that they have accumulated an extensive amount of sources, the majority of which were peer reviewed, and those that were not were either conference proceedings or published by established authors. These sources have been attained in order to strengthen and support existing theories. A wide range of articles exist regarding logistics, supply chain management and green logistics. However, the number of available articles on green logistics in emerging markets, and specifically in the South African, is limited. Thus much of the research gathered for this paper is based on other regions in different countries.
The authors have followed the knowledge development in the chosen field since the used articles span over time. This has given a comprehensive picture of the progress of the theory. Secondary sources have been avoided as much as possible although it has been used to give a different perspective and deeper knowledge. We believe that the data collection is credible since they originate from large well-known databases and institutions.

3.2 Practical Methodology

The practical methodology used throughout the research will be presented in this chapter. Previous knowledge and the reason for the research area will be discussed as well the approach towards the interviews and data collection.

3.2.1 Choice of Subject

The authors have chosen the subject based on their interest and curiosity relating to sustainability within supply chain management. Due to this, the authors have become more and more curious about the logistics sector, and hence chosen a logistic topic for the degree project within business administration. We both believe that the environmental issues are important and that today's society, especially in the western world are becoming more environmentally aware. However, as stated in the problem discussion, we identify South Africa as a country with low environmental concerns. Since South Africa, compared to other African countries are relatively developed, the authors believes that the logistic sector has the potential to develop further in green logistics.

Another reason for choosing South Africa is because one of the authors have resided and conducted an internship in the country. Due to this, there was a relationship that influenced the decision to conduct the Minor Field Study in South Africa.

3.2.2 Preconception

Both authors are International Business students and have a limited link with the logistics sector in South Africa. This can act as an assurance that the conclusions of the study will not be based on preconceptions and therefore will limit the bias. However, since one of the authors has previous experience in South Africa from an internship, this could affect the influence on the results. The fact that the other author does not have any previous experience within South Africa can reduce the bias and influence on results. The authors have during their studies participated in logistic courses within the fields of lean and operating management as well as supply chain management. Previous knowledge stems from these logistics courses as well as additional readings regarding the chosen area and country. Personal values have influences on our research choices and are able to affect all the stages of the research process, from the research conducted to the way of doing it (Saunders et al., 2009, p. 116). We are aware of our personal values and throughout the research process we have attempted to minimize our influence. For example, through the interviewing process we have not stated any leading questions in order to not lead the
respondents to a specific answer. The lack of knowledge about the logistics situation in South Africa could be seen as a limitation, however we believe that it will allow us to approach the study with an open mind.

3.2.3 Data Collection

There are several approaches to collect data; these are within primary and secondary sources. Primary sources are evidence that is collected directly from the managers, in this case, by conducting either a qualitative or quantitative study. Secondary sources are information that has already been published but add further knowledge in the specified field. We will be conducting interviews directly with the transportation companies regarding green logistics. Secondary data will also be collected in order to contribute with an answer to the research purpose regarding the managerial perceptions. Hence, the authors will be collecting both primary evidence (interviews) as well as secondary data in this thesis.

Bryman and Bell (2011, p. 465) explain that there are three types of interview types: structured, semi-structured, and unstructured. In this research, the semi-structured interview will be applied, as it is the most appropriate. Structured interviews follow a strict set-up of questions that the whole dialogue will follow. Unstructured interviews, on the other hand, give interviewers freedom to deviate and spontaneously ask questions within the conversation. Unlike these, the semi-structured interview follows a rough guideline of questions but allows for the opportunity of asking broader questions in an unplanned fashion. Semi-structured interviews are thus the chosen strategy for this research.

As mentioned previously by the authors, the type of interviews conducted will be semi-structured interviews. The investigation is on a fairly clear focus where we wish to address the more specific issues, which is why semi-structured interviews are preferred (Bryman & Bell, 2011, p. 472). However, we also want to allow the respondent to express their thoughts without restrictions. Also, Bryman and Bell (2011, p. 473) continue by saying that since we are two researchers carrying out the fieldwork, semi-structured interviews should be preferred. There will be a guideline of topics that the questions will be based upon but during the interview these questions may change or arise new ones (Bryman & Bell, 2011, p.475).

The interviews will be conducted with open-ended questions, leaving the respondent with the liberty of elaborating with the answer. All interviews will be recorded for the purpose of reviewing the dialogue afterwards as well as to take note of the important aspects of the conversation. All the interviews will be conducted in English.

According to Saunders et al. (2009), secondary data can provide valuable sources that can answer or partially answer a study’s research questions. Hence, the authors have evaluated existing secondary data and concluded that it may contribute to answer the research question regarding the managerial perceptions of green logistics in South Africa. Furthermore, the authors believe that the secondary data used in the thesis has relevance
and provides further valuable information to the reader regarding to what extent transportation companies apply green logistics (Saunders et al, p. 256).

Throughout the thesis, the authors have found secondary data relating to the state of logistics in South Africa. This information had not yet been published by CSIR prior to undertaking the research. Since the primary data only includes seven interviews, due to time constraints, we felt it was important to gain insight from secondary data to fully answer both research questions. Also, the secondary data that is related to the fuel quality in South Africa was found after conducting the primary data collection. The authors decided that secondary data related to the fuel quality was of importance since it was mentioned several times by the respondents as a barrier. Since Sasol have recently implemented 10ppm diesel, and are partially owned by the South African government employees pension fund, we felt that the data would provide the reader with further information surrounding the barriers as perceived by the managers. The secondary data regarding the quality of the fuel has been evaluated as vital in order to answer the following research question of the thesis: “What are the incentives and barriers of implementing green logistics in South Africa according to transportation managers?”

The mentioned difficulties together with the timeframe of the thesis and an increasing time constraint were crucial reasons for the collection of secondary data. This is in alignment with Ghauri and Grønhaug (2005; cited in Saunders et al, 2009, p. 268), that the main advantage of using secondary data is the huge saving of time and money. Stewart and Kamins (1999; cited in Saunders et al, 2009, p. 269), even suggests that using secondary data can be the only viable alternative. However, the authors are aware of the existing disadvantages to secondary data sources such as; the data collected may not be appropriate to the research and only partially answer the research question (Saunders et al. 2009, p. 269).

The authors evaluate the secondary data findings as far larger data sets collected by CSIR (2014) and Sasol (2013), than could have been collected by the authors themselves. Thus, we have been able to interpret and analyze large sets of data that is of value to the reader of the thesis concerning the current situation of logistics and fuel quality in South Africa. This is again in alignment with previous research, such as by Saunders et al (2009), that states that researchers can save time and money by using secondary data and more effort on analyzing and interpreting the actual data (Saunders et al, 2009, p268).

3.2.4 Sampling

The chosen companies will be selected on a convenient sampling method. This means that the sample of companies will be elected on a non-probability basis from the part of logistical companies that is close to hand (Bryman & Bell, 2011, pp. 489-490). In other words, transportation companies that the authors have easy access to in their surroundings of Johannesburg and Cape Town, South Africa, will be sampled. Due to the time constraints of the degree project, as well as money constraints and availability of data, convenience sampling was the most appropriate approach. This technique is widely used, however Saunders et al. (2009, p. 241) argue that it is subject to bias and influences beyond the researchers control. We acknowledge that there is a risk for bias regarding our sampling
type. However, since we contacted the companies and they connected us with the responsible manager, we believe that our influence is limited. The authors will conduct the study on 7 companies and their transport managers. The sample size will cover and represent the major operators on the South African market. Thus, the results of the sample size will provide credibility to the research. International as well as domestic firms is chosen in order to cover the real market situation and provide further credibility. The study focuses on large transportation companies with major impact on the logistical South African market. Furthermore, by selecting international as well as domestic companies, interesting comparisons can be derived.

Limitations regarding the convenient sampling method have to be taken into account. By applying this selection strategy, one cannot, according to Bryman and Bell (2011, pp. 489-490), generalize a market since the numbers of respondents are limited. In this case, since the authors do not study each and every transportation firm in the country, as well as does not focus on all the geographical areas and cities, the results can only speculate on a widely applied result. Looking at the literature by Bryman and Bell (2011, pp. 489-490), the authors believe that the study will provide a pattern that can be utilized beyond the sampling range.

After the interviews with the managers, the answers were being strengthened rather than providing new information and we felt that there was a general consensus between the responses. To get another perspective regarding green logistics in South Africa, we interviewed Hans Ittman who has been researching the logistics field for over 40 years. He has seen the development of green logistics and especially within South Africa and his view was very rewarding. To further support the interviews, we felt that it was necessary to get secondary data in order to get a further view of the topic at interest.

3.2.5 Interview Guide

According to Bryman and Bell (2011, p. 473), an interview guide is not as specific as a structured interview schedule, and in semi-structured interviewing; a prompt or structured list of the issues to be addressed or questions asked is all that is needed. With a semi-structured interview there is a degree of flexibility, according to Bryman and Bell (Ibid), and it allows for questions to be reshaped or arise a new ones during the interview.

The interview guide is divided into three sections, which conforms to the literature review and will be exhibited in the empirical findings as well as the analysis. The three sections of the interview guide are as follows:

- Responsibility: concerned with sustainability and triple bottom line theory.
- Green Logistics Activities: in conjunction with the green logistics section of the literature review.
- Managerial Perceptions: regarding SEM and perceptions of sustainability and green logistics.
Bryman and Bell (2011, p. 475) present five basic elements in the preparation of the interview guide and these were all followed. Firstly, the authors attempted to create an order of the topic areas with a flow between questions. The questions were formed in a way to answer the research questions/purpose. A language was used that would be comprehensible to all the respondents and relevant to the people interviewed, and overly complicated language was avoided. The questions were formed in such a way that they were not leading and the respondents were allowed the freedom to elaborate. Lastly, ‘face sheet’ information was recorded of both a general and specific kind to help contextualize the responses (Bryman & Bell, 2011, p. 475).

3.2.6 Conduction of Interviews

The interviews have been conducted face-to-face in English with the respondents. The authors contacted the companies by email, by introducing themselves, their background and explaining the purpose of the thesis. We waited between two and three days for responses, and if there was no response we called the managers directly by phone. In some cases we had to call and ask for the right person and their personal phone-number. Due to various holidays such as: bank holiday, freedom day and Labour Day, some managers were unavailable for interviews. The authors therefore had problems booking the interviews with the desired companies and managers. This can explain why there was not a larger amount of respondents.

Upon conducting the interviews, the authors visited the respondents at their headquarters in Johannesburg. The pace of the traffic as well as the left-handed traffic (right handed in Sweden) was a difficulty that was overcome.

- Each interview was scheduled and booked according to the agreed date and time.
- An introduction of the authors took place in the beginning of each interview.
- The respondents were kindly asked if they wanted to be anonymous and if the interviews could be recorded.
- Every meeting ended by asking for allowance to further contact the respondents in case new questions would arise. The authors offered each and every manager to receive a copy of the study after the date of publication.

One interview has been excluded from the empirical findings and the thesis. The authors had booked an interview with a transportation manager at the global freight forward company DSV. Upon arriving the manager was unable to attend and therefore we met with another employee. However, after the interview we realized that these empirical findings could not be used and included in the study. This due to the interview person not being a manager and that the company had a limited amount of road transport operations.

3.2.7 Respondents Grid

The following respondents were interviewed and agreed to participate in this study: Mrs Dawn Steenberg from DB Schenker, Mrs Liesl De Wet from Barloworld Logistics, Mr
Peder Jensen from DHL Global Forward, Mrs Reetsang Mothibi from Imperial Logistics, Mrs Ursula Uys from Unitrans and Mr Hans Ittmann, logistics researcher and consultant at Transnet. The respondent from United Parcel Services (UPS) has requested to remain anonymous, but allowed to be mentioned as manager of the company. In the table below is further information, including: the respondents name, respondent’s position, name of the company, years of experience, interview type and date of the meeting as well as duration of the interview.

<table>
<thead>
<tr>
<th>Respondents Name</th>
<th>Respondents Position</th>
<th>Company</th>
<th>Years of Experience</th>
<th>Interview Type</th>
<th>Date and Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dawn Steenberg</td>
<td>National Safety, Health, Environmental and Quality Manager</td>
<td>DB Schenker</td>
<td>26 years</td>
<td>Face-to-face</td>
<td>2014/04/15 36 minutes</td>
</tr>
<tr>
<td>Manager A</td>
<td>Not applicable</td>
<td>UPS</td>
<td>24 years</td>
<td>Face-to-face</td>
<td>2014/04/16 19 minutes</td>
</tr>
<tr>
<td>Liesl De Wet</td>
<td>Sustainability Champion/Manager</td>
<td>Barloworld Logistics</td>
<td>5 years</td>
<td>Face-to-face</td>
<td>2014/04/16 49 minutes</td>
</tr>
<tr>
<td>Peder Jensen</td>
<td>Vice President of Ocean Freight, Sub-Saharan Africa</td>
<td>DHL</td>
<td>30 years</td>
<td>Face-to-face</td>
<td>2014/04/22 20 minutes</td>
</tr>
<tr>
<td>Reetsang Mothibi</td>
<td>Sustainability Manager</td>
<td>Imperial Logistics</td>
<td>13 years</td>
<td>Face-to-face</td>
<td>2014/04/22 1 hour and 18 minutes</td>
</tr>
<tr>
<td>Ursula Uys</td>
<td>Marketing and Communications Manager</td>
<td>Unitrans</td>
<td>5 years</td>
<td>Face-to-face</td>
<td>2014/04/23 42 minutes</td>
</tr>
<tr>
<td>Hans Ittmann</td>
<td>Researcher and Consultant Logistic Researcher</td>
<td></td>
<td>41 years</td>
<td>Face-to-face</td>
<td>2014/04/24 1 hour and 37 minutes</td>
</tr>
</tbody>
</table>

Table 2. Interview Information  
Source: Own Table

### 3.2.8 Data Analysis Method

The purpose of the data analysis is to connect the theory presented in the literature review with the results found in the empirical findings. Comparing the two will generate valuable
information that is able to build on concepts and theories. However, one of the main
difficulties with qualitative data is that there is usually a large amount of data gathered, and
researchers have to guard against failing to carry out a true analysis, according to Bryman
and Bell (2011, p. 571). For this reason, the authors have decided to select applicable data
and compare this with that of the theory presented in the literature review. This was done
by recording the interviews and listening to the data to recognize the important areas.
During the interviews, one person asked the questions while the other took notes of
important points. We are aware of the disadvantages of not transcribing the interviews,
however due to time constraints we were unable to do so. As stated earlier, we counteracted
this by both recording the interviews as well as taking notes throughout the interviews.

The analysis will also be divided into three sections that will be derived from the theory, and
compare the empirical findings according to this. Therefore, we will be using a thematic
data analysis method in accordance with Saunders et al. (2009, p. 536). The three themes
that we have established are: Responsibility, Green Logistics Activities, and Managerial
Perceptions. The theoretical knowledge will also serve as a baseline to understand how the
theory and concepts are applied into practical situations.

3.2.9 Ethical Considerations

According to Bryman and Bell (2011, p. 128) there are four main areas where issues may
arise when performing research: Harm to participants, lack of informed consent, invasion of
privacy, and deception.

All of these ethical principles are adhered to and the interview process will be done in such
a manner to be as respectful as possible to the respondent. No harm will entail the
respondent, whether physical or mental. The authors followed all ethical codes, explained
by Bryman and Bell (2011, p. 128), regarding harm to respondents and acted carefully to
make sure that the harm to the participants were minimized. Bryman and Bell (2011, p.
129) also state that harm to non-participants have to be evaluated to make sure that no harm
entails them. This has been taken into consideration by the authors and the risk to harm
either participants or non-participants is minimal.

Regarding lack of informed consent, Bryman and Bell (2011, p. 133) describe it as giving
participants the needed information to make an informed decision if they wish to
participate. To make sure that we adhered to this ethical consideration, we presented
ourselves, as well as the intent of our research so as to give the respondent full information
when contacting the companies. All the participants were given the chance to refuse to
cooperate, according to Bryman and Bell (2011, p. 133) since we introduced ourselves as
well as the purpose of the research.

We also made sure that to treat the subject of ‘invasion of privacy’ with full respect and did
not reveal the names of any individual who desires to remain anonymous. The participants
were told that they did not have to answer any question that they did not wish to answer,
which confirms with Bryman and Bell’s (2011, p. 136) invasion of privacy. One participant
desired to remain anonymous, which was adhered to. On several occasions were we told
things in confidence which has not been presented in this research as we have adhered
towards the invasion of privacy. Bryman and Bell (Ibid) state that confidentiality with regards to recording the interviews should also be considered. We followed this and the recordings were only used for reviewable purposes only, which was said to the respondents.

Lastly, there will be no deception within the research as we will explain the purpose of the study clearly and clarify who we are (Bryman & Bell, 2011, pp. 128-137). We presented the research for what it is and no form of deception was used through the process. As stated above, the respondents were given full information of our purpose as well as background information about us and that we are students from Umeå University.

In this study, the social factor of the triple bottom line theory is included. This means that the social and societal impacts of green logistics are also in focus of this paper. Beyond the ethical considerations, the societal impacts will be reviewed as they are closely linked. Throughout the study, social issues will be raised and social implications of the research will be discussed in the conclusion.

3.2.10 Limitations of methods

- The authors use a qualitative interview method when retrieving data, and are therefore reliant on the information provided from the respondents. However, the authors stress that the data quality criterion have been complied with when conducting the research.

- Semi-structured interview methods have been chosen, thus the authors questions may have varied slightly for each interview.

- The size of the interview pool only represent a minimal portion of the transportation industry, therefore the results are not able to serve as an indicator for the entire industry. However, by including several of the major actors, the authors strongly believe that the results from the research are able to provide estimations for the logistics companies in South Africa.
4. Empirical Findings

In this chapter, the findings from the interviews are presented and the answers by each respondent. Refer to the Appendix where the interview guide is provided. A short presentation of the companies is given before the results from the qualitative interviews are shown. First, the companies are presented and then Hans Ittmann.

4.1 Presentation of Companies

4.1.1 DB Schenker Logistics

Schenker logistics supports industry and trade on a global level through exchanging goods by land transports, air carriers and ocean freights. To its size and revenue, it is considered to be among the top three companies within the logistic industry, and thus one of the largest actors in the world. The company has approximately 94,000 employees at 2000 locations within 130 countries around the world. Gottfried Schenker founded Schenker & Co in 1982 in Vienna. In 1931, the German railways acquired Schenker. In modern time, Schenker belongs to the Deutsche Bahn AG as a subsidiary. (Schenker, 2012)

In South Africa, Schenker started operations in 1962. Today, the company have more than 1000 employees on a nationwide level, either permanently or contractually hired. The branches are located in Johannesburg, Durban, East London, Port Elizabeth and Cape Town and serve more than 5,500 national destinations. In our interview with DB Schenker, we interviewed Dawn Steenberg, National Safety, Health, Environmental and Quality Manager. (Schenker, 2012)

4.1.2 United Parcel Service Inc., UPS

UPS, United Parcel Service Inc. is the largest express carrier and package delivery company in the world, enabling commerce around the globe. The company is a leading provider within specialised transports, logistics, and capital and e-commerce services. As today, UPS have approximately 397,600 employees located both within the United States and on a worldwide level. It’s operations, managing the flow of goods, information and funds, meets the daily demand of 8.8 million customers across 220 countries and territories. The service area includes every address in the United States and Europe. James E Casey founded UPS as the American Messenger Company in Seattle, Washington in 1907. As the business grew and continued to expand outside Seattle (1919), the company name was changed to United Parcel Services Inc., UPS. By the 1980s, the company had established a presence at the international shipping market, reaching destinations in the Americas, Europe, Middle East, the Pacific Rim, and in Africa. UPS South African branches are located in Johannesburg, Cape Town, Durban and Port Elizabeth. In our interview with UPS, the manager has requests to remain anonymous. Hence, in this paper we will regard him as Manager A. (UPS, 2014)
4.1.3 Barloworld Logistics

Ernest Barlow founded Barloworld in 1902 in South Africa. The company started out selling woollen goods, blankets and coats. Later on, the company expanded to include engineering equipment. Moreover, the company also sold and conducted services of Caterpillar products. Later on, Barloworld moved into manufacturing of cement, paint, stainless steel, household products and mining. Today it is widely recognised as a conglomerate, operating business in various fields. The logistical function within Barloworld Inc. was established in 2001 as a subsidiary. Barloworld Logistics conducts business in South Africa, Middle East, Spain, Germany, the United Kingdom and the United States of America. This includes more than 300 offices in 100 countries. In our interview with Barloworld Logistics, we interviewed Liesl De Wet, Sustainability Champion. (Barloworld, 2014)

4.1.4 DHL Global Forwarding

DHL Express belongs to the largest and most international logistic companies in the world, offering express mail services, industry sector solutions, supply chain solutions and freight transportation services. The company operates in over 220 countries and territories across the globe, with a workforce of approximately 285,000 employees. Since 2001, the German Deutsche Post AG entirely owns DHL Express. (DHL, 2014)

Adrian Dalsey, Larry Hillblom and Robert Lynn founded DHL in 1969. The first letter in the surnames becomes DHL, and thus the company name. The company was the first international express delivery service in the world. The three founders started the operations by delivering shipping documents by air between San Francisco and Honolulu. This so that shipping documents could arrive at the customs offices before the freights, which greatly reduced delays when passing through the customs. DHL eventually began to offer door-to-door express delivery services to companies and private persons. In 1979, DHL entered South Africa by opening up new offices. In total the company possesses a total workforce reaching about 800 employees. DHL’s branches are located in Johannesburg, Cape Town, Port Elizabeth, Durban and Isando and another 11 service centres are located across the nation. In our interview with DHL Global Forwarding, we interviewed Peder Jensen, Vice President of Ocean freight sub-Saharan Africa. (DHL, 2014)

4.1.5 Imperial Logistics

Imperial Logistics is one of three divisions within Imperial Holdings. Imperial was founded in 1947 as a motor dealership in Johannesburg. Today the company has grown to have 51,000 people across Africa, Europe, the United States, United Kingdom and Australia. The logistics division was established in 1975 and has since then become a global actor within logistics and supply chain. The company conducts extensive operations in Europe and Southern Africa; this includes air, ocean, rail and road freights. The road logistics currently serves 14 African countries. In South Africa, the company possesses more than
5,500 vehicles and a workforce of approximately 17,000 employees. Internationally, Imperial logistics have approximately 21,000 employees and 6000 vehicles. Annually, Imperial International transports over 110 million tons across Europe and Africa. In our interview with Imperial Logistics, we interviewed Reetsang Mothibi, Sustainability Manager. (Imperial Logistics, 2014)

4.1.6 Unitrans

Unitrans Freight and Logistics is a division within the KAP Industrial group, who is listed at the Johannesburg Stock Exchange. Unitrans Supply chain Solutions has since its foundation in 1962 designed, implemented and managed supply chain and logistics solutions in sub-Saharan African countries. Operating services include warehousing, road transportation, ocean/air/rail forwarding, agricultural services, mining services, consulting services and supply chain re-engineering. The company operates from 133 locations in 10 countries at the African continent. Currently, Unitrans operates 160 logistic depots, 3000 self owned vehicles and has a workforce of 11,000 employees. In our interview with Unitrans, we interviewed Ursula Uys, Marketing and Communication Manager. (Unitrans, 2012)

4.1.7 Hans Ittmann - Logistics Researcher

Hans Ittmann is a distinguished logistic expert, internationally and locally recognised for his papers, editorials and book reviews. The annual State of Logistics survey by CSIR in South Africa was originally founded and started by Hans W Ittmann. The survey is widely quoted and recognised within and outside South Africa. (CSIR, 2010)

He holds a Bachelor of Science in Physics, Mathematics and Aeronautics from the Stellenbosch University, a Bachelor of Science (Hons) in Operational Research and a Master of Science in Operational research from the University of South Africa and an MBA from the University of Pretoria. Ittmann started his career at the CSIR (Council for Scientific and Industrial Research) in 1973 as a researcher at the National Research Institute for Mathematical Sciences. Within the CSIR, Hans Ittmann held several management positions such as head of operations research and statistics before becoming the executive manager of the logistics and quantitative methods group at CSIR Built Environment. Hans Ittmann is currently contracted by the Transnet Freight Company, and runs HWI Consulting. (CSIR, 2010; Interview)

4.2 Company Findings

In this section of the thesis we will present the results from the interviews with the respondents. The interviews started with several general questions about the respondent in order to make them comfortable, before the main topic of green logistics and their perception of it were discussed. The findings have been grouped into three dimensions that were chosen based on the theory. The dimensions are: Responsibility, green logistics
activities, and managerial perceptions. First, the managers’ views on each dimension were discussed and secondly the views from Hans Ittmann are also presented. In this section, the names of the managers will be used as we were looking into their perception of the concept of green logistics.

4.2.1 Responsibility

Regarding Transportation Companies Responsibility Towards the Sustainability

There is a general consensus that transportation companies have a great deal of responsibility towards the sustainability. Reducing the carbon emissions and the environmental impact of the companies operations were the main responsibility as seen by the companies.

Dawn Steenberg (DB Schenker) believes that “green logistics is absolutely imperative”. It is needed to ensure sustainability, and it is important for transportation companies to take accountability and monitor their emissions and truck loads in order to leave the earth in a better way for our children. All companies also have a responsibility towards the environment according to Reetsang Mothibi (Imperial Logistics). She states that a company that uses natural resources has an obligation to use these resources in a responsible manner and keep the impact on the environment as low as possible.

Peder Jensen from DHL stated that reducing the carbon emissions of the company is the main priority when it comes to their corporate responsibility. He says that a company must reduce their emissions as much as possible in order to keep the environmental impact low. Manager A (UPS) identifies two main responsibilities when it comes to the environment. Firstly, much like Peder Jensen, Manager A states that reducing your carbon footprint and the impact that the vehicles have is their responsibility. They are also responsible to optimize their route capabilities, which will lower their fuel consumption and their carbon emissions.

According to Liesl de Wet (Barloworld Logistics), they have a responsibility towards their clients to move a product from point A to B as effectively as possibly. She states that making an inefficient fleet as efficient as possible will reduce the impact made on the environment. Ursula Uys at Unitrans also mentions that it is a challenging concept because people need their products. Transport companies will always look to reduce their kilometres travelled in order to reduce the logistics costs, which will directly affect the environment in a positive way. The managers at Barloworld and Unitrans both express that transportation companies should become as efficient as possible in order to be ‘green’, as the two are directly linked.

Companies’ Actions Towards Environmental Issues

All the managers that were questioned said that their companies do take actions towards environmental issues and regarding green initiatives. Below is a description of each
company and the activities that they have implemented. There is also information on their ISO certifications and the ones that each company has obtained.

DB Schenker in South Africa is given environmental targets and objectives from their headquarters in Germany. These targets involve goals such as monitoring waste, recycling, environmental, and health and safety issues. Their environmental objectives are to reduce the environmental impact of the business, and to constantly improve on their environmental performance in a sustainable manner. DB Schenker has an overall target to reduce their Carbon Dioxide (CO₂) emissions by 20% by the year 2020. They are also International Organization of Standardization (ISO) certified with the 9001, 14001, and 18001 certificates.

DHL started with a global goal in 2007 to reduce their overall carbon footprint by 30% by the year 2020. Due to this, each country’s division including South Africa has to contribute by lowering the carbon footprint. Peder Jensen explains that this is met through reducing the CO₂ emissions by using the most modern vehicles and engines at the market. Since DHL belongs to the largest transportation companies in the world, they have a responsibility to reduce the emissions as much as possible. Regarding the environmental ISO standards, DHL are certified with the 14001 certificates.

UPS have environmental roles and responsibilities guidelines that they adhere to and need to follow. This includes roles such as making sure that they do not pollute where unnecessary, washing cars according to environmental legislations, pollution prevention practices and environmental violation procedures. The company have implement petrol control and procedures, such as the no-idle policy. The no-idle policy signifies that a driver has to start and drive immediately and is not allowed to leave the car standing on for even 10 seconds, as this will unnecessarily harm the environment. Another action that UPS takes in order to be responsible towards the environment is their rapid spill response. This implies that when an accident occurs and any harmful materials are released, UPS ensures that this is cleaned up as quickly as possible and disposed of in an orderly manner. The ISO standards are not used in UPS as they have their own set of standard that they abide to. UPS used to be ISO-certified but the organization feels that it is no longer required. In the opinion of Manager A (UPS) these standards are much higher compared to the ISO standards.

Barloworld logistics follows internal policies and responds to a carbon disclosure project. The company has worked hard to get a road transport standard with the CSIR (Council for Scientific and Industrial Research). The applied standards are called RTMS, which is about governing your vehicle fleet and behaving in the right way on the road. There are strives towards liking efficiency with lowering the carbon emissions. A scorecard has been introduced to help transport suppliers to measure their carbon emissions. According to Liesl De Wet, Barloworld Logistics measurements on how these contractors are doing and how they participate. In some instances, the company applies the ISO standards. The ISO standards are applied if a requirement from the customer exists.

From Unitrans’ perspective, the focus is to always reduce the km’s travelled. Ursula Uys mentions routing and scheduling optimization as key components. By selecting the optimal
route and load, Unitrans can reduce the km travelled. Ursula also states that optimizing payload can save massive amounts in transportation costs, due to fewer trips conducted. Another action conducted is: Centre of gravity simulations to determine the best locations for warehouses. By having the optimal warehouse location, Unitrans can further optimize the routes. Recycling waste is yet another action that Unitrans are committed towards. Cardboard and waste comes back with trucks and is continuously recycled and sold. Unitrans are certified with the ISO standards and have obtained the 9001, 14001, and 18001 certificates. However, not all operations have the certifications, only the ones where the customers require it.

Imperial Logistics have identified six sustainability themes, of which four deal with environmental issues. These four themes are: energy efficiency and carbon management, water management, waste management, and fuel management. Their energy efficiency and carbon management project means that they identify the sites where they operate and make them as energy efficient as possible in order to be able to bring down carbon emissions. These projects include using energy efficient lighting, with motion sensors turning lights on and off. Imperial Logistics also look at their water consumption and how they are able to reduce it within their water management project, which includes water recycling. The waste management theme is mostly based around company level recycling. However, it is difficult to implement, as the participation and awareness of all of the employees as well as contractors are needed. Within their fuel management theme, Imperial Logistics has attempted to introduce Euro 5 trucks. However, since the fuel in South Africa is of a very low standard they have been unable to introduce them successfully and only have a limited number of Euro 5 trucks. Imperial Logistics do not implement ISO standards, unless it is a requirement by the client.

**Hans Ittmann**

All companies have a responsibility towards the environment, according to Hans Ittmann. However, he does go on to add that finances are the driving force of any business and as much as you may want to be environmental and social (in accordance with the triple bottom line), the economical factor is the key to running a sustainably sound business. If you are able to incorporate all of the factors then that is optimal, but you are not able to have all three if you do not make money. Hans believes that every business should be environmentally and socially conscious but the primary objective is to run a financially sound business in order to make a difference. Finding a balance between the three is when you find sustainability so it is obviously important to find the perfect equilibrium for your company.

Regarding the ISO standards, Hans Ittmann believes that they are important but you have to ask yourself if it is really making the impact that it should be. Are companies installing it correctly and making a cultural change within the organization to become more environmentally friendly and socially responsible? If they are, then the standards are beneficial but he is sceptical if companies are forced to apply the certifications by, for example the clients. Then, he claims, it is not a company decision but rather to satisfy the client. In some cases companies have their own standards, which might be better since they made the conscious decision about implementing their own standards. However, he
continues by saying that having the ISO standards or your own standards can have both benefits and downsides.

4.2.2 Green Logistics Activities

Green Logistics Activities in Place

In this part, companies were asked what green logistics activities they currently have in place. They also elaborated a bit on what their companies do regarding green logistics. Each company does have green initiatives to some extent, and many of the activities were relatively similar from company to company.

DB Schenker has several green logistics activities in place at present. The vehicles and trucks that they use have to be emission compliant and they are required to have regular checks and services. This is to ensure that they do indeed comply with emission regulations as well as keeping up maintenance of the vehicles. They also engage in activities such as calculating carbon emissions, as well as implementing driver-training programs to reduce fuel consumption.

The green logistics activities that UPS have implemented are regarded as ‘control dispatch’ and ‘goods dispatch’. This includes practices such as ensuring that the driver has the correct amount of packages when commencing his route, as well as following route sequences in the delivery cycle correctly. This is to prevent any ‘spaghetti driving’ as Manager A called it, which is where the driver goes past a destination and then they have to go back to deliver the package. The vehicles are specifically designed to deliver packages in a sequential manner. The vehicles have shelves in them, which allow the drivers to easily get a package and deliver it, which optimizes the time taken and ultimately the fuel consumed.

Liesl de Wet at Barloworld Logistics questioned the definition of green logistics. According to Liesl, green logistics is more than road freights; it is holistic. It is important to understand what green logistics actually is, and that it includes many components. However, Barloworld Logistics do have green logistics activities and are focusing on being innovative and implementing innovative actions for clients, such as payload enhancements and by using aerodynamic trailers and trucks. The Triple Bottom Line is however critical. If only focusing on the environmental aspects while neglecting other factors such as social and economical, there will become problems. The subject needs continuous and further research.

Unitrans acknowledge that they do indeed apply green logistics. Compared to the normal Euro-2 standard vehicles used by the majority of the market, Unitrans uses Euro-3 and Euro-4, which is more modern, cleaner and emits fewer emissions. Also, Ursula stresses the need for efficiency through optimal route and payload optimization. These activities mean less distance travelled which leads to lower transportation costs and increased efficiency, which in turn reduces carbon emissions.
Currently, Imperial Logistics apply several green logistics activities. An initiative that they have carried out is the use of driver training. Reetsang Mothibi (Imperial Logistics) states that this has been valuable as they have been able to reduce fuel consumption and ultimately decrease their emissions as well. They have also received input from employees and a great deal of employee involvement after this initiative to optimize the drivers’ fuel consumption. Route optimization is also an activity that has been imposed to a large success. Imperial logistics have managed to take trucks of the road, cut down costs, as well as reducing carbon emissions all from optimizing their routes.

DHL is one of the most advanced logistics companies in the world when it comes to green logistics according to Peder Jensen. Their ‘GoGreen’ program covers all their operations and is what the program they designed to meet their requirements of reducing their carbon emissions through green logistic practices. In a South African context, Peder Jensen states that DHL encourage the trucking companies that they work with to have cleaner engines. They also use payload optimization to best utilize their trucks and avoid trucking half empty. This will reduce the amount of carbon emissions released per kilometre.

**Green Logistics Activities Focused on**

*In this section, the authors have asked what activities the companies have currently got implemented from the activities mentioned in the theory. These activities consisted of: fuel efficiency, route optimization, reverse logistics, packaging optimization, and measuring carbon emissions. The results from the companies are presented in the table below.*

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Table 3. Green Logistics Activities Table
Hans Ittmann

Hans Ittmann believes that companies are becoming more and more aware of green logistics in South Africa. He states that there are two competitions that have been introduced by two newspapers: the logistics news and the supply chain magazine. They are both monthly magazines and have introduced green logistics competitions. He adds that the number of entries into these competitions has been increasing over the last couple of years, which indicates that companies in South Africa are implementing green logistics more and more. There is an increase in awareness and Hans does believe that companies in South Africa are applying green logistics activities more. However, he is sceptical that the companies are looking at their entire supply chain as a whole. Only looking at warehouses and what you implement there is very far from the entire supply chain. There are still some challenges all the way from production, throughout manufacturing and to the moving of the product, which is what the companies need to look at. Companies that are competing and operating globally are surely taking sustainability seriously and applying it as much as possible. The distance between South Africa and the world market is undoubtedly making companies operating on a global scale work towards green supply chains, as you need to compete with everybody.

4.2.3 Managerial Perceptions

Green Logistics Importance

The managers were asked if they considered green logistics important and to describe further. Each manager expressed that green logistics was important, although the reasons for each were not the same. Within companies the managers all believed that green logistics was important to improve their operations.

Considering the importance of green logistics, Dawn Steenberg at DB Schenker states that it is absolutely important. What is being done in the company function can have a huge environmental impact. It is possible to achieve a big difference in an ecological sense. Also, electricity and water consumption can be reduced, vehicle performances can be increased, all this due to a green logistic approach.

Manager A at UPS also regards green logistics to be important. When looking in the way of how UPS operates in South Africa, the company always tries to streamline their customers business. Instead of moving goods every single day to a customer, UPS tries to streamline by delivering only on the required days, which brings down the amount of trips and also meets their service agreement level. Manager A believes that green logistics can improves the supply chain and the efficiency while also reducing the impact on the environment. UPS is constantly looking at ways to improve the efficiency of the supply chain for themselves, their customers and reduce the impact on the environment.

Liesl de Wet at Barloworld Logistics considers green logistics very important, and states that for her it is critical. She continues by saying that the resources are becoming scarcer and scarcer which means a sustainable, flexible, and agile supply chain is vital since it will
put you one step ahead of your opponents. There is a carbon tax planned for implementation in 2016, and Liesl believes that practicing green logistics will leave you ahead and able to deal with this tax. A sustainable supply chain, for Liesl, is the essence of making your supply chain and logistics operations effective and greener. It will reduce your emissions, improve lead times and flow of your product and decrease your overall logistics costs.

Ursula Uys at Unitrans implies that green logistics is important for any company, as they have a responsibility to be environmental and sustainable. She also voices the benefits of going green, which is not only positive for the company but also for the customers. The benefits of going green are massive as customers are more willing to do business, but it also makes financial sense since there are massive cost savers in it, with the added benefit that it also has positive effects for the environment.

Reetsang Mothibi at Imperial Logistics states that she personally believes that an organization cannot do without sustainability and it needs to incorporate it, along with environmental issues, into the organization. She continues by saying that it is important that both management and employees from all levels are aware of the benefits of green logistics. Looking from a cost point of view, she discussed the importance of green logistics as the costs of logistics are increasing, and green initiatives are able to reduce these costs. Reetsang believes that green logistics is very important, not only for environmental reasons, but for efficiency reasons also.

For DHL and Peder Jensen, green logistics is absolutely important. Again, the company's objective is to reduce the CO_2 emissions. As a company they have to work on that. For DHL working in an emerging country, it is very different compared to the developed world where people are much more conscious about the environment. Therefore it is very important for DHL to spread the information about green logistics and their program “go green”. DHL are trying to save the planet by transporting smarter and not using old trucks with out-dated engines and in South Africa, they are staying away from the worst quality of diesel (500PPM Diesel). DHL also demands that sub-contractors comply with environmental policies.

**Does Interpretation of Green Logistics Different from Companies?**

In this question the companies were asked whether or not their interpretation of green logistics differed from that of their companies. This was an intriguing topic to see if the managers’ perspective matched that of the companies’, and if the company culture and policy runs through to them. The results were interesting as all but one of the managers said that their interpretation did not differ.

Dawn Steenberg (DB Schenker) and Peder Jensen (DHL) both said that they were introduced to green logistics at their respective companies and that they were schooled in it, so their views do not differ. Manager A at UPS also admitted that they were a policy procedure person and that their interpretation matched that of UPS. According to Ursula Uys (Unitrans) and Liesl de Wet (Barloworld) their interpretations were the same as their companies. However, Liesl de Wet did state that the definition of green logistics is not well
defined and that is where her interpretation could differ from that of Barloworld’s. She adds that green logistics is constantly growing and changing and it needs to be defined better within the company.

The one manager that believed that their interpretation could possibly differ from their company was Reetsang Mothibi at Imperial Logistics. She comments that her view could differ since she considers green logistics as a holistic concept between environmental and costs points of views together. Whereas in the company it is not always that you are seen as an environmental person and as a group, Imperial has not integrated the environmental and cost views. That is the only real gap that Reetsang see between her views and that of Imperial Logistics’.

**Green Logistics: Cost-saver or Unnecessary Cost?**

*When the managers were asked whether they considered green logistics a cost-saver or an unnecessary cost, they all stated that it could definitely be a cost saver. Although a few mentioned that it is possible to be an unnecessary cost if it is not feasible, the managers agreed that the initial payback would pay off in the long term.*

According to Dawn Steenberg at DB Schenker, green logistics can definitely be a cost saver, but it has to be managed properly. On the transport side, activities such as route optimization and fuel efficiency can save costs. If drivers stop during their routes it costs the company money, she adds, and driver training has been a cost saver since it has limited the amount of trucks sitting idly or going off route.

Manager A from UPS reveals that green logistics most definitely is a cost saver. They continue by stating that the original investment will cost money but in the long run it will most definitely be a cost saver. UPS have a Global Position System (GPS) system that can track the cars and see if they stop or go off route. There was a cheaper version without the GPS system but Manager A continues by saying that green logistics does initially cost you money, but your long-term payback is definitely there.

Green logistics is a cost saver according to Liesl de Wet at Barloworld Logistics. However, the implementation requires an initial outlay (investment) upfront that can be seen as a large cost. Some projects are not feasible, such as solar warehouses when being leased. Sometimes the investment exceeds the payback period, which is a barrier. The costs do not stop Barloworld Logistics from always investigating what can be further done, such as water savings and small projects. If you improve the processes and focus on continuous improvements, small changes will have big impacts on green initiatives. However, as mentioned the bigger projects can be costly.

At Unitrans, green logistics is viewed as cost saver. Ursula Uys perceive green logistics as a massive cost saver, because the whole concept is to reduce your carbon emissions, which relates directly to diesel consumption. The lower amounts of diesels you consume, the less costs you have. There is a direct correlation. Companies have to implement green initiatives that reduce costs. For Unitrans there are benefits with green logistics from their own perspective and for their customers.
Reetsang Mothibi at Imperial Logistics suggests that it depends whether or not green logistics is a cost saver or an unnecessary cost. If the payback period of implementing an initiative exceeds the return of investment then it does not make financial sense to implement it. She outlines that you should not implement green logistics just for the sake of it; it must also make financial sense. However, Reetsang does continue by stating that if green logistics is able to reduce kilometres in essence fuel consumption, then it is definitely a cost saver. Through activities such as route optimization and driver training it can definitely become a cost saver. However, she does insist that you have to look at the costs versus the benefits to have a clear view of whether or not it will be profitable or not. Reetsang does end by saying that she believes that it is more of a saving than a cost.

Peder Jensen at DHL stated that green logistics is definitely a cost saver in the long term by optimizing route optimization and better utilization among people. Ocean freight instead of airfreight and rail instead of trucks could for example increase the efficiency, leading to lower costs and at the same time reduced CO$_2$ emissions. The goal to reduce CO$_2$ can lead to a change of transport mode, which can bring down the costs and thus be a huge cost saver.

**Hans Ittmann**

When asked about the importance of green logistics and whether or not it was a cost saver or an additional cost, Hans Ittmann was assured that it is important and absolutely a cost saver. Hans Ittmann states that fuel prices contribute to 60% of total logistic costs. Cost is therefore an issue because of the fuel prices change, and then companies are under pressure to optimize operations in order to limit the cost of fuel. He continues by saying that people see it as an additional cost in the beginning as it is just costing them money. However, more and more people are realizing that it is actually a cost saver instead of an unnecessary cost. There are many good examples of companies able to save vast amounts of money through implementing green logistics and also making their supply chains more efficient. He considers that more and more companies, but also managers, are becoming increasingly aware of green logistics and its potential benefits.

### 4.2.3.1 Incentives

**Incentives for Green Logistics in South Africa**

_The managers were asked the incentives for implementing green logistics in South Africa. The answers were both from a company point of view and the incentives coming from the government. Most managers consider that there is a lack of incentives for implementing green logistics in South Africa._

Incentives are in terms of project or reward systems are usually difficult to implement in South Africa, as they are usually monetary, according to Dawn Steenberg. However, DB Schenker has used rebates from recycling as an incentive and these have been implemented into the working area and made employees more active in search for recycling ideas.
Incentives in South Africa would have to come in the form of a monetary reward system or performance perspective incentives in the view of Dawn Steenberg.

In South Africa, UPS have driver incentive plans in place which incentives the driver to deliver more packages. This system means that UPS are measuring the amount of unsuccessful returns a driver has. There is a penalty for each return that is made and a bonus for successful deliveries, this incentivises the drivers to deliver their packages on time. Efficiency is achieved due to fewer trips and reduced amount of fuel needed.

Liesl de Wets at Barloworld Logistics suggests that there are no incentives in place at the moment in South Africa. However, she does continue by saying that there is a lighting efficiency rebate for warehouses that Barloworld Logistics have claimed. She adds that the only incentive that would work in South Africa would be rebates or financial incentives by improving such things as fuel efficiency (by showing that you have decreased your emissions) or by warehousing optimization. Liesl de Wet believes that more incentives should be implemented in the form of rebates to make more companies willing to implement green logistics. She continues by saying that you have to do something in order to be eligible for the rebates, that it should be a reward for good behaviour.

Ursula Uys at Unitrans believes the main incentive is the cost saving, also a competitive advantage can be achieved by being green when approaching customers. Being green can also be used as a huge marketing tool towards consumers. The consumers want to be associated with these things Ursula stresses. For Unitrans it is a huge competitive advantage if you are greener than your competition. There are no incentives from the South African government when it comes to green logistics within trucking. In warehousing it do exist incentives, but not in transportation. As a company you just have to comply with the minimum requirements according to the law.

Reetsang Mothibi at Imperial Logistics believes that there are several incentives for green logistics, both from a company and a government perspective. Regarding company incentives she states that from a marketing point of view it is important as it can help to get contracts from clients, and more and more companies are asking what you are doing in terms of sustainability projects, so it is important to be sustainable. Reetsang adds that she believes that it is a business risk not to have green logistics and sustainability projects in place because then your competitors will be chosen over you. From a brand perspective it speaks for itself because it is beneficial for the image of the company. From the point of view from employees, Reetsang believes that it is an incentive to have green projects as it engages current employees but it also appeals for potential employees who want to be associated with a company that is engaged in sustainability. The government perspectives are that they are implementing a carbon tax in 2016, which will put pressure on companies to implement green logistics in order to lower carbon emissions. Reetsang adds that government incentives are important and that Eskom (government owned energy company) used to have a rebate for sustainability but it has been put on hold. So there are no direct incentives from the government anymore and this should be looked at.

Peder Jensen at DHL believes that it is very premature to speak about green logistics in South Africa. Being able to demonstrate a plan for how you are efficient by optimizing
routes and being fuel-efficient attracts more business. From a government’s perspective, Sasol a South African petroleum company that is partly owned by the state is introducing a cleaner type of Diesel (10 Parts Per Million (PPM)). This could be an incentive for firms to use cleaner fuel.

Hans Ittmann

An incentive for companies to go green is the new carbon tax that will be introduced in 2016 in South Africa. The government was supposed to introduce the carbon tax already in 2015, however the implementation was delayed. Hans Ittmann stresses that the carbon tax could be problematic. One have to understand that in a country like South Africa where there is a 25% unemployment rate, a carbon tax will increase the cost for the companies. This has implications on the amount of jobs created and available. It comes down to a trade off between what is most important, protecting the environment or creating jobs. People care less for the environment compared to having a job. They need food. Hans Ittmann states that it is clear that this can have side effects, as unforeseen consequences by implementing the carbon tax. The environment is important, but a balance is needed between these circumstances.

4.2.3.2 Barriers

Barriers for Green Logistics in South Africa

There were several barriers when implementing green logistics in South Africa from the point of view of the managers. Technology was considered a hindrance by many; the unavailability of it and the high costs of it. The managers were also asked about their thoughts of the roads, and the general consensus was that the roads ranged from good to shocking.

The barriers of implementing green logistics are a few in the view of Dawn Steenberg from DB Schenker. The culture can be a hindrance, according to Dawn, there is not a culture for caring for the environment, and the difficulty with the African culture is making the employees aware of the environmental issues and the effects that they have. Education regarding green logistics needs to be improved in order to improve the awareness of employees and educate them on the environmental effects that they have. Dawn Steenberg believes that education and awareness surrounding green logistics needs to be improved within companies. For DB Schenker as a company, there are not many barriers since they have a great deal of support from the head office in Germany and there are constantly different projects coming from the head office in Germany.

Manager A at UPS points out the condition of the roads in South Africa as a barrier. The conditions of the roads are deteriorating. The rural areas have bad roads, which damages the tyres and trucks as well as affects the stop and starting. The highways however are in relatively good condition.

The existing barriers are quite a few in South Africa according to Liesl De Wet at Barloworld Logistics. There are limited modes of transports that can be used in South
Africa. The long distances between cities are another barrier that causes problems. Johannesburg is the largest logistic hut, but it is located far from the city. The city with the major port Durban is up to the limits of its capacity. Until a more reliable and efficient rail system is in place, there will be a barriers and challenges for logistics companies. Deploying the latest and cleanest Euro-vehicle technology is difficult because of a cost factor, the bad exchange rate of the South African currency. Due to this cost factor the cleaner fuel are not available. The cleaner fuel that exists cannot be used for long haul transports due to the scarcity of its supply locations. Clients are not completely aware or concerned with green logistics. There is a perception that green logistics cost money. Clients are not willing to pay more for it. They consider a green product as a plus but costs is the main motivator for choosing a logistic company. Also the short-term thinking is a challenge. The long-term is rarely considered. What happens right now and within a short time frame is important, and thus not the future of what happens in 30 to 40 years. Silo thinking is yet another barrier. It is often the case that a logistic company handles a part of the supply chain. Rarely can one look holistically on the entire supply chain and give an effective solution for the wholeness. Holistic management are according to Liesl De Wet more efficient and greener. The time factor and the value of sustainable and environmentally friendly supply chains, has to be rooted in finances. Unless there is a linkage between these factors, there is a big barrier to green logistics. Infrastructure is also a challenge. The quality of the roads range from ok to shocking, the standard of the roads in rural areas are especially poor. This has an impact on the logistic costs.

The biggest barrier of implementing green logistics in South Africa, according to Ursula Uys from Unitrans, is that the legislation is not there so the fuel is not available either. Since the optimal fuel is not available, it is not possible to use the best Euro trucks; Euro-5. The barrier is that it is not compulsory to use the better fuel and until the government enforce it the diesel companies will not make the better diesel available. Ursula also mentions that the conditions are very different in South Africa from Europe, that is to say that technology that works in Europe will not be always work in South Africa. One such example that Ursula elaborates on was liquefied petroleum gas (LPG), which works in Europe but when companies in South Africa have tried to implement it, there have been several problems with it. Ursula also reveals that the she does not consider the roads in South Africa to be off a very high standard and this is also a barrier. Certain areas throughout the country have shocking road conditions. This affects logistics operations negatively since trucks are not able to drive past a certain speed, and the potholes in the road can cause serious damage to the trucks. Another barrier that Ursula elaborated on was that very few customers are actually willing to pay the extra cost of green operations. It is something that they want but they are not willing to pay for and Unitrans are not able to put the extra cost of going green onto the price to the customers.

In the view of Reetsang Mothibi at Imperial Logistics, the cost and unavailability of technology are the biggest barriers towards implementing green logistics in South Africa. Technology does not always work within South Africa, and there are a few biodegradable fuels, for example, that does not work in South Africa and have a negative effect on the engines of the trucks. She continues by stating that the bad fuels available in South Africa is also making it difficult to use Euro 4 or 5 trucks in South Africa, and at the moment the Euro 2 trucks are the legally legislative vehicles. Reetsang believes that the unavailability
of technology is the biggest barrier, but she adds that once technology becomes more available, the costs of it (technology) will decrease and green logistics will be easier to implement. Regarding the conditions of the roads, Reetsang mentions that the road infrastructure along the major routes is in good condition. However the rural routes have bad roads in very poor condition, although the conditions of the roads do not necessarily affect Imperial’s strive towards green logistics. Reetsang also suggested that the E-tolls have increased the cost of logistics.

According to Peder Jensen at DHL, there is a barrier if the customer perceives green logistics as an additional cost. It is a highly cost-oriented market and customers are reluctant to additional logistic costs. Peder Jensen has never before met any customer who wants to pay extra for green services in South Africa. In other parts of the world, there is an incentive of being green and using green services due to annual and quarterly environmental reports. In South Africa, this is not a case and that is a barrier for green logistics. When it comes to the roads and the infrastructure, the highways such as the National Route-1 (N1) are good. For example the highway between Johannesburg and the seaport Durban is great. However, when you leave the highways and especially in rural areas, the condition of the roads becomes challenging. Main routes as mentioned is not a barrier for DHL, the condition of the roads in the rural areas is definitely a barrier.

Hans Ittmann

The logistic researcher Han Ittmann describes the current barriers as many. He wonders if clients in South Africa are prepared to pay extra for green logistics or sustainable activities. In the bigger sense, he believes that people are conscious about the environment. More and more people are conscious about what they purchase and they will become more conscious about green logistics.

When it comes to the quality of the roads, the national roads and the highways are in general in a very good state. The South African National Agency is doing an excellent job. Our prudential roads are however not in such a good condition although things are starting to improve. A reason for the poor quality of the prudential roads is the shutdown of railway and train-traffic. Transnet, the national railway company closed several railways to rural areas due to the high operating and maintenance cost. Hence, the roads received increased traffic and got further damaged. The current capacity on the roads is too high. Hans Ittmann mentions that there has been an outcry during the recent years regarding the quality of the roads. Also, the conditions of the roads in the town areas are neither in good condition. For example when the weather is bad and it is raining, potholes arise often and people lack the knowledge of how to fix them properly. The roads affect green transportations. Goods that are being transported gets damaged, vehicles use more fuel and thus should be considered since they have an impact on green logistics.

When it comes to transportation managers, their hands are “tied” because of the fuel prices. They do not control that. What they can do is to figure out how they can reduce their fuel demand. People are aware of the environmental concerns and managers are starting to have a bigger influence in the companies. Hans Ittmann explains that this influence is by managers being able to introduce new and innovative thinking into the operations. The
chief executive officers are much more open for these actions nowadays and they support creativity within the business chain. However, a big challenge is to actually introduce the proposed green strategies. Hans W Ittmann believes that the large transportation companies within South Africa are striving towards green activities and sustainability. The problem he stresses is the small logistic companies of which there are thousands. These small firms also affect green transportation.

Another barrier is of course the high costs. Logistics cost in South Africa has increased even since last year. This is because of the high fuel prices, which contributes to 60% of the total logistic costs. Cost is an issue. Except costs, the proper service is another factor. The service level of the railways is currently inadequate, good within certain areas and for the mineral and mining industry. But for example regarding the logistic situation in South Africa, a container might take 7 days to leave the harbour of Durban; in Rotterdam (The Netherlands) it takes 7 hours. Thus, Hans Ittmann points out that a higher degree of service can be worth an additional/higher cost. Many of the transportation companies operating in South Africa are looking at introducing vehicles with Euro-5 standard. This means that the vehicles engine is cleaner and emits less harmful exhaust gases. One of the barriers and difficulties with this is that the specific high quality fuel required for their engines is not available in South Africa. Hans Ittmann stresses that the government need to act on this matter. These vehicles are costly, but slowly people and companies are introduced to them when buying new modern trucks. This will however not occur over a night.

4.2.3.3 Advice

Improvements or Changes Recommended

The managers had a few improvements or changes that they would recommend to their organizations. These answers ranged quite a lot and the managers had different perspectives on how green logistics could be improved within their respective companies.

Dawn Steenberg says that the major changes or improvements that she would recommend would be to educate the staff and raise awareness about green logistics and environmental issues. You have to raise awareness and training levels and you constantly have to restate it as well as continually send out information about green logistics and its benefits. Education, training, and awareness are huge and it is not only needed from across the working level, but also needed from the senior level. It needs to be implemented from the Chief Executive Officer (CEO) downwards.

Manager A, of UPS, would suggest something that they already do, but they believe that it is important to sell the “bundle” solution more. The “bundle” solution would mean that they are the company that is control over the entire supply chain rather than just one segment. What Manager A suggest is that companies should look into getting customers to buy into the full supply chain package, because that is when you are able to make the operations more efficient and environmentally friendly.
If Liesl De Wet would suggest any improvements for Barloworld Logistics, it would be regarding measurements. It is complicated but further measurements are needed, and it is very important. Another suggestion would be pricing externalities, although they can be costly which is not always justified. By using pricing externalities, one can quantify the waste and impact on the environment. Getting the story out there in order to raise awareness among clients and workers. By stating this, Liesl De Wet stresses the importance about spreading information. Communicating the effects achieved by small changes that has reduced carbon emissions. Also, empowering the employees further by showing them the effects they can have on the improvement on environmental impacts. Education has a massive impact and thus needs to be improved.

Ursula Uys suggests that her organization as a group needs to experiment more with new initiatives. However, the cost perspective has to be considered. Unitrans could strive to become more innovative to try new measures and test new technology. Allocating a central budget for green initiatives and experiment more is a final suggestion.

Reetsang Mothibi from Imperial Logistics suggests that it is important to drive more around the environmental view and push that within the company. However, she recommends that Imperial need to push more towards partnerships with their clients. There are certain things that Imperial cannot necessarily do on their own and partnerships would be important to help with this. It would help Imperial be able to introduce new initiatives but it would also help them to become more efficient. Reetsang goes on to say that they need to find out who their key clients are and how Imperial are able to form partnerships with them in order to do things better in the future. They also need to make sure that their subcontractors are driving with them and moving with Imperial towards greener initiatives.

If Peder Jensen would advise DHL on potential improvements or changes regarding their green logistics, then it would be to further change the mode of transports. He states that he believes a change from road to rail and more intermodal transport would be beneficial. Also, he continues that trying to optimize the trailers further would be another advises.

**Advice for Managers Implementing Green Logistics**

In this question, the managers were asked to give advice for other managers planning on implementing green logistics. The answers were all valuable and the most answered was that you had to do the analysis correctly about your operations and look for the small details that you are able to improve upon and make greener.

It is critical to ensure that you have the full backing of senior management when you are implementing green logistics according to Dawn Steenberg at DB Schenker. She continues by stating that they are the ones that are able to agree to, or turn down, a new initiative when it is introduced so their backing is vital for managers. She also says that implementing green activities will always meet resistance within the company, so you need to ensure that the management understands why introducing it is important, and how they are able to do it.

Manager A at UPS stresses the need to do the analysis correctly. That is their biggest advice for managers when implementing green logistics but they also mention the need to
look at the little things and details of your operations and see where it is possible to implement green initiatives. Manager A also suggests testing the product and be certain that the implementation is done correctly. Planning is vital and Manager A strongly urges managers to have a good plan when they intend to implement green logistics.

Liesl De wet at Barloworld Logistics stresses that her most important advice to other is to get your data right and understand your baseline. Some things are difficult to measure but it is not as complicated as one may think. You need to do what is realistic and cost effective for your business and you company. Quantify what you are able to do so that you can measure it correctly and find the improvement it has on the environment. See where potential improvements can accurately be performed, and from there do the small things that have a big impact.

Ursula Uys at Unitrans advises other managers who are looking at implementing green logistics to collaborate with technicians. This in order to make sure that the activity you are implementing does not harm the vehicles. Return on investment is also important and the amount of years until payback. She stresses that one have to make sure that the investment is actually reducing the fuel consumption, that the investment is worthwhile. One has to make research on the activity that is being introduced and whether or not it works. Consider all of the trade offs and if the project is feasible on the desired market. Looking at your operations holistically in order to precise the net benefit is an additional advice from Ursula Uys.

Reetsang Mothibi from Imperial Logistics believes that the best advice would be to look at your operations holistically. All the departments within the organization have to do with sustainability and environmental operations, so you cannot limit yourself and you have to look at the company broadly. She states that you have to look at everything that you do and your carbon emissions and how they can be reduced in environmental activities as a whole. Be innovative and look at different ways to be innovative and research what is available in the market to be implemented. She thinks it is vital to be open-minded and innovation is very important. Her advice is to have a budgeting and give resources, both human and financial, to implement green initiatives within the company.

Peder Jensen at DHL stated that any given advice depends on where you are in the world. In Africa he advises that you need to educate people within the organization about how green logistics can differentiate the company from others. This could be successful since many competitors in South Africa are not familiar with the green logistics concept.

**Hans Ittmann**

Hans Ittmann has several changes and improvements that he would recommend to logistics companies. He believes that companies need to make sure that the trucks are starting to move increasingly into the more fuel efficient Euro 4 or 5 trucks. If you are able to comply with that, you will be able to reduce your emissions. He adds that they should start looking at your operations as a whole and a component of the supply chain in order to reduce your energy consumption. Another proposal was; companies need to start changing the mind-set in order to realize the benefits from going green. He adds that you have to be prepared to
make the initial capital investment and realize that you will recover it over a period of time. However, he believes that there needs to be a leader on the market willing to take the risk and who is prepared to go the green, environmental way. Having control over the entire supply chain is something that Hans considers to simplify the process, and it would allow a company to reduce the emissions of that entire chain.

The advice that Hans Ittmann has to offer road transportation managers is to not fall into the trap that green logistics is costing you money. From his experience, he suggests managers to change their mind-set and to realize that in the long term, green logistics will be a benefit for their logistical operations and the company as a whole. This is what Hans believes is one of the biggest obstacles when implementing green logistics, that people still think that it will cost them extra money but they need to be able to look into the medium-long term which is where they will be able to see the added benefits of it.

4.2.4 Secondary Data

While collecting empirical findings, the authors have found further relevant data that adds value to the analysis as well as provide further answers and explanations towards the research questions. Secondary data from the current state of logistics in South Africa will help to answer, “to what extent do transportation companies apply green logistics?” within the first research question.

The CSIR state of logistics for 2014 was not available while the authors designed the introduction, literature review, or methodology of the study or when we performed the interviews. Therefore, this data is included in the research as a secondary data. These findings from the State of Logistics by CSIR are providing further details of the logistic concerns in South Africa, which will provide more perspectives when analysing the empirical data. The following data comes exclusively from the CSIR State of Logistics research for 2014 due to its comprehensive overview of the logistics situation in the South African market.

CSIR states in this report that individual transportation companies perceived the following as logistic constraints; the cost of transports, ineffective processes and systems, supply chain information and intelligence, internal and external silo-based mentality, lack of overall supply chain strategy and tactics and reluctance to change/innovate (CSIR, State of Logistics, 2014, p. 11). Furthermore, one of the main challenges for South African transportation companies is regarding planning. CSIR states that South African companies perceive the planning process as a significant area of opportunity (CSIR, State of Logistics, 2014, p. 18).

During the recent years, logistical costs have increased by every year. CSIR argues that in 2012 and 2013, the total cost of logistics in South Africa was 393 and 424 billion rand. The forecasted total cost for 2014 is at a staggering 456 billion rand. In order for this forecast to be accurate, the fuel price needs to stay at the average of the 2013 fuel price. If the fuel price would increase by 15%, the total cost would increase by 14 billion rand (CSIR, State of Logistics, 2014, p. 12).
The CSIR findings regarding rail-infrastructure are worth to mention even though it is not in focus for this paper. The research states that 95% of the railways in South Africa were constructed before 1938 and only 40% are electrified. Furthermore, the signalling system dates back to 1960 (CSIR, State of Logistics, 2014, p. 22-23).

The road-infrastructure in South Africa is comprehensive, consisting of approximately 535 000 km of roads, according to CSIR and the 2014 State of Logistics report. The rural roads amounts to 366 873 km. Out of these, 300 000 km are gravel roads. CSIR continues by stating that the quality of the roads in South Africa differs a lot and that these conditions according to statistics have an impact on the cost of road transports. Overall, the road network in South Africa is connecting the major cities, towns and rural areas which supports the economic growth in South Africa, as well as the development and social contribution to job creation (CSIR, State of Logistics, 2014, p. 24).

4.2.5 Secondary Data relating to Fuel

The secondary data relating to fuel quality in South Africa provides further explanations to the managers’ perception of fuel quality as a barrier. Hence, this is related to the research question “What are the incentives and barriers of implementing green logistics in South Africa according to transportation managers?”. 
Sasol, the South African integrated energy and chemical company have during 2013 in November introduced the cleaner Diesel fuel with 10-PPM. This means that the diesel has lower sulphur content. In fact, according to Sasol, this is the lowest sulphur content diesel available in South Africa. Sasol continues by stating that less harmful exhaust emissions and increased vehicle efficiency will come from this type of fuel. It is ideally appropriate as a complement to the modern day fuel. The 10-PPM diesel fuel for trucks results in ultra-low sulphur content enhanced detergency, improved acceleration and improved fuel economy. By improved fuel economy, Sasol means that performance of the trucks will increase and the overall fuel consumption will be reduced.

All diesel vehicles can use the 10-PPM type of diesel, including older to newer models. Sasol will provide this fuel at 78 locations in the Gauteng and Mpumalanga region in South Africa. During 2014 and 2015, the 10-PPM diesel will be further available in more areas throughout the country. (Sasol, 2013)
5. Analysis

In this chapter we will analyse and discuss the findings from the interviews. The analysis will be divided into the three dimensions provided in the previous chapter. The aim with this chapter is to analyse the results from the empirical findings in conjunction with the literature review from the second chapter to discuss in accordance with the problem discussion and purpose. In the analysis we want to reach an understanding of the major barriers interpreted by the managers and interpret possible solutions to overcome them. In this chapter, the name of the companies will be used instead of the names of the managers. This is in order to facilitate the process for the reader. An additional reason is the managers’ state that they share a similar interpretation of green logistics to that of their respective companies. The logistics researcher, Hans Ittmann, will however be mentioned by name.

5.1 Responsibility

According to John Elkington, the founder of the triple bottom line, companies should take three bottom lines into account; economical, environmental and social. These factors are needed in order to reach sustainability. Bloemhof (2005, p. 12) states that the triple bottom line is focused within the forward logistics of a supply chain, which is why it is directly linked with the concept of green logistics. From the empirical findings, we can identify that all the managers agree that their companies, and the transportation industry, have a responsibility towards the environment. There is a clear pattern that reducing the impact on the environment by lowering carbon emissions is the common strive by all the managers and their respective companies. However, increasing the efficiency was also considered an important aspect by several of the managers in order to decrease the costs of their operations.

Markley and Davis (2007, p. 768) argue that there is a trade-off between the three factors of the triple bottom line, and that the environmentally friendly option may not always be the most economically viable option in the short-term. Both managers from DB Schenker and Imperial Logistics insist the importance of green logistics is to ensure sustainability and to use resources in a responsible manner. Their views are stimulated more from the environmental factor of the triple bottom line than either the economical or social. The managers from DHL and UPS also fall under this category, as they believe that their corporate responsibility is to reduce the carbon emissions of the companies. However, the manager from UPS also states that they are responsible to optimize their operations in order to lower their fuel consumption and their carbon emissions. The authors interpret this as an economic driver in conjunction with an environmental one. The two managers from Barloworld Logistics and Unitrans both express efficiency as a driving factor that leads to greener activities due to optimization. We can see that the views of the companies’ responsibility are different here as these two managers (Barloworld and Unitrans) consider the economical factor as a driver towards reduced environmental impact. This is in agreement with Van Hoek’s (1999, p. 131) statement that green logistics is emerging with managers and companies as a practice that is able to reach economical targets while also minimizing their carbon footprint.
The manager from Barloworld Logistics does concede that the triple bottom line is critical. She states that only focusing on the environmental aspect, or just economical or social, while neglecting the other factors will cause problems. A firm that wishes to be effective should have a sustainability strategy in place that takes the social, environmental, and economical aspects into consideration (De Giovanni, 2012, p. 266). Hans Ittmann states that all companies have a responsibility towards the environment. However, he admits that the finances are the driving force of any business. He adds that incorporating the environmental and social factors is the optimal situation, but running a financially sound business is crucial. Thus the economical factor has a significant role within the transportation industry. This can also be seen from the point of view of the consumer. As the managers did not believe that their customers were willing to pay the extra cost of green logistics.

5.2 Green Logistics Activities

As seen in the green logistic activities table, all the interviewed companies performed three of the activities. These activities were: fuel efficiency, route optimization and the measuring of carbon emissions. However, reverse logistics was only performed by two of the companies actively, and one company only implemented packaging optimization. By looking at these in common areas, some companies’ activities are noteworthy to mention in the analysis because of the managers detailed explanation, which is in correlation with the theoretical frame of reference.

Conducting regular service and maintenance on the vehicles was according to the manager at DB Schenker a fuel saver. Wu and Dunn (1995, p. 33) pointed out in their study that indeed logistic companies could save costs as well as reducing their environmental impact by properly maintaining vehicles. Furthermore they stated that this could improve the efficiency, prolong vehicle lifetime and reduce the accident rates. Driving technique where another activity recognised within fuel efficiency by the managers. Two managers (DB Schenker and Imperial Logistics) mentioned that they have driver-training programs implemented. This is in alignment with the study by Janota et al. (2010, p. 60), which is pointing out that eco-driving is a way to improve fuel efficiency and that the technique aims at reducing the fuel consumption.

Janota et al. (2010, p. 64) argues that a tracking system, as the control dispatch system used by UPS, to achieve route optimization will provide information about unnecessary vehicle usage, poor driving behaviours, speeding and fuel wastage. Thus, concerning route optimization and fuel efficiency, the authors identifies benefits within all three of John Elkington’s triple bottom line factors; environmental, social and economical. Environmental from reduced emissions, social from information about recklessness & dangerous driving, reduced accident rates and economical to reduce fuel usage. The managers stated that the usage of route optimization leads to lower amounts of used fuel, less distance travelled and reduced lead time, which led to decreased costs. Wu and Dunn (1995, p. 32) also confirms this in their study, stating that route optimization leads to efficiency by being a cost minimizer due to the economical usage of vehicles and reduction
of travelled distances as well as reduced levels of pollution. Hence, by each transportation company in this study applying route optimization, increased safety on the roads, reduced emissions and cost efficiency is sought.

The interviewed managers answered unified that their companies are measuring carbon emissions. The authors do not find this surprising, as according to Hart and Ahuja (1996, p. 31), by measuring the carbon emissions, a company is able to reduce environmental impact, costs, and also become more efficient. When taking findings from the previous empirical chapter, 3 out of the 6 companies consider it as a responsibility towards sustainability. An interesting pattern was that these 3 were the international companies; DHL, UPS and DB Schenker. The fact that every company interviewed in this study applies carbon measuring methods and also that some managers considered it a responsibility, confirms Piecyk and McKinnon’s study from 2010. Piecyk and McKinnon (2010, p. 34) state that managers are becoming increasingly aware of the climate change problem and of its scale and severity. Furthermore, it highlights companies’ needs to measure and manage their carbon emissions from their road operations (Piecyk & McKinnon, 2010, pp. 34-35).

Two of the managers expressed that they use packaging optimization where possible in their operations and if demanded by the client. Manager A at UPS was the only one who claimed to use packaging optimization constantly. However by their statement, the authors perceive the manager’s answer to refer to load optimization as well, which in fact is closely linked and related to packaging optimization. Packaging optimization is the physical design of the package in which a good is transported in, whereas load optimization is relating to the positioning of packages in the cargo space of a truck. Furthermore, all the respondents indicated that they actively applied the load optimization activity. According to Piecyk and McKinnon (2010, p. 38), the design of the packaging can directly influence the vehicle and load optimization, which has an impact on the environmental performance of logistics. The authors perceive that managers and companies are not actively pursuing packaging optimization but only load optimization. Several articles (Min & Galle, 1997; Piecyk & McKinnon, 2010) consider the design of packaging as able to cut carbon emissions. Due to this, the authors consider that this activity is of importance and can be of value for transportation companies. Since the respondents indicated that they apply load optimization, and because of the link between packaging and load, there may be reasons for developing the packaging part further.

In the case of reverse logistics there was a mixture of answers from the interviews. Two of the respondents stated that they always provide their clients with reverse logistics and constantly apply it. One company answered that the company offered reverse logistics where possible and if it was a requirement by the client. This is similar to two other companies that offered this activity only if it was required by the client. Reverse logistics is, according to Rogers and Tibben-Lembke (2001, p. 146), becoming important to transportation companies since new customer policies are increasing product returns. This corresponds well with the empirical findings that three of the respondents offer the service exclusively by the request of the customer. Rogers and Tibben-Lembke (2001, p. 129) also state that the recovering of discarded materials can be beneficial and able to reduce costs of logistics due to a new low cost origin of materials. These discarded materials can be a driving force that explains why a few of the companies actively use reverse logistics.
However, it is not clear from our respondents or the aim of the study, which receives and disposes of the discarded materials. Lastly, one company responded that they do not offer reverse logistics in their operations. This may be explained by the study by Van Hoek (1999, p. 130), which argues that reverse logistics is not enough by itself. The entire chain should rather be examined when implementing green logistics initiatives. The managers at Barloworld and UPS stated in the empirical findings that not being able to review the supply chain holistically is a challenge. Interestingly, these were also the two companies who applied reverse logistics actively. The authors perceive that this can suggest that an improvement of the reverse logistics activities can be achieved if given access to a larger part or given holistic control of the supply chain.

5.3 Managerial Perception

The interviewed managers in this study unanimously confirmed that they perceive green logistics as important. This is in alignment with Piecyk and McKinnon’s study from 2010, where they find that transportation managers is increasingly aware of the growing environmental problems. A reason for this could be due to the society’s increase in environmental awareness and changing customer demands according to Murphy and Poist (2003, p. 131). They continue by stating that this is making companies change their supply chain and act in a responsible manner (Murphy & Poist, 2003, p. 122). However, based on the empirical findings, we are able to see that there are two reasons for green logistics importance in South Africa, according to the managers. These are environmental factors and increased efficiency of logistics.

Based on the findings, two managers mentioned that the environmental benefits from green logistics, was their driving factor for its importance. The authors believe that this can be explained from the two articles presented above (Piecyk & McKinnon, 2010; Murphy & Poist, 2003), where awareness amongst managers, as well as consumers, is said to be increasing. Ittmann and King (2010, p. 9) also agree that an increased recognition from the public and government have put pressure on companies to apply green logistics. The manager from Imperial Logistics stated that they considered both environmental and efficiency factors to be of importance within green logistics. This goes well with according to Van Hoek’s article from 1999. Van Hoek (1999, p. 131) expresses that managers can use green logistics in order to reach their economic objectives and reduce their environmental impact. Three of the managers explained that efficiency was their main motive behind the importance of green logistics, which they state will benefit the environmental factor. The authors believe, however, that efficiency is seen as the primary cause for these respondents. These responses can be explained by Walker et al. (2008, p. 82), who state that the benefits from green logistics can lead to improved efficiency and competitive advantage, in the long run. Thus, there is much to suggest that efficiency is a main component to why managers wish to implement green logistics in South Africa. Hans W Ittmann, a logistics researcher in South Africa, commented that more companies, as well as managers, are becoming further aware of green logistics and its benefits. With that said, the authors believe that green logistics has the potential to be important, to an even greater extent, in the upcoming future for both companies and managers.
All managers deem that they shared the company's view on green logistics. One manager does, however, state that there is one small gap between views; that the environmental and cost points of views are not always integrated together in the company. A few managers indicated that their view was a product of the company's approach as their respective company in green logistic practises had trained them. Other managers such as the ones representing UPS and Barloworld argued that their personal approach was according to the company’s policy. Here, the authors think it is appropriate to compare with the following study. Sharma (2000, p. 681) demonstrates that the environmental issues, as interpreted by the managers, may be shaped directly by the organizations. This is an interesting finding, since this represents a unity between the managers and company. The authors believe that this can show a united perception throughout the empirical findings, and that the views of the managers can reflect that of the company.

Green logistics can definitely be a cost saver, according to the managers interviewed. The arguments for this were specifically its ability to improve efficiency of operations (through route optimization and fuel efficiency) and reducing costs. Hans Ittmann also states that green logistics can be a cost saver, especially when fuel prices increase. He means that as fuel prices rise, companies are under more pressure to reduce fuel consumption, which is best done through optimization. From the secondary data findings from CSIR, the authors can also see that the total cost of logistics have been continuously increasing in South Africa over the past 10 years. In 2012 the total cost was 393 billion Rand, while at 2014 it is forecasted to reach 456 billion Rand. As Hans Ittmann mentions, the increasing fuel prices are affecting costs to a large extent. We believe, in accordance with Piecyk and McKinnon (2010, p. 37), that increasing fuel prices could increase innovative initiatives to reduce fuel consumption and carbon emissions with it. The importance of green logistics in order to reach the maximum efficiency can thus be considered critical. Hart and Ahuja (1996, p. 34) also believe that it does pay off to be green as it is able to cut down costs and also increase efficiency. However, a few managers stated that green logistics required an initial outlay. Thus, it is sometimes viewed as an unnecessary cost as it costs money in the beginning, but Hans Ittmann believes that more and more people are realizing that it is actually a cost saver. Hart and Ahuja (Ibid) also confirm that a starting investment may be needed but it is beneficial to be environmentally friendly in the long-term. The Imperial and Barloworld managers both explained that the payback period can exceed the return on investment however, and thus not all green projects are feasible. The authors believe that the managerial perception is that green logistics is, in general, a cost-saver, which is also reflected in the theory.

5.3.1 Incentives

The managers interpreted the question regarding perceived incentives differently. Two managers perceived it according to a company perspective, one according to government incentives, and three of the managers explained from both views. This section will look at the managerial perceptions of incentives in South Africa, which is a critical part of the second research question.
According to the managerial views on the government incentives, there are currently no active enticements in place. As mentioned in the problem discussion and theory chapter (2.3.2), there have been incentive programs from the government in the past to go green: the Eskom Integrated Demand Management program and the Industrial Energy-Efficiency program (CSIR, 2011, p. 91). However, according to the manager at Imperial Logistics, these programs have been put on hold and are no longer offered. Two managers state that there are no government incentives regarding transportation from A to B, but that rebates do exist within warehousing. Hans Ittmann mentions that there are awards coming from two newspapers, which delegate prizes for companies implementing green logistics. Ittmann means that these are able to serve as motivators for transportation businesses to go green.

The five managers who perceived the incentives from a company perspective stated various reasons to “go green”. UPS and DB Schenker pointed out that internal projects regarding employees could serve as incentives. For example, the driver incentive plan that UPS has in place. Not only is it beneficial to have green projects as it engages current employees, but the manager of Imperial Logistics argues that it also appeals for potential employees who wish to be associated with a sustainable company. This can be associated with the study by Bansal and Hunter (2003, p. 293), where they mention that a greener supply chain can benefit the image of the firm and its Corporate Social Responsibility reputation, while at the same time strengthening its legitimacy. The authors believe that this can be accurate in South Africa, as both managers at Unitrans and Imperial Logistics stated that green logistics enhance the corporate reputation. Which is further argued in alignment with the study by Carter and Rogers (2008, p. 361). They state that green activities can reduce the costs of operations, but also reinforce corporate reputation. The same two managers also express that it can be a competitive advantage if you are able to be greener than your competition.

A company that has an environmentally positive image in the eyes of the consumer are able to use their legitimacy to gain a competitive advantage (Bansal & Hunter, 2003, p. 292). The Unitrans and Imperial managers stress that it can be a huge marketing tool towards customers and that more clients wish to be associated with sustainable companies. We think that this is interesting since it draws attention to the communication of the green activities as a driving force. The authors believe that this may be a result of the previously mentioned; that consumers and society has an increased awareness and demand on how a company operates. The Imperial Logistics manager even goes as far as to say that she believes it is a business risk not to have green and sustainable logistics, as your competitors will be chosen over you. This strengthens our belief that it is important to communicate your undertaken activities.

Lastly, an incentive for green logistics in South Africa is the upcoming carbon tax that will be implemented in 2016. The Barloworld manager believes that it is important to practice green logistics, as this will leave you ahead of the competition when the carbon tax is introduced. Michael Porter (1991; cited in Goldstein, 2002, p.496) comes to the conclusion that increased environmental regulations are able to decrease costs and environmental impacts through enhanced competitiveness and innovation. Due to the statement by Porter,
we consider that the Barloworld manager to have a sound view when it comes to green logistics and the carbon tax. A voluntary environmental strategy as stated by Sharma (2000, p. 683), can therefore be important as it will decrease the environmental impact and be able to fulfil the implementation of new regulations and taxes. Since South Africa have such a high carbon emission per capita, as explained in the problem discussion, the authors perceive a carbon tax can be beneficial. However, Hans Ittmann states that there are social aspects that need to be considered. He stresses that the tax could be problematic in a country with such a high unemployment rate as South Africa. As a tax will increase the cost for companies, the availability of jobs will decrease, which raises an important trade-off between protecting the environment and creating jobs. This is in direct correlation with the triple bottom line regarding sustainability, as there is a trade off between the bottom lines (social, economical and environmental).

5.3.2 Barriers

From the problem discussion and the theory chapter, the reader shall be acquainted with the green logistics situation of South Africa. As well as several of the potential barriers for implementing green logistics. One of the main objectives for the authors in this study has been to identify, according to the managerial perspectives, what these barriers can be. From the empirical findings, the barriers have been categorized into the following: Infrastructure, technology, customers and management. From the responses, we interpret that the infrastructure and technology are the biggest perceived barriers.

The poor roads were a main concern for all of the managers and they perceived them to be lacking in quality in the rural areas. These statements are in alignment with the findings in the secondary data chapter. There we can see that the rural roads amount to 366 873 km, and that approximately 300 000 of these are gravel roads. The authors believe that the gravel roads have a clear connection with the poor conditions of the rural area roads. However, the main corridors and highways were considered to be in good condition. Again, this is in alignment with the findings in the secondary data, stating that the quality of the roads differ in South Africa. The effect from bad roads can have a severe impact on the logistical cost, which can be seen in table 3 in the literature review chapter. From the mentioned table, we can see that bad roads are able to increase costs by almost 10% compared to good quality roads (CSIR, 2010, p. 33). The social contribution from a well functioning infrastructure enhances the economic growth and develops further job opportunities, as seen in the secondary data. Thus, the authors perceive that the infrastructure can affect the all three factors of the triple bottom line. Along with this, the Imperial Logistics manager mentioned that the E-toll costs also have a negative impact on the transportation operations. At the moment, E-tolls are only implemented in the Gauteng province. However, there are reports stating the possibility of road tolls in other regions of the country, according to Olifant (2014); this could increase the cost of logistics significantly.

The lack of alternative transportation modes was also brought up as a perceived barrier by two of the managers. Regarding this answer, there might be interesting to point out that currently there is an imbalance of the transportation modes in South Africa according to
The majority of goods in transported on roads instead of railways, especially along the main freight corridors (CSIR, 2011, p. 72). Due to long distances between cities, the manager at Barloworld believes that there is a need for a better rail system. The manager at DHL also mentions this and believes that using rail rather than trucks could be able to lower costs and also carbon emissions. It should be included that Hans Ittmann explained this matter during the interview. He stated that the poor quality of the roads in the rural areas of South Africa is a result of abandoned rail networks and thus heavier traffic on the roads. Shifting from road to rail is an important factor, and the authors believe that an increase in rail would indirectly improve roads, reduce emissions and be beneficial for transportation companies. The current investments in a railway system over a seven-year span (starting in 2012) are meant to intensify train usage. From the secondary data findings, the authors believe that this can prove to be a challenge. This since 98 per cent of the railway was built before 1938, which should be an indicator of the demanded extent of modernization. Furthermore, only 40 per cent of the railway is electrified. The authors are therefore critical that the railway will be an alternative transport mode to trucks in the near future.

Half of the respondents answered that they perceived the lack and unavailability of clean fuel (low PPM) a major barrier. These managers pointed out that the right technology and the unavailability of clean fuel and alternative fuels in South Africa is an obstacle to green logistics. A specific reference was made to the use of advanced Euro-trucks. Hans Ittmann also recognised this barrier regarding the Euro trucks and stated that the high quality of fuel required is not available in South Africa. However, according to a secondary source, Sasol, a South African chemical petroleum company, has introduced clean 10-PPM diesel in November 2013 (Sasol, 2013). From the interviews, the authors interpret that this new fuel has not yet become standardized in South Africa, but that it may contribute to environmental improvements in the upcoming future. This is somewhat contradictory to the secondary data findings, which states that the 10-PPM clean diesels are actually available at 78 locations in the Gauteng and Mpumalanga region. In 2014 and 2015 the cleaner 10-PPM diesel fuel will continuously be further available in more areas throughout the country. In this part of the analysis, the authors are able to see a pattern. We see that the technological barriers are something that the managers, in their view, cannot influence. Due to the mentioned secondary data findings, stating that the fuel will be further available in the upcoming years, the authors believe that the clean fuel will become less of a barrier in the future.

Three managers consider customers as another barrier. They state that their clients are not willing to pay for green activities if there is a cheaper option. Customers are very cost oriented and perceive green logistics as an extra cost according to the managers. This is inconsistent with the mentioned arguments that customers in South Africa are becoming more aware of environmental issues. It can also be seen as contradictory to the previous statements where the managers did not perceive green logistics as an extra cost. The authors believes that this can be described by the Barloworld manager and Hans Ittmann’s comments, saying that in South Africa the mind frame is short-term rather than medium to long-term.
Hans Ittmann along with two managers commented that there are barriers within the internal and external management. From the external management point of view, the lack of being able to analyse the supply chain holistically is a barrier for success according to the manager at Barloworld Logistics. This is also perceived by Hans Ittmann who states that having control over the entire supply chain simplifies the process and allows companies to further reduce the emissions. The manager at DB Schenker also perceives internal management as a barrier, as she believes that education and awareness of green logistics needs to be improved in the company. Comparing with the findings regarding infrastructure and technology, the authors believe this is an interesting finding. Managers are actually able to do something about this aspect and thus have the opportunity to influence it.

5.3.3 Advice according to managers

Every manager expressed that there was potential for improvement within his or her company. Their recommendations differed greatly and to simplify their results we have divided the improvements into four categories: Education, Holistic, Planning and Strategy. The authors believe that the findings varied because the companies having different strengths and weaknesses and areas of improvement.

Two managers pointed out that their recommendations would be to improve the education and awareness among the employees. Two other managers stressed the strategic importance of driving green logistics and optimizing operations. Another manager mentioned the need for bundle solutions, and to sell the supply chain holistically to the clients. Lastly, planning was seen as important and the allocation of a budget for innovation. Hans Ittmann expressed the importance of planning properly and with a holistic view. He also mentioned that there are needs for a market leader to be innovative and try new things in order to further develop green logistics in South Africa. We agree with Hans Ittmann and believe that if a company is willing to try and successfully implement green logistics, then others may follow.

Concerning the recommendations for other managers implementing green logistics, the authors have again identified categories, which represents the respondents’ answers. The following categories were identified from the managerial findings: Education, Planning and Holistic.

Planning stood out as the most crucial advice to other managers with four out of the six managers stating it as important. Doing the analysis correctly and knowing your operations accurately were considered vital. Two of the managers that mentioned planning as an advice, also stated that looking at the operations holistically is important. Two managers mentioned the last category, education, which is needed at all levels of the company and including top management. From the empirical findings, we can conclude that planning was considered the most valuable advice for managers implementing green logistics. The article by Wu and Dunn (1995, p. 36) explains that logistics managers face several challenges when implementing green logistics; they have to plan operations optimally for their company, as well as addressing environmental issues. We believe that this answers our sub-
purpose regarding recommendations for transportation managers, and as planning was identified the most; we believe that it holds the most significance. CSIR states in the secondary data findings that one of the main challenges for transportation companies is regarding planning. They continue by stating that the transportation companies perceive the planning process as a significant area of opportunity. This is in alignment with the empirical findings from interviewing the managers. Hence, the authors identify that planning is a vital advise as well as an area of significance. We are of the opinion that this is credible and reliable, based on the managers’ experience in the logistics industry.
6. Conclusion

In this chapter, the final conclusions from the analysis will be presented and the outcomes of the research. The aim is to answer the research questions and the overall purpose of the paper. Recommendations for further research will also be presented.

6.1 Final conclusions

The conclusions are based on our previous analysis. In the following section, we presents the answers to our research questions: “How do logistic managers perceive green logistics in South Africa and to what extent do transportation companies apply green logistics?” and “What are the incentives and barriers of implementing green logistics in South Africa according to transportation managers?” The chapter also intends to respond to the study's purpose: to develop a further understanding for the managerial perceptions of green logistics in South Africa. This included, finding answers on what the managers perceived as incentives and barriers as well as investigating their general perceptions of green logistics. These findings aimed to extend the theoretical knowledge of green logistics and provide practical value based on the managerial recommendations for the implementation of green logistics. In general, we found a high degree of consensus between the managers’ perceptions of green logistics. We can also conclude that the empirical findings are in strong agreement with the literature review.

From our findings within green activities, the authors come to the conclusion that green logistics is implemented to a large extent among the major transportation companies in South Africa. There are two areas that we can distinguish have a higher emphasize among the companies: fuel efficiency and route optimization. We believe that this is directly related with their abilities to drive down costs effectively and the consciously rising logistic costs in South Africa. However, reverse logistics and packaging optimization are two activities that are less frequently applied. At the moment there are only two companies stating that they use reverse logistics frequently. In order for this activity to develop further we believe that other managers have to see the benefits in forms of results from it before they are willing to take the risk of implementing it. The authors believe that reverse logistics and packaging optimization need to be integrated more into the transportation companies operations in order for green logistics to develop further in the country and in the industry. We believe that this answers the question “to what extent transportation companies in South Africa applying green logistics”.

The analysis provided us with a practical answer to the logistics managers’ perception of green logistics. We can conclude that economical aspects are generally considered first hand ahead of environmental and social factors when implementing green logistics. Thus, we identify that green logistics in South Africa is not primarily concerned with reducing environmental impact, but rather to reduce costs, which will lower carbon emissions. All the interviewed managers were in agreement that green logistics is able to be a cost saver, which is compliant with the theory. We believe that they mentioned this since activities
such as route optimization and fuel efficiency are able to lower fuel consumption, costs and indirectly decrease environmental impacts.

From the theory chapter of this study, it is stated that corporate reputation and the positive image of an environmentally conscious company was seen as an incentive. The managers in the empirical findings also mentioned this as strength of green practises. Furthermore, managers perceived it possible to obtain a competitive advantage through green logistics, which is consistent with the theory. We believe that this perception is very sound and has a clear point. With the upcoming carbon tax being introduced in 2016, it can even be considered as a business risk not to implement green logistics. This reinforces our viewpoint that reducing emissions should be a high priority for transportation companies in South Africa. We believe that this answers the research question regarding the incentives for green logistics. The next section will concern the managerial perceptions of the barriers.

From the barriers that we identified in the analysis, there are two that fall into the spotlight in this conclusion. They are the infrastructure in South Africa, and the high cost and low availability of technology. Regarding the infrastructure, every manager interviewed mentioned that the roads were a big issue and contributed to higher costs of logistics. This is a factor that we discussed in the problem discussion as well as literature review, and we had our suspicions that it would be mentioned. However, moving to intermodal transportation and the use of railway does not seem viable in the near future since the standard is low. We believe that investments are needed in the infrastructure to raise the quality of the roads and rails, as currently there are negative consequences on economic, environmental and social factors. Technology was also considered a major barrier from some managers, and makes it harder to implement green logistics. Based on the managers’ answers, we are able to see that low access to high quality fuel and advanced trucks has an impact on the implementation of green logistics. We had not taken into account that this would be an issue, as coming from a third world country, it is not a concern that is actively seen.

6.2 Practical Implications

This section will specifically provide practical value for the implementation of green logistics, based on the managerial recommendations and advice. As presented in the analysis, we are able to see that the managers viewed planning as the most important advice for implementation. Therefore, managers who seek to implement green logistics need to conduct a proper analysis of the holistic operation. Also, communicating internally as well as externally is perceived as crucial. These two advices can be of particular interest for managers and companies alike looking to implement green logistics in South Africa, as well as other emerging countries. We have also been able to identify incentives and barriers of implementation, which can be of value for managers. In order for companies to successfully implement green logistics in South Africa, we believe from the research findings, that careful planning is necessary to review possible areas where there is an opportunity to improve.
6.3 Theoretical Implications

From the readers' perspective, the research findings can be viewed as practical. However, the authors believe that there are theoretical implications and further knowledge provided. We believe that the study provides additional knowledge within the green logistic concept. The research’s view of looking at green logistics through managerial perceptions, can build further on the concept, especially regarding emerging economies. Furthermore, it can be concluded that in emerging markets it is economic and efficiency that are the drivers for green logistics and positive environmental advantages result thereof. The activities of green logistics that could add further costs but have a positive environmental impact are less applied at the transportation companies. Our findings indicate that the economical aspect of the triple bottom line is primary for managers when applying green logistics in South Africa. Hence, we can agree with previous research, as we believe that the green logistics concept is in close conjunction with the triple bottom line theory. Although green logistics is well developed in South Africa, there is still potential to improve further and barriers to overcome before it is fully incorporated.

6.4 Implications on Society

In this study, the social aspects have been considered during the entire paper. One of the main theories used in this paper is the Triple Bottom Line by John Elkington (1994). The Triple Bottom Line theory states that Environmental, Social and Economical factors are equally important and necessary in order to reach and achieve successful sustainability.

Throughout the paper, societal aspects have continuously been argued and viewed. An example of this is regarding vehicle tracking, route control and driver training, which affect the society from several aspects: safety, thefts, and crimes. By implementing route optimization to become further efficient, companies have started to track and control their vehicles and have been able to reduce crimes. Criminal activities such as hijacking of the vehicles have thus been minimized as much as possible. Furthermore, by implementing driver-training programs, the amount of accidents caused by trucks can be decreased. In this paper, the authors perceive from the empirical findings as well as indicate through the analysis that the infrastructure is considered as a barrier regarding green logistics. The infrastructure is discussed as an important component in South Africa’s economic growth, connecting cities and creating jobs. This is an important social as well as economical aspect highlighted since unemployment in South Africa is at staggering 25 per cent.

One drawback is identified from the study according to the authors. In a developing country, increased logistic efficiency generated by green logistic activities could also lead to negative social results. Due to the high unemployment rate in South Africa, reducing the amount of kilometres travelled as well as optimizing the cargo load, may lead to fewer jobs available for truck drivers. Lost incomes leads to poverty. At the end according to Hans Ittmann, people care for food primarily. The authors would therefore point out that there are positive and negative impacts of green logistics. However, the study emphasizes the balance of the triple bottom line. In the conclusion, we identify that the balance between
social, economical and environmental factors are necessary for being sustainable. Hence, it is our belief that this study may provide more knowledge and interest regarding the triple bottom line and the social implications within logistics.

6.5 Further Research

Throughout the paper, we have identified several areas that can be recommended for further research. Further studies regarding green logistics in other developing countries could provide valuable information about their managerial perceptions towards green logistics. Testing two developing countries with each other could point out similarities and differences and thus be an interesting study.

The clients/customers perception on green logistics could also be very interesting. To investigate whether or not they are willing to purchase green and environmentally friendly logistic activities. Clients’ view on sustainability and the triple bottom line could according to the authors be able to generate with meaningful contributions to the research area. This could potentially provide explanations to what we have found from our empirical findings, that clients are perceived not to be willing to pay extra for green logistics.

We also recommend small truck companies in South Africa as a subject of continuous research. The authors believe that the small transportation firms in South Africa can have an impact on the environment, as well as affect social and economical factors. Comparing the findings from small transportation companies and that of larger companies could develop a deeper view of the green logistics situation in South Africa.

This study has only been focused on land-based transportation by trucks, which is mentioned in the limitations. Therefore, it would be of interest to look into green logistics activities in another transportation mode, such as shipping or airfreight. This could provide an interesting comparison to this research, as well as observations of the differences between the transportation forms.

How and if green logistics affect CSR in South Africa is another area where the authors believe that further research could be of value. This could further develop the area of sustainability and the triple bottom line. Looking at this could further develop sustainability and the triple bottom line. This topic could be interesting as a Minor Field Study at the Swedish International Development Agency (SIDA).
7. Truth Criteria

In this section, we will present the truth criteria that are relevant to this study. The criteria that will be used are trustworthiness and authenticity. These criteria will be used to determine if the research done is both trustworthy and authentic which will allow the reader to conclude if the study meets the truth criteria.

Reliability, replication and validity are the truth criteria used to evaluate a quantitative study, according to Bryman and Bell (2011, p. 42). However, there are debates if qualitative studies should use these same criteria. Lincoln and Guba and Guba and Lincoln (1985 & 1994; cited in Bryman & Bell, 2011, p. 395) have suggested alternative criteria for qualitative research, and propose trustworthiness and authenticity as the criteria for assessing the quality of a qualitative research. Bryman and Bell (2011, p. 395) explain the four criteria of trustworthiness as: credibility, transferability, dependability, and conformability. Along with these four, authenticity will be tested to ensure the quality of this study.

In order to establish credibility for the study, we used triangulation and several methods and sources of data to get a deeper understanding of the area of interest. Along with the six interviews with the transportation managers, we also interviewed a logistics researcher of South Africa, as well as a secondary source to develop deeper understandings of the research area. Kanter (1977, p. 337) explains that each source of data and respondent can be used as a check against each other, which will enhance credibility. The interviewees were all given the opportunity to see the results of the study and were all interested to see the findings.

Since qualitative research are typically involved with small groups of respondents who share certain characteristics, the social world being studied (its uniqueness and significance) is of interest (Bryman & Bell, 2011, p. 398). It is therefore of importance to follow thick description, as described by Geertz (1973; cited in Bryman & Bell, 2011, p. 398), and provide rich descriptions of the details of the culture that the researchers are studying. A rich database is provided for the reader within the problem discussion and literature review to build upon the social characteristics, which will allow for judgements on transferability of the findings. With the information provided throughout the paper we wish to present a picture of the reality of the social world for the reader. Information of the respondents, their employers, and the interview information should establish further transferability. The inclusion of Hans Ittmann was also to build further on the social dynamic and characteristic surrounding the research area.

An ‘auditing’ approach is proposed by Guba and Lincoln (1994; cited in Bryman & Bell, 2011, p. 398) which entails that the complete process of the paper are recorded and kept track of in an accessible manner. All the phases of the process need to be recorded including the problem formulation, participants’ selection, interview notes, data analysis, etc. Which would then allow peers to act as auditors and ensure dependability in the research. However, Bryman and Bell (2011, p. 398) explain that this is not a popular approach since the amount of data collected in a qualitative research is extensive and makes it very demanding on the auditor. Throughout the thesis, the processes have been explained
and in the practical methodology we have explained the process of the paper further. Along with this, our supervisor has examined the material and the proposed processes.

According to Bryman and Bell (2011, p. 398), confirmability is concerned with acting in good faith, and not allowing personal values or theoretical manifestations affect the research. Although they do recognize that complete objectivity is impossible, it should not have inclinations on the conduct of the research or the findings from it (Ibid). The authors have, to as large an extent as possible, attempted to remain objective and not let personal values affect the outcome of the findings. The interview questions were designed in such a way as to not be guiding so that personal views would not be reflected in the managers’ answers. The relative inexperience that the authors had of the research area should ensure that our personal values are not reflected in the theory and has not swayed the results.

Authenticity is reached within this paper by showing fairness and presenting the viewpoints of the members fairly. The other four criteria within authenticity have been deemed irrelevant for this study and fairness is the criteria that will be in focus. The views of the respondents are presented as clearly as possible, and the inclusions of quotes in the empirical findings were done to in order to get a better understanding of respondents’ answers. All the organizations are within the road transportation in order to represent a fair view of research area. One of the interviews could not be included in the research since it did not meet these criteria, which may act as a representation of the fairness and authenticity of this research paper.
References


Appendix

Interview Guide – Managers

Company: .................................
Date: ....................................

Background Information

● Name (Optional) ..........................
● What position do you hold within the company?
● What is your previous professional and educational background?
● How long have you worked within the logistic industry?

Responsibility

● What do you consider to be transportation companies responsibility towards sustainability? If none, describe why.
● What does your company do to be responsible regarding environmental issues?
● Is your company certified with the ISO-standards? If yes, which one? If no, why?

Green Logistics Activities

● Does your company apply Green Logistics? If yes, describe how and in what way.
● Out of the following green logistic activities, which one(s) does your company apply? Describe
  - Fuel Efficiency
  - Route Optimization
  - Reverse Logistics
  - Packaging Optimization
Measuring Carbon Emissions

- If you apply Reverse Logistics, is this a demand of your customer or do you actively apply it?
- In case your company does not apply one or more of the previous mentioned activities, explain why not?
- Is your company planning on introducing any new green logistics activities in the near future? Describe

Managerial Perceptions

- Do you consider green logistics important? Why? Why not?
- What do you consider as incentives for companies applying green logistics in South Africa?
- What barriers do you consider exists for companies applying green logistics in South Africa?
- Do you consider Green Logistics to be a cost saver or an unnecessary expense?
- If you were advising your organization on green logistics, what are the main changes or improvements that you would recommend?
- Does your interpretation of green logistics differ from the company’s?
- From your experience in road transportation, what advice would you offer to other managers when implementing green logistics?
Interview Guide – Hans Ittmann

Company: .................................
Date: .................................

Background Information

● Name (Optional) .................................

● What is your current position?

● What is your previous professional and educational background?

● How long have you worked/been active in the logistic industry?

● How many articles/journals have you published?

Responsibility

● Is it important to take into consideration the “Tripple Bottom Line” when applying green logistics?

● What do you consider to be transportation companies responsibility towards the sustainability? If none, describe why.

● Do you consider the ISO-standards important? If yes, why? If no, why?

Green Logistic Activities

● What is your opinion about Green Logistics?

● Do you consider companies in South Africa to apply green logistics?

● What current trends do you see in the transport industry in South Africa?

● Are companies moving towards greener activities?
Do you believe that transportation companies in South Africa are doing enough when it comes to green logistics?

Is there any difference between domestic and global transport companies operating in South Africa?

What do you think has to be done in order for green logistics to evolve further in South Africa?
- from a government point of view
- from a company point of view

What do you think about the following green logistic activities? Describe
- Fuel Efficiency
- Route Optimization
- Reverse Logistics
- Packaging Optimization
- Load Optimization
- Measuring Carbon Emissions

Are they applied among transportation companies in South Africa?

Managerial Perceptions

What do you consider as incentives for companies applying green logistics in South Africa?
- Any incentives from the government?

What barriers do you consider exists for companies applying green logistics in South Africa?

What is your opinion about the quality of the roads in South Africa and the effect it has on the transportation industry?

Is green logistics important from a client perspective in South Africa?

Do you consider clients in South Africa to be willing to pay extra for a greener transportation product.

Do you consider Green Logistics to be a cost saver or an additional/unnecessary expense?
- From a long term perspective
- Short term perspective ROI

● Do you think that transportation managers are aware and well educated when it comes to green logistics?

● If you were advising a company on green logistics, what are the main changes or improvements that you would recommend?

● From your experience in road transportation, what advice would you offer to other managers when implementing green logistics?