Profiling the safety needs of the South African truck transportation sector

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ABSTRACT

The purpose of this mini-dissertation is to profile the safety needs of the South African truck transportation sector. This research draws both from a comprehensive literature study, as an empirical research project, that was done at Ukulala Truck Stop. Participants in the research were a sample of 166 truck drivers driving on the N3 highway between Johannesburg and Durban.

South Africa, as a developing country, relies heavily on road transport for the movement of freight and raw materials. Road fatalities in South Africa rank the worst out of 36 countries. The goal of this research was to assess the role played by Government, private haulage companies, and the truck drivers themselves from a safety perspective.

Upon examination of these results, it became clear that most legislation is old, strategies are not always executed and followed up, and very little effort is spent on research and development.

This research document draws attention to the significance of aggravating factors resulting in the occurrence of road accidents, such as driver fatigue, social- and emotional stressors, the lack of proper structure within the confines of Government, and the socio-economic effect long haul driving has on communities and families.

It is the researcher's hope that this mini-dissertation will serve as a stepping stone for further research to be done on this subject.

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CHAPTER 1

NATURE AND SCOPE OF THE STUDY

1.1 INTRODUCTION

Transportation is the heartbeat of any country's economic growth and social development, allowing for both the internal and external movement of goods. Transportation in South Africa consists of public transport, rail transportation, civil aviation, shipping, freight and motor vehicles.

Johannesburg is seen as the capital hub of the country, but is not situated near a river or the ocean, resulting in goods to be transported either by air-, rail- or predominantly by road transport. The busiest route for road transport is therefore the N3 between Johannesburg and Durban.

Most industries cannot operate without a frequent, regular and just-in-time (JIT) transport infrastructure that enables them to move goods to markets or to obtain and/or transport raw materials and finished products.

Transport is not only an effective way of alleviating poverty in rural areas, but it is also essential for the effective functioning of companies in urban areas.

Due to this obvious demand in freight transportation, vast numbers of delivery vans, links, super links and abnormal vehicles are frequently using the South African roads twenty four hours a day, resulting in the transport industry forming a significant economic sector in its own right.

However, a big concern amongst all role players in the freight transportation sector is the increasing levels of safety issues and risks that have a causal relation to the increased number of Long Haul Heavy Vehicles (LHHV) on the roads. Economic factors such as supply and demand, the role of new entrants into the market, rivalry amongst current operators, and the constant goal of reducing overheads and increased profits, put huge pressure on operators that in turn, may result in accidents.

Not only do accidents cause the obvious economic loss to company owners, insurance companies and subsequently the country as a whole, but it might also result in the loss of lives and in some instances people spending the rest of their lives in a disabled state. Road tankers are responsible for the transportation of highly flammable and highly toxic products. In the event of an accident, the spillage of the substances might lead to damage to the road surface, or should it leak into the sewers, rivers, dams or plantations it could cause ground or water pollution. These leaking substances might even ignite, causing further loss of lives, air pollution or the possibility of other associated fires.

One of the goals of this study has been to evaluate the level of co-operation between Government, road agencies, transport company owners and the drivers, as well as to identify areas and/or factors relevant to the safety of the drivers, their vehicles and their cargo.

During this study the emphasis fell on:

- The authorities and the role they play in driver safety;
- Current and future legislation and the shortcomings or success thereof;
- Current trends, e.g. LHHV versus trains and the importance of this study in light of the growth of LHHV transport in South Africa;
- A synopsis of recent accidents and problems identified by drivers;
- The human factor – behaviourism of LHHV drivers, their attitude towards personal safety, the safety of their cargo and their attitude towards proposed safety aspects.

The transport industry is extremely complex and dynamic. The majority of companies are trying to run above board, honest and ethical businesses, but there are some fly-by-night companies that come and go, trying as new entrants to break into the market by means of a low price advantage, subsequently giving the industry a bad reputation. This study will explore the business practises of a typical transport company and to what extent there is a profit to be made, as well as to whether or not it is a cut-throat industry where only companies that can leverage from their position in the market and economies of scale, could make a profit.

In this study the focus will primarily be on profiling the drivers in the commercial freight transportation sector, along with determining their needs, from a safety perspective. The emphasis will also fall on the roles that Government, transport organisations and company owners can fulfil to improve the safety, security, reliability, quality, and speed of transporting goods, while remaining competitive in both the local and the international markets. It is commonly accepted that the transport element related to the cost of products, raw materials, and manufactured goods, can be of significant proportions and that it adds to the final cost of both exported- and imported products.

1.2 PROBLEM STATEMENT

Transport is the heartbeat of any country's economy, and South Africa as a young and upcoming economy, is no exception. With thousands of companies relying on road freight transport to move their products and raw materials, the LHHV sector became an industry in its own right, but without proper legislation or at least the proper execution of the existing legislation, this sector of the economy is bound to become a problem. The safety of LHHV drivers within the South African Long Haul Heavy Vehicle (LHHV) sector is a great concern. South Africa is ranked worst out of 36 countries with respect to road fatalities. With the transport market expected to grow by 200% to 250% over the next couple of years, the problem is bound to increase. During 1996 the White Paper on National Transport Policy (SA, 1996:3) has been accepted by the Government and during 2007 a Road Safety Conference was held in Ghana, where a road safety strategy with some goals was discussed (see Par. 2.3). To date no significant progress has been made, thus there are concerns that the goals set by this sector, will not be met. This has posed a challenge to compile a study that could assist in profiling the safety needs of Long Haul Heavy Vehicle (LHHV) drivers, which could serve as a possible guideline within the confines of Government, transport companies, road agencies and other role players.

1.3 GOALS AND OBJECTIVES OF THE STUDY

The goals and objectives of this study will be subdivided into a main objective and secondary objectives.

1.3.1 MAIN OBJECTIVE

The main objective of this study will be to profile the safety needs of the South African truck transportation sector.

1.3.2 SECONDARY OBJECTIVES

- To compile and understand the profile of a typical LHHV driver within the South African commercial freight transportation sector;
- To determine the aggravating factors causing the increased number of road accidents involving long haul heavy vehicles;
- To determine the role of human behaviour with respect to the drivers' own safety and the safety of their cargo;
- To investigate the effectiveness and efficiency of current legislation and the efforts made by the role players in relation to the long haul heavy vehicle drivers' perspective thereof;
- To determine the role company owners play in ensuring driver safety; and
- To investigate the socio-economic effect long haul heavy vehicle driving has on the country, communities and families.

1.4 RESEARCH METHODOLOGY

The research methodology that will be applied to this study will consist of both a literature as well as an empirical study.

1.4.1 LITERATURE STUDY

The literature study will include an overview of the market within the transport sector of South Africa; the current and proposed legislation, including the current White Paper on National Transport Policy; and will pay specific attention to existing data on road safety. Furthermore the study will investigate road safety issues, including but not limited to, human behaviour with respect to road accidents, non-human factors, and the role companies play in the prevention of accidents. Finally the literature study will focus on socio-economic factors within the long haul heavy vehicle sector, and the associated role truck stops play with respect to road safety.

1.4.2 EMPIRICAL STUDY

The empirical study will be conducted by applying a quantitative research methodology consisting of questionnaires that will be distributed amongst long haul heavy vehicle drivers utilising the sleep-over facilities of a truck stop next to the N3 highway, roughly halfway between Durban and Johannesburg. In order to maximise validity and to protect the integrity of the answers, anonymity will be guaranteed to all recipients. Welman, *et al*. (2005:145), are of the opinion that reliability has to do with the findings of the research and the level of credibility associated with it.

The methodology that will be applied to the research will consist of the following factors:

- Method – The method used will be in the form of a questionnaire, applying both the ratio- and the interval (five point Likert scale) measurements. Some of the questions will contain categorical variables (qualitative variables), such as the sex of the respondents and others numerical variables (quantitative variables). The questions containing numerical variables are not an exact science, therefore the term, continuous variables, will be used (Levine, *et al*., 2011).
- Data analysis and the interpretation of results – The research questions will be coded and analysed by the North-West University, Potchefstroom: Statistical Consultation services, utilising an Excel spread sheet. The aim will be to receive between 150 and 200 questionnaires, and interpretations will be concluded by means of descriptive as well as inferential statistics. Different conclusions will be drawn by comparing scenarios obtained from the research results.

- Geography – The study will be conducted amongst drivers en route on the N3 highway.

1.5 SCOPE OF THE STUDY

The scope of the study falls within the discipline of economics. Specific attention will however be given to the profiling of long haul heavy vehicle drivers from a safety perspective. The study sample will be conducted among the population of long haul heavy vehicle drivers frequenting the N3 highway on a regular basis.

1.6 LIMITATIONS OF THE STUDY

The following limitations to the study have been identified:

- Language barrier – Due to the fact that some of the long haul heavy vehicle drivers have limited linguistic skills, the research questions will have to be explained to them on an individual basis;
- Anonymity - Due to the drivers' concerns that their anonymity would be compromised, they might not reveal the correct answers, especially concerning the more sensitive questions relating to their health and sexual behaviour;
- Time constraints – Due to the nature of the questionnaire, it might take some drivers a long time to complete the questionnaire, which might result in a lower participation ratio;
- Geography – It would have been ideal to do a survey amongst drivers from all over the country, but due to the geographic restrictions, this could not be done;
- Availability of Information – Considering the controversy regarding the De Beers Pass diversion (Section 2.6.1), very limited information is available. There is also very little recent research available on the subject of the safety of LHHV drivers in South Africa. Even the available legislation dates back to the mid 1990's. Due to this lack in research information, a number of references older than 7 years will be used.

1.7 CONTRIBUTION OF THE STUDY

The issue of road accidents affects every citizen of this country. Road accidents are being aggravated by the increased number of vehicles, especially LHHVs and the deterioration of the roads in South Africa. Although there has been a lot of research done on this subject, the research is old, mostly done for international markets, and does not really profile LHHV drivers from a safety perspective. For such a contemporary issue, more recent research is necessary, which will encourage renewed interest and dialog from role-players, which can effect change. This research has not intended to be conclusive, but will try to serve as a building block for future research to be done on the subject.

1.8 LAYOUT OF THE STUDY

Chapter 1: Nature and scope of the study.

Chapter one serves as an overview of what to expect in the rest of the study. The layout of Chapter one can be summarised as an introductory statement that intends to lay the foundation, after which there is a short paragraph under the “Problem Statement” heading, indicating why there is a need for this study to be conducted. The goals and objectives of the study are briefly discussed, after which the reader is informed of the research methodology that will be applied. The scope and the limitations of the study are followed by the layout, after which the chapter will be concluded with a brief summary.

Chapter 2: A literature overview of the South African commercial long haul heavy vehicle transportation sector.

Chapter two intends to investigate the long haul heavy vehicle sector from a theoretical perspective, in order for the research to be conducted. The focus of chapter two is on current legislation, the profile of long haul heavy vehicle drivers, to determine the aggravating factors relating to road accidents. The chapter ends by investigating the

socio-economic effect of this sector on communities and families and as well as overview of a modern truck stop.

Chapter 3: Empirical Study.

In chapter three the results of the empirical study are discussed. This chapter predominantly deals with the comparison of the literature review and the results obtained from the quantitative research done amongst the sample of long haul heavy vehicle drivers. In this chapter different scenarios will be discussed and various conclusions are drawn.

Chapter 4: Conclusions and Recommendations.

The last chapter serves as the grand finale, where conclusions are drawn from the study as a whole, and where recommendations are made. This chapter deals with the issue of whether the objectives of this study were met, and it suggests areas for further research. The chapter ends with a conclusion of the whole study.

1.9 SUMMARY

The safety needs of LHHV drivers in the commercial LHHV transportation sector, has far reaching consequences, not only for transport companies, but also for the country as a whole. LHHV accidents do not only have an economic impact, but it also affects people and their families. Although there might be fewer accidents involving LHHVs than private vehicles, the effect of a LHHV accident normally has far more devastating consequences. Not only is it most of the time associated with loss of lives or cargo, but many a traveller can relate to the long hours wasted at a scene of a LHHV accident while the authorities have been trying to clean up.

This study intends to summarise the most important factors relating to the safety needs of LHHV drivers, and to provide guidance for remedial steps that might be considered. Chapter 2 will thus focus on a literature study concerning the subject of LHHV drivers and the aggravating factors regarding road accidents and –fatalities.

CHAPTER 2

A LITERATURE OVERVIEW OF THE SOUTH AFRICAN COMMERCIAL LONG HAUL HEAVY VEHICLE TRANSPORTATION SECTOR

2.1 INTRODUCTION

Road safety is currently a buzz term in South Africa, and is used by politicians and other role players in the media almost on a daily basis. During Easter- and Christmas holidays it almost becomes a refrain and several aspects of road safety are highlighted and prioritised with numerous initiatives being put into place, in an effort to ensure that the death tolls on the South African roads are on a decrease (Scherer, 2013).

According to Minister Dipuo Peters, the current Minister of Transport, there are about 18 000 traffic officers monitoring an estimated 10 million vehicles on the South African roads (Ensor, 2013:1). The magnitude of South Africa poses a challenge for effective policing. What complicates the process even more is the fact that there are provincial as well as municipal law-enforcement agencies, each with their own *modus operandi*.

The number of vehicles in South Africa has almost doubled in the last 20 years. The trend is continuing with a 5% increase in total market sales from January – September 2012, when 466 838 vehicles were sold, compared to the January to September 2013 figures, when 490 297 vehicles were sold. Inclusive to these statistics, are the sales of LHHVs which increased from 8840 (January to September 2012) to 9705 (January to September 2013), an increase of almost 10% (Anon., 2013).

Bearing these figures in mind, the International Transport Forum's (ITF) latest Road Safety Annual Report (2013:382), has ranked South Africa the worst out of 36 other countries, with respect to the number of road fatalities. Road fatalities per 100 000 inhabitants were reported at 27.6 in 2011. This is shocking statistics when compared to developed countries, such as North America (10.4) or Australia (5.6). None of the developing countries included in the report has exceeded South Africa's road death toll. Both Argentina and Colombia reached around 12.0, while Malaysia came off second worst with 23.8. According to the report, there were 11 228 serious accidents

reported, resulting in 13 954 fatalities, a very small decrease of -0.01% in comparison to 2010, when 13 967 fatalities were reported.

The report has also estimated the economic cost of South Africa's road accidents to be R307 billion each year. This cost has been calculated by using the human capital method which, according to Ledger (1994:17(1):84-93), is based on the assumption that every person produce a certain output during a lifetime, approximating to a value. This method does not take any emotional value into consideration and does not intend to reduce human beings to a monetary value only. It is merely a tool for Government and other role-players to use when making decisions involving accidents and/or diseases. The loss in human capital exceeds the budget allocated by Transnet for funding its seven-year infrastructure building program (Steyn, 2013).

Unfortunately the report does not differentiate between the accident data of Long Haul Heavy Vehicles (LHHV), and other vehicles. Based on the research of Radebe (2010:1) though, LHHVs constitute for more than 30% of all traffic on the N3.

2.2 THE MARKET FOR TRANSPORT

The following five modes of transport are utilised in order to move freight, liquid, gas and people in South Africa:

- Road transport;
- Railway transport;
- Air transport;
- Seaports; and
- Pipelines.

The two modes of transport that are highlighted when it comes to the transportation of goods are road transport and rail transport. Rail transport is generally associated with lower cost, lower energy consumption and safety, while advocates for road transport focus on speed and flexibility (Smithwick, 2013).

According to the White Paper on the National Transport Policy, (SA, 1996:21) rail is seen as an essential long-term component of the network for both freight and passenger transport. The provision and maintenance of rail infrastructure for bulk- and general cargo freight transport will be determined by market needs and commercial viability.

Transnet, a semi-governmental institution, is responsible for the rail network in South Africa. Transnet has announced an expansion of its freight rail division to such an extent that it will be the fifth largest in the world. A capital investment of R300 billion will reduce the cost of doing business in South Africa, by moving freight from road to rail (Ueckerman, 2013), as rail-freight transportation is said to be at least 75% cheaper than the transportation of freight by road. Moving freight to rail will benefit both South African companies as well as exporters. Transnet is currently moving about 200 million tons per annum, but is planning to move at least 350 million tons by the end of 2019 (Anon., 2013).

For the purpose of this paper the focus falls on Road Transport and more specifically on Long Haul Heavy Vehicle Transport (LHHVT) on the N3 corridor between Durban and Johannesburg.

According to Oliver (2013:1), despite Transnet's goal to win back more freight onto rail, and taking into consideration the large amount of money spent on upgrading the oil pipeline, to date very little evidence of road freight being transferred to rail has been observed.

The motorised vehicle fleet however, is growing fast in South Africa (Ghozi & Selala, 2013). This growth in vehicle sales is indicative of the assumption that the number of accidents on South African roads, with the associated loss of lives and goods, is bound to increase unless something drastic is done about it. In an article by Fourie (2012:1), it is said that over 7000 LHHV accidents occurred on the Durban roads alone during 2011, resulting in no less than 70 people losing their lives. According to the same article, 1597 of these accidents related to vehicles colliding head to tail, also known as rear-ending. Another 2469 accidents were due to vehicles colliding from the side,

known as sideswiping. Both of these causes relate to driver fatigue, which will be discussed in more detail later on in this paper.

Between 1990 and 2011, the number of road fatalities has increased by 25%, peaking in 2006 with 15 419 fatal accidents. As from 2000, more than 10 000 fatalities have been recorded on a year-on-year basis. Since 2006, the number of fatalities has decreased by only 10%. Rapid urbanisation and motorisation can be seen as major contributing factors hereto.

During the South African Transport Conference of 2013 that was held at the Council for Scientific and Industrial Research (CSIR) International Convention Centre in Pretoria, it was mentioned that the average daily traffic (ADT) ranges between 8500 to 13 500 vehicles, of which an estimated third, 3500 to 5000 vehicles, are long haul heavy vehicles (Labuschagne *et al.,* 2013:55).

To improve South Africa's competitiveness and that of its transport infrastructure and operations, attention must be given to greater effectiveness and efficiency in order to better meet the needs of the different customer groups, both locally and globally. The term Just-in-Time (JIT) is defined as: "*An inventory strategy companies employ to increase efficiency and decrease waste by receiving goods only as they are needed in the production process, thereby reducing inventory costs*" (Investopedia, 2013). In order for a company to be more efficient and to decrease waste, timing is of utmost importance. Large warehouses and inventories can cripple a company's cash flow – hence their reliance on LHHVs for fast and reliable delivery of goods and raw materials. Companies that base their operation on the JIT principle, require smaller but more continuous batch deliveries of goods.
The transportation infrastructure of South Africa is the responsibility of the Department of Transport, whose duty it is to ensure a proper environment in which transportation companies can perform their business. Poor infrastructure will lead to poor performance by these companies which will have a ripple effect on the economy.

2.3 GOVERNMENT'S PERSPECTIVE

In a presentation by the acting Chief Operating Officer (COO) of the Road Traffic Management Corporation (discussed below), Ms Refilwe Mongale (2013), she suggests that, while there is no specific target for road safety, there is definitely a relationship between transport and poverty. The transport sector serves as a major employer, and in times of economic down-turn, the loss of jobs impacts negatively on communities and families.

Mongale (2013) states that the Road Traffic Management Corporation (RTMC), which is a coordinating structure of the Department of Transport (further discussed in par 2.4), has a goal to reduce the rate of accident fatalities by half by 2020. Mongale also refers to the African Road Safety Conference that was held in Ghana in 2007, organized by the World Health Organisation and the United Nations Economic Commission for Africa. During this conference the following objectives in connection with road safety have been identified:

- Progress made by African countries in improving road safety must be reviewed;
- Recommendations of the World Report on Injury Prevention must be implemented;
- Preparations for the first United Nations Global Road Safety Week must be done;
- A National Action Plan for road safety for countries in the region must be developed;
- Ways to mobilize resources for road safety must be identified.

Resolutions from the Ghana Conference are summarised in the following table:

Table 2.1 Road Safety Resolutions from the Ghana Conference

Establish a lead agency	○ RTMC established in 2005
Improve data collection and management	○ Cash Information Management System ○ Monthly Road Safety Report

Commit to Safety Education	○ Participatory Educational Techniques ○ Road Safety Debates Competition
Commit to improve road safety management	○ Approval of an integrated, comprehensive and holistic National Road Safety Strategy.
Harmonize national action plans at sub-regional level	○ Southern African Developing Community (SADC) Ministerial Summit on the Decade of Action
Develop quick win enforcement plans in respect of serious traffic violations	○ Development of the National Rolling Enforcement Plan with monthly targets
Partnership and collaboration	○ RTMC has established relations with the United Nations Road Safety Collaboration, Institute for Road Safety Research (Netherlands), IRTAD (International Road Traffic and Data Analysis Group) and the Indian High Commission. At sub-regional level, collaboration with SADC Countries in respect of harmonization and the International Union for Professional Drivers (UICR) Contest. Various national traffic, transport and road safety Non-Governmental Organisations, academic & research institutions (MRC). Collaborations between National Incident Management Systems (NIMS) and Corporate

	and Industrial Management Systems (CIMS), community based organisations and the private sector.
Develop rural road safety programmes	○ Incorporated into the National Rolling Enforcement Plan (NREP) are targets especially with regards to vulnerable road users, cyclists, pedestrian and scholar transport
National Road Safety targets	○ Very limited

Source: (Mongale, 2013)

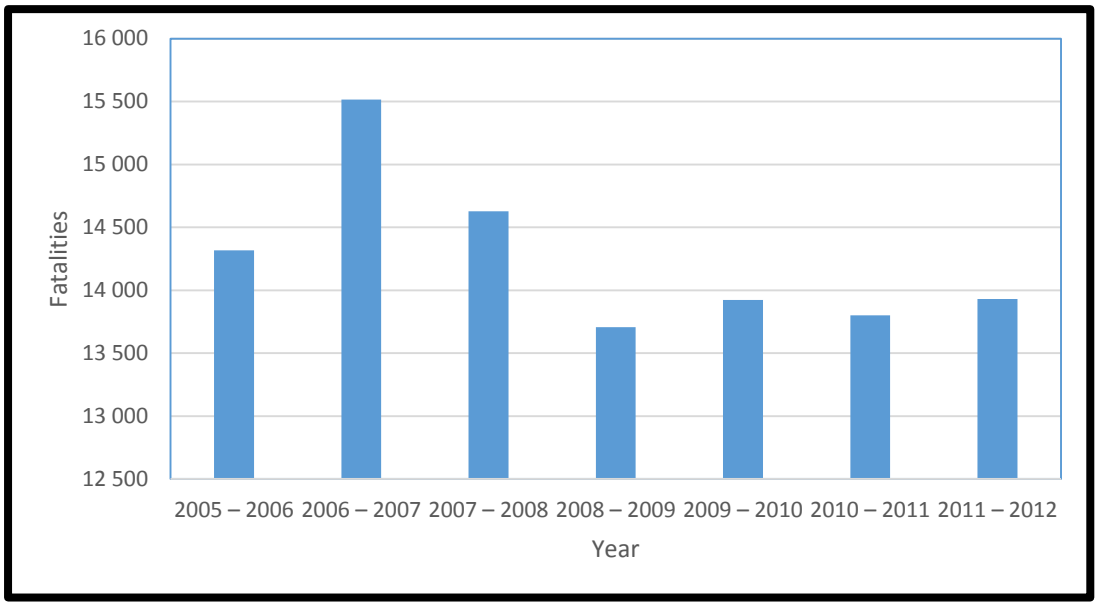
Table 2.1, the left column, summarises the planning phase, while the implementation phase or the outcome, is summarised on the right. During the Ghana conference, the following fatality figures have been released, which emphasises the seriousness of road safety, not only in South Africa but globally. From these figures one can derive that, unless something drastic happens within the transport environment, the target of a 50% reduction in road fatalities, as accepted both internationally and nationally, will not be achieved.

Table 2.2 Road fatalities in South Africa: 2005 - 2012

Year	**Fatalities**
2005 – 2006	14 317
2006 – 2007	15 515
2007 – 2008	14 627
2008 – 2009	13 707
2009 – 2010	13 923
2010 – 2011	13 802
2011 – 2012	13 932

Source: (Mongale, 2013)

Figure 2.1 Road fatalities in South Africa: 2005 - 2012



Source: (Mongale, 2013)

The Minister of Transport, Minister Dipuo Peters, confirmed in an interview by Ensor (2013) that an intergovernmental team, comprising of officials from the Department of Transport (DoT), the Road Traffic Management Corporation (RTMC), the Road Traffic Infringement Agency (RTIA), the South African National Road Agency Limited (SANRAL) and the Road Accident Fund (RAF), has been established. The aim of the team is to investigate and implement some pragmatic and sustainable interventions, in order to minimise the high number of road accidents. According to Peters, this intergovernmental team and the proposed new legislation are a move in the right direction to reach Government's commitment of reducing road fatalities by half before 2020. However, as indicated in Table 2.2 and Figure 2.1, the fatal road traffic accidents reported over the past four years remained constant. The only period when a decrease in road fatalities has been reported, was for the period 2006–2007 to 2007–2008. Assuming that this trend continues, it will be very challenging to reach the proposed target.

2.4 CURRENT TRANSPORT LEGISLATION

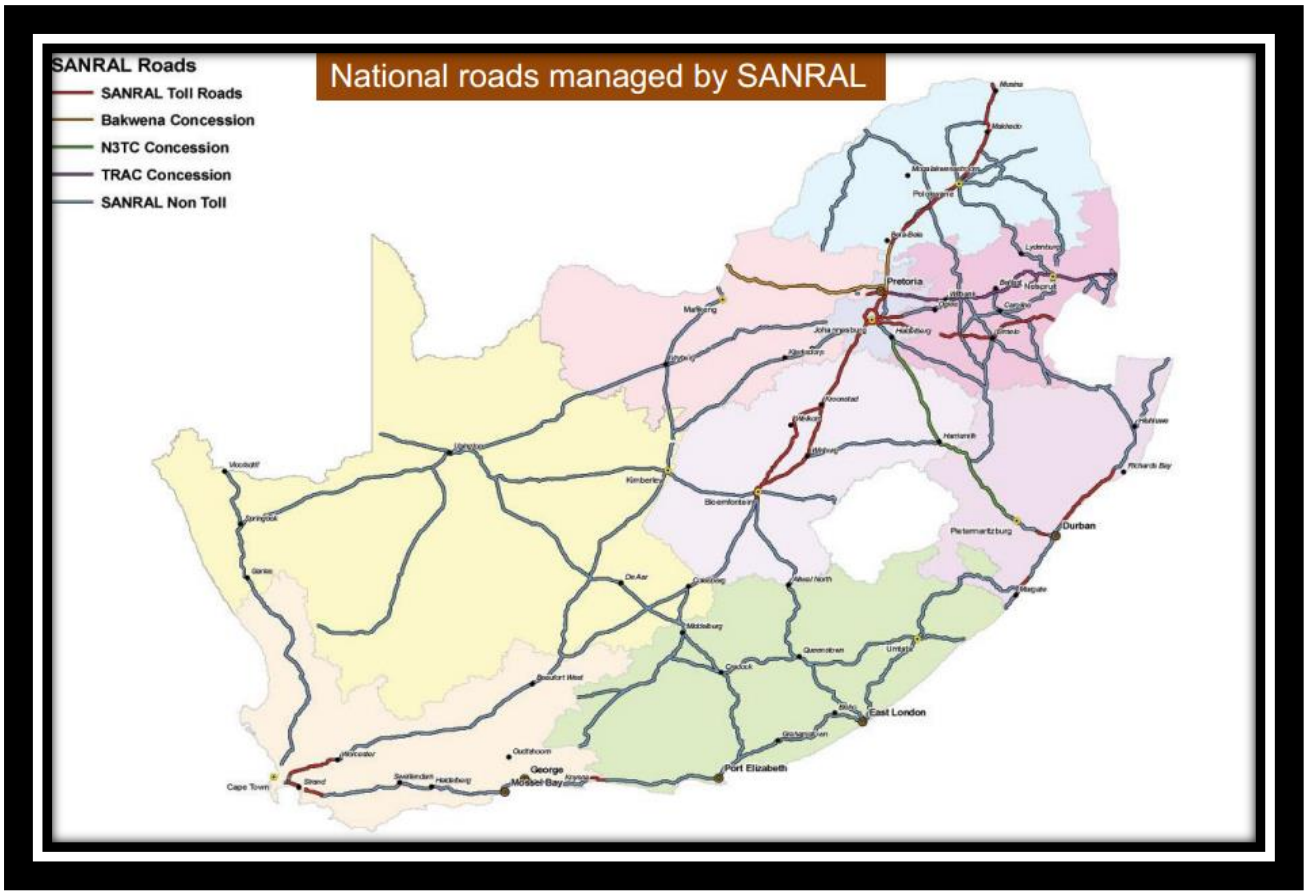
In terms of the National Road Traffic Act (93/1996), the Department of Transport (DoT) is the responsible lead agency with respect to a national road safety strategy.

According to Watson (2007:1), it is the responsibility of the DoT to set up the Road Traffic Management Corporation (RTMC) through the RTMC Act (20/1999), as a coordinating structure, to work with provinces and local authorities in order to ensure a co-operative approach, particularly in the area of enforcement.

In order to improve on the National Road Safety Strategy, the RTMC Act (20/1999) and the Administrative Adjudication of Road Traffic Offences (AARTO) Act, (46/1998) were promulgated. In addition to this, the Arrive Alive campaign was established as a communication medium between the Government and the general public. The Road to Safety Strategy 2001-2005 was designed with the aim of focusing on law enforcement officers. The aim was to improve their skills and to decrease corruption. The National Road Safety 2006 Strategy has been approved by the cabinet, with the main focus on “back to basics” policing of day-to-day traffic offenders. The 2006 strategy relied heavily on law enforcement and poignant advertising of the different campaigns in order to improve public awareness.

In terms of Section 41(1) (h) of the South African Constitution (1996), Road Traffic Management resorts under the responsibility of all three tiers of Government. The National Road Traffic Act (93/1996) deems the DoT to be the lead agency for policy and regulation, while the DoT has transferred some co-ordinating functions to the RTMC. The National Roads in South Africa, sometimes referred to as the ‘economic arteries’, are managed by the South African National Roads Agency Limited (SANRAL). SANRAL is an independent, statutory company registered in terms of the Companies Act (71/2008). The South African Government, represented by the Minister of Transport, is the sole shareholder and owner of SANRAL.

Figure 2.2 National roads managed by SANRAL



(Ittman, *et al.*, 2013)

Although SANRAL is primarily responsible for all the affairs relating to roads in South Africa, three concessions have been conceded by SANRAL. As indicated in Figure 2.2 the concession holders are:

- The Bakwena concession;
- The TRAC concession; and
- The N3 Toll concession. The N3TC is a private consortia conceded for a 30 year period to manage, design, construct, finance, operate and maintain the stretch of the road from Heidelberg in Gauteng down to Cedara in KZN (Radebe, 2010:2).

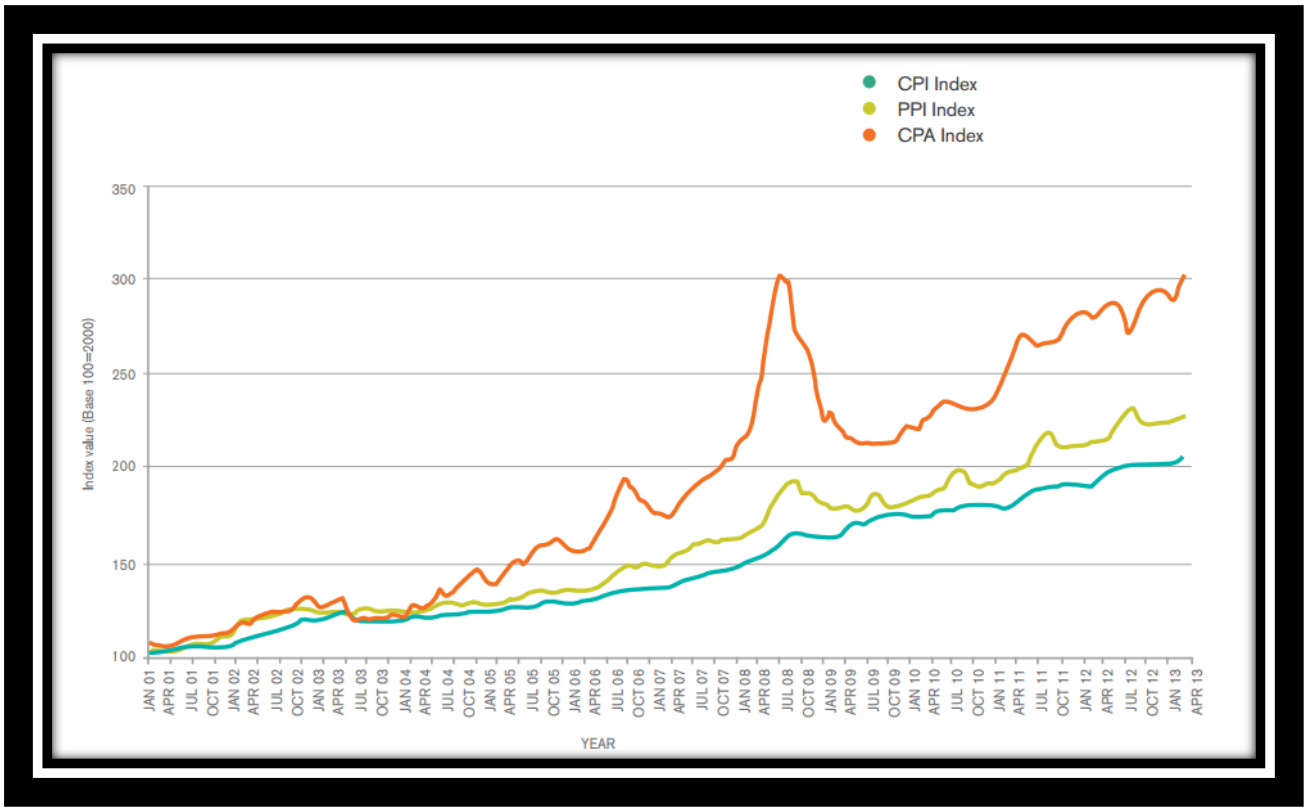
The other two focus areas of SANRAL, as indicated by Figure 2.2, are non-toll roads that are funded from allocations made by the National Treasury, and toll roads that are funded from borrowings on the capital- and money markets. In this research the focus is on the N3 Toll Concession (N3TC), which is the busiest road in South Africa

(Qabathe: 2013), linking the Durban harbour with Johannesburg, the economic hub of the country.

The Road Traffic Act (93/1996), and the Road Traffic Regulations made in terms of this Act, deal with specific issues pertaining vehicles used on public roads. The Road Traffic Act (93/1996) also determines the powers of traffic officers regarding the enforcement of legislation. All of these agencies ultimately resort under the auspice of the Minister of Transport. During an interview by Business Day (Ensor, 2013), the current Minister of Transport, Dipuo Peters, assured the South African public of Government's commitment towards reducing the death toll on the roads. Peters reiterated the fact that amendments to the NRTA, are being considered. Some of the amendments under consideration include a two year probation period for first time applicants of driver's licenses, and a reduction from the current 0.05% blood-alcohol ratio to 0.02%, for normal drivers and 0% for LHHV drivers.

During the 2012/2013 budget speech, the annual fiscal allocation to SANRAL has amounted to R8 billion (Ndebele, 2012) and during the 2013/2014 budget speech, a further R3.454 billion have been allocated, specifically earmarked for "current operations" and R7.043 billion for capital infrastructure.

Figure 2.3 CPI, PPI, CPA Index: 2001 – 2013



(SANRAL Annual Report, 2013)

Figure 2.3 shows a smaller growth for consumer- and producer prices in relation to the construction price adjustment factor (CPA). The CPA refers to the price of road construction (Anon., 2013). According to Ndebele (2012:2), some of the major projects that SANRAL are contemplating, which is in accordance to the fiscal policy and budget allocations, include the following:

- The development of the Sitebe Kommkhulu to Viedgesville Road on the N2 in the Eastern Cape to the value of R341 million;
- The development of the Harrismith-Kestell Road to the value of R42 million;
- The development of the Durban North Coast Interchange project to the value of R64 million;
- The development of the Ventersburg-Kroonstad road to the value of R147 million; and
- The project at the Mhloti-Tongaat plaza to the value of R51 million.

All of these development projects are intended to improve the country's infrastructure, which will in turn grow the LHHV market. A bigger market will result in an increased demand for LHHV drivers as well as for LHHVs.

2.5 GREEN AND WHITE PAPERS ON NATIONAL TRANSPORT POLICY

The Green Paper on the National Transport Policy has been released during March 1996. A Green Paper can be seen as a consultative document, specifically designed to start a process of communication between the Government and interested parties, in order for a policy to be formulated (SA, 1996:1). Under the auspice of the then Minister of Transport, Mac Maharaj, a process of dialog with several role-players within the transport sector, took place. The result was a White Paper, which sets out the National Government's transport policy. The aim of a White Paper is to create a basis for transport to play a more strategic role in social development and economic growth, as the Government has recognised it as one of its five main priority areas for socio-economic development (SA, 1996:3).

Vision

The vision for South African Transport, is a system which will:

"Provide safe, reliable, effective, efficient, and fully integrated transport operations and infrastructure which will best meet the needs of freight and passenger customers at improving levels of service and cost in a fashion which supports Government strategies for economic and social development whilst being environmentally and economically sustainable" (Maharaj, 1996).

Maharaj (1996) points out that the effectiveness of the role played by transport is to a large extend dictated by the soundness of the transport policy, and the strategies utilised in implementing it. Although it is clear that the focus of the vision is on safety, it goes without saying that not only the safety of transport, but also the security as well as the quality of transport in general, is not acceptable, and that the focus therefore must fall on all of these components to build a proper foundation for socio-economic development.

In order for South Africa to maintain its competitiveness in accordance with international standards and best practices, the White Paper (SA, 1996:23) indicates policies for both infrastructure and operations for the various modes of transport. For the purpose of this paper these modes are briefly discussed:

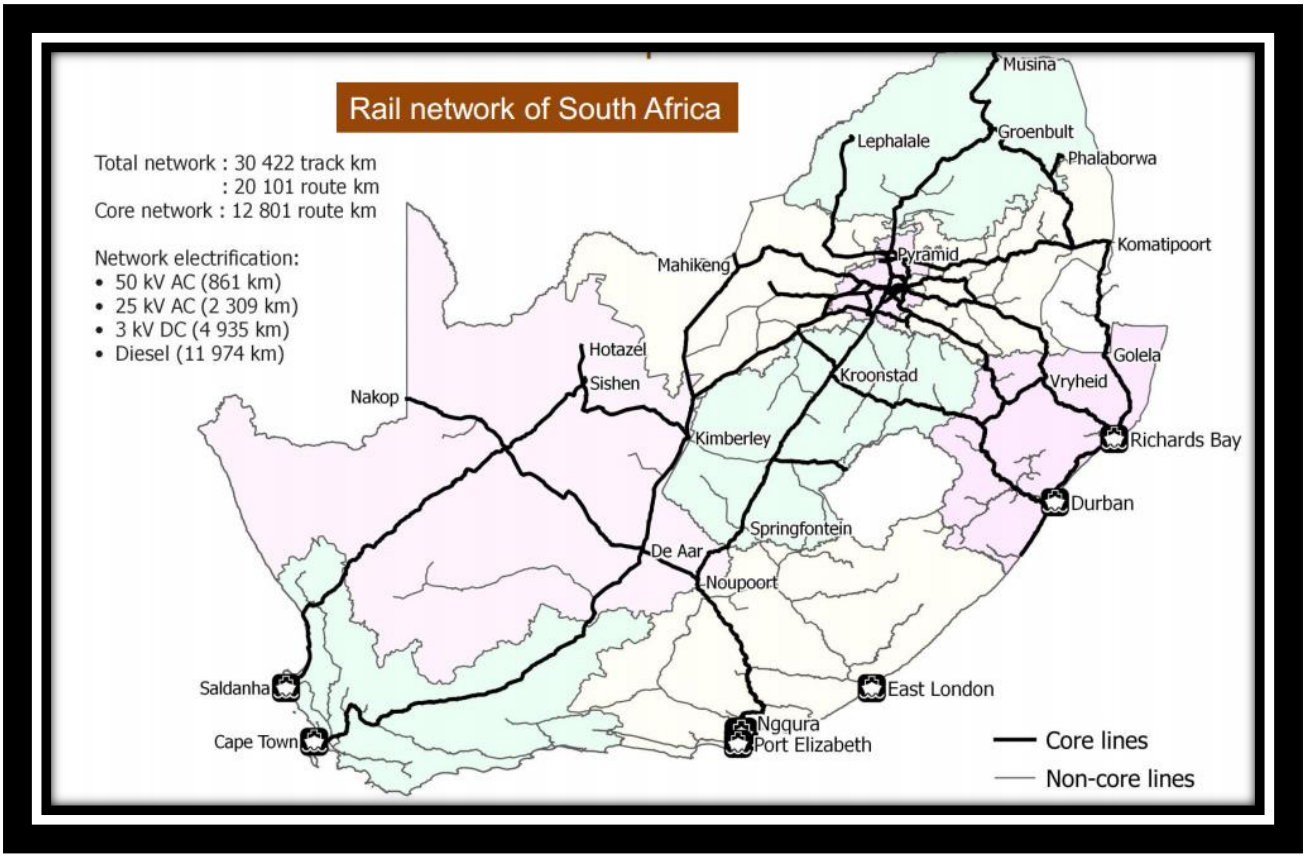
- Roads

Derived from the White Paper (SA, 1996:23), a professionally managed Roads Agency must be established, to orchestrate the provision, maintenance and operation of the primary road infrastructure. In accordance with this requirement, the RTMC has been set up by the DoT.

- Railways

According to the White Paper (SA. 1996:23) it has been acknowledged that rail is seen as an essential long-term component, in order to transport freight. A market needs analysis will have to be conducted to determine whether or not it will be financially viable to provide a rail infrastructure for bulk and general cargo transport. The current rail network in South Africa is best understood from the following figure.

Figure 2.4 Rail network of South Africa



(Ittman *et al.*, 2013)

As indicated in Figure 2.4, the rail network of South Africa could be divided into two main categories, namely a core network covering about 12 801 route kilometres, and a secondary network of about 20 101 route kilometres. Transnet's goal to win back more freight onto rail and to upgrade the oil pipelines, are factors that have to be taken into consideration. To date very little evidence of road freight being transferred to rail is perceived. However, with the large budget that the Government had set aside to improve the country's rail infrastructure, there is no doubt that some of the bulk long-distance freight will return to rail. Resulting from the effort that Transnet is applying to get more freight back onto rail, some changes in the pattern of freight transportation will be seen in the future, with more of the heavy long-distance freight moved by rail, but with an increase in local logistics. This could result in the shrinkage of the LHHV market, but balanced out by an increase in the sale of heavy and medium commercial vehicles (Oliver, 2013).

Rail transport, the improvement thereof, and the strategy to substitute road freight with rail, have been of cardinal importance to Government for the past couple of years. During the budget speech of early 2012, the then Minister of Transport, Sibusiso Ndebele, state that six strategic infrastructure projects have been identified, of which the Durban-Free State-Gauteng Logistics and Industrial Corridor, is high on the priority list (Ndebele, 2012).

During the 2013 budget speech, the then Minister of Transport, Ben Martins, reiterated the importance of the Durban-Free State-Gauteng Logistics Corridor, saying that "*the Department of Transport continues to play a central role in this strategic projec*t" (Martins, 2013).

According to Ndebele (2012:1), transport serves as a catalyst for socio-economic development, especially in relation to the movement of goods and passengers. Government decided to prioritize the following projects within the Durban-Johannesburg Corridor:

- The Durban International Airport was earmarked to be sold to Transnet to establish a dig-out port;
- A dry port must be developed at Cato Ridge;
- The commuter rail must be extended to reach Pietermaritzburg;
- Harrismith must be developed as a logistical and industrial hub;
- There is also a focus on Gauteng Logistics Hub with specific reference to Tambo-Springs, Central Rand and some improvements to City Deep.

Government further recognises the fact that South Africa's freight transportation network forms an integral role in facilitating economic growth for the country and the Southern African region. Operational planning and the establishment of proper infrastructure by 2050 are the current focus and vision of Government.

Part of the vision is the establishment of a Southern African Regional Freight Corridor. Preliminary estimates to establish such a port development precinct, will cost in the region of R100 billion, with a further half a trillion rand for the entire corridor.

The port development consists of the following components:

- The Durban Port;
- The Durban-Gauteng Road Corridor;
- The Durban-Gauteng Rail Corridor (including high speed rail);
- Logistics hubs and terminals within the corridor;
- Supportive area land-use plans

During an interview by Transport World (2013:1), Dr Jan Havenga, Director: Centre of Supply Chain Management, Department of Logistics at Stellenbosh University, has stated that approximately 56 million tonnes of freight are moved on the Durban-Johannesburg Corridor, of which 85% is moved on road. As 45% of the freight on this corridor is for imports and exports, it can be seen as an important corridor for international trade. At least 5 million tonnes of freight can be transferred in a modal shift to rail. This could save the country a substantial amount on the freight bill and reduce the amount of LHHV on this route by at least 400 vehicles. As an interim solution, the target can be increased by a further 18 million tonnes, which would save another R1.2 billion, and take a further 1400 LHHVs off this route (Havenga, 2013:1).

Based on research, Government projects show a growth of between 200% and 250% in freight carried by roads, which will put further pressure on the N3 highway (Ndebele, 2012). Currently less than 17% of all goods are transported by rail, which puts more pressure on roads. The result is higher congestion, higher vehicle operating costs, and ultimately, higher logistical costs, which will make South Africa less competitive in relation to the rest of the world.

- Seaports

A port authority which will operate autonomously with specific focus on port infrastructure will be established. To ensure fair business practises, an independent regulator will oversee the port authority.

The Durban harbour has already been widened in order for larger vessels to be able to dock with ease. According to Mr Andre Pottas, corporate finance advisory leader at Deloitte in Durban, the timing with respect to the competition the Durban harbour is going to face over the next 20 years, is crucial. Maputo harbour as well as the Walvis

Bay harbour, are posing threats to the Durban harbour. The Maputo harbour is closer to Gauteng than the Durban harbour, and by utilising the Walvis Bay harbour, it will remove the need for Europe and US exporters to route around the Cape (Anon., 2013). With the expansion of the Durban harbour, it can undoubtedly be assumed that the N3 corridor will get busier. More freight will be allocated to this route, which will result in an intensified number of LHHVs on the road.

- Pipelines

The proposed network of liquid and gas pipelines operating as a utility, and regulated by Government has not only been approved and promulgated in the aforesaid White Paper (SA, 1996:23), but Oliver also reports that the new upgraded oil pipeline has already affected long-distance road tanker operations. Some road tanker operators are reporting a slowdown in requests for the transport of products (Oliver, 2013).

According to Transnet's Long-Term Planning Framework (LPF), formerly known as Transnet Infrastructure Planning (TIP), there are six focus areas that need consideration, namely:

- Demand Planning;
- Rail Development Plan;
- Port Development Plan;
- Property Planning;
- Sustainability Planning; and
- Pipeline Development Plan.

Transnet's multi-product pipeline network from Durban to Johannesburg, passing through five provinces, namely KwaZulu Natal, Free State, Gauteng, Mpumalanga and North West, was constructed in 1965. Although this pipeline is currently still in use, it has reached its ultimate end. Technical upgrades that need to be done are, from an economic perspective, not a viable option. It has thus been suggested that the current 12 inch pipeline be replaced with a 24 inch multi-product pipeline by the end of 2013.

Transnet's pipelines comprise of four separate commodity specific networks of pipelines:

- Refined fuels running from Durban to Alrode in Gauteng. From Alrode it divides into different inland networks;
- Crude oils pipeline running from Durban to Natref oil refinery in Coalbrook;
- Avtur (Aviation Turbine fuel) pipeline running from Natref to the OR Tambo International Airport. This, however, is not a very long pipeline;
- A methane-rich gas pipeline. This pipeline was reconfigured only in 1995 to convey the methane-rich gas to run from Secunda to Durban via Empangeni.

Although it is not possible to move away from road haul in its entirety, pipelines are to a great extent, able to serve this portion of the market better, posing a threat to the LHHV market. Some of the greatest advantages of pipelines are that it is:

- Safe;
- Able to convey large volumes of product at a fairly reasonable cost;
- Environmentally friendly;
- Reliable;
- Assisting to a great extent to minimise the negative impact of road traffic, such as wear-and-tear, road accidents, spillage and road carnages;
- Cost effective.

At this stage the 24 inch multi-product pipeline (24" MPP) is planned to be completed by 2033. Some of the advantages are that it will satisfy most of the inland demand, and that it will require no additional surface such as additional roads for LHHV, and/or the upgrading of rails for train transport. On completion of this project further development will be considered (SA, 1996:23).

- Land Freight Transport

According to the White Paper on the National Transport Policy (SA, 1996:20), land freight transport is a focus area of transport that embraces both domestic and international conveyance of goods by both road and rail, and is concerned with:

- The quality of service to the satisfaction of customers and users (including cost, reliability and timeous delivery);
- Seamless, intermodal operations;

- Optimised use of capacity and management of operations;
- Protection of its infrastructure; and
- Minimized impact on the environment and natural resources.

The strategic objectives for land freight transport in order to fulfil this mission are to:

- Develop a comprehensive land freight transport information system;
- Promote the provision of seamless intermodal services;
- Optimise current capacity and maintain and develop the land freight transportation system;
- Prioritise issues in terms of sustainable economic and development needs;
- Find a practical and reasonable solution that leads to an equitable distribution of infrastructure capital, management, operating and maintenance costs;
- Promote a strong, diverse, efficient and competitive transport industry within the limits of sustainable transport infrastructure;
- Promote environmental protection and resource conservation, with specific reference to all aspects of transporting hazardous substances and goods;
- Enhance the quality of freight transport services by providing transport customers with a safe, secure, reliable and cost-competitive system;
- Advance human resource development and expand participation in the freight industry through the creation and growth of entrepreneurial opportunities, training and skills development;
- Optimise road transport law enforcement.

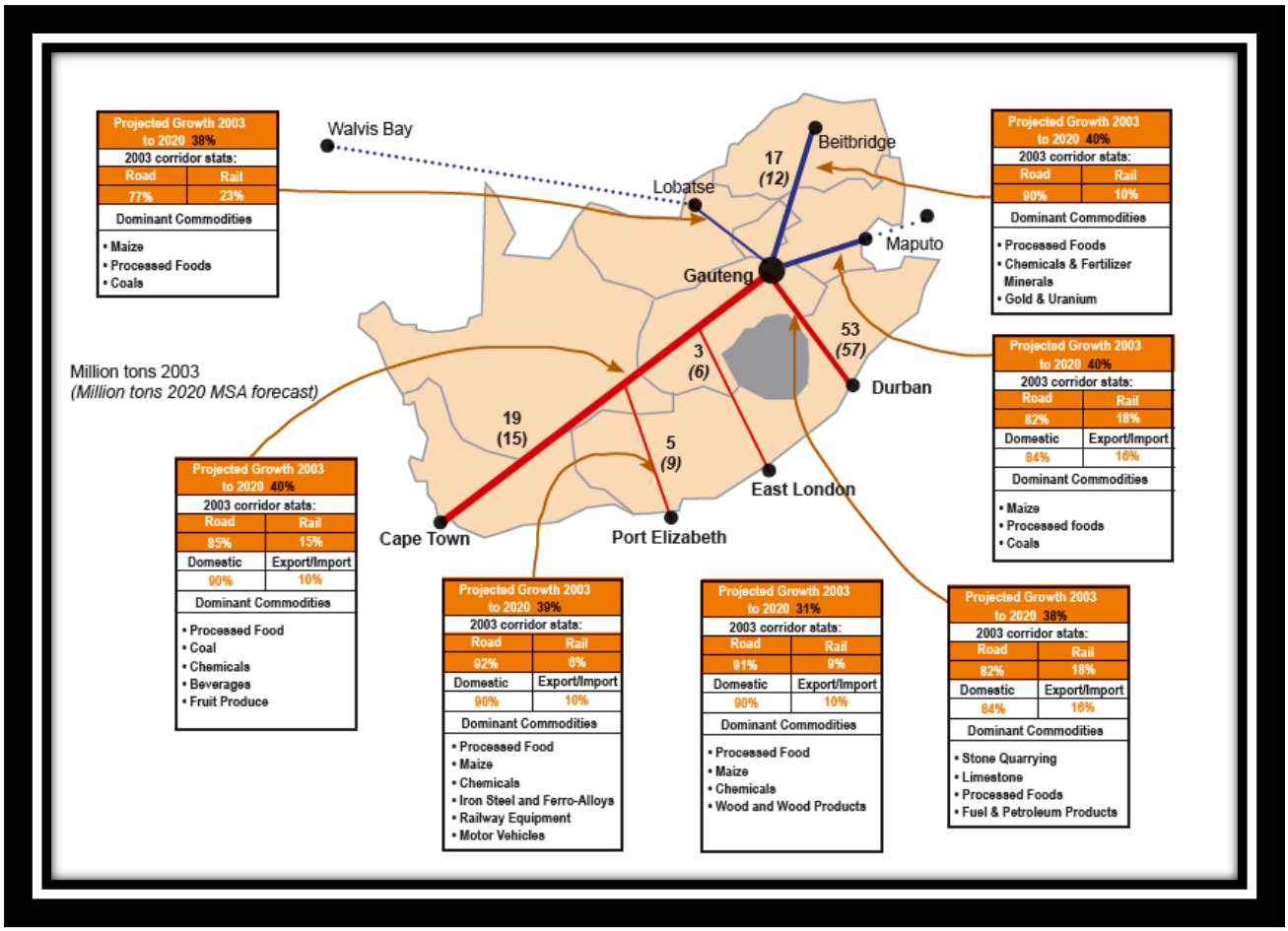
This research intends to profile the safety needs of the South African LHHV transportation sector, which makes it very relevant to the strategic objectives, not only of the National Government, but of the transport sector as a whole.

2.6 THE INCREASED NUMBER OF LHHVs IN SOUTH AFRICA

According to Radebe (2010:3), South Africa has seven primary transport corridors of which the N3 corridor between Gauteng and Durban is the most strategic regarding freight movement and tourism. The National Freight Logistics Strategy (2005:26-28) confirms this fact indicating that the following seven corridors are functional:

1. The Gauteng – Durban corridor;
2. The Gauteng – Walvis Bay (Lobatse) corridor;
3. The Gauteng – Beitbridge corridor;
4. The Gauteng – Maputo corridor;
5. The N1 – East London corridor;
6. The N1 – Port Elizabeth corridor; and
7. The Gauteng – Cape Town corridor.

Figure 2.5 Freight Corridors in South Africa



(Anon., 2005)

From Figure 2.5, it can be determined that Government projects a growth on all seven corridors of between 31% and 40%, from 2003 to 2020. The projected growth on the N3 between Durban and Gauteng is 82% on road and 11% on rail. The Durban–Gauteng corridor is the busiest road for LHHVs, and therefore it will be safe to derive a sample of a National tendency from figures obtained from the N3TC. N3TC's traffic data have been provided on a year to year basis from 2010 to 2012, indicating a cumulative growth in the number of vehicles of about 13% (Anon., 2012). The current traffic volumes are estimated on between 8500 and 13 500 on the N3 highway per day (Radebe, 2010). Taking this phenomenal growth of LHHVs into consideration, one could assume that the problem of accidents and death tolls on the roads will escalate in the near future.

Two of the strategies that are currently being investigated by the N3TC as interim solutions to the problem of increased volumes of traffic, are:

1. To divert the N3 from the Van Reenen's Pass via the De Beer's Pass, as the Van Reenen's Pass has been identified as a major contributor to road accidents; and
2. To establish a logistical hub in Harrismith in order to limit the number of LHHVs passing Van Reenen's.

2.6.1 DE BEER'S PASS DIVERSION

During the late 1960's, the limitations of the Van Reenen's Pass have been identified, and some alternatives investigated. Some of the limitations that have been identified are:

- Van Reenen's Pass has a limited capacity for vehicles passing. In a study by Oliver (2009:3), the average traffic en route passing Van Reenen was, at the time of the study, 9100 per day, of which at least 30% were accounted for by LHHVs. This tends to be problematic bearing in mind that Van Reenen's maximum capacity is about 13 900 per day;
- Van Reenen's Pass is known for its mountainous terrain, gorges, deep valleys and steep grades, which makes it geometrically unsuitable for the volume of traffic it is accomodating currently;
- Travellers are also confronted with severe weather conditions, such as strong winds, mist and snow. Many LHHV drivers will testify about the difficulty of driving through the so called "windy corner" on Van Reenen's. Totliners (LHHV's where the sides of the trailer are closed by sail or something similar), are finding it especially difficult, and many a LHHV has been tipped by strong winds;
- Strong winds result in cargo, or portions of cargo, falling in the road. These objects lying on the road are potentially very dangerous, especially for passenger vehicles;
- Yet another difficulty faced by motorists are the speed differences between LHHVs in low gear, and passenger vehicles travelling at high speeds;
- Due to the steep rise and fall of the road on Van Reenen's Pass, LHHVs' brakes could fail and thus many accidents occur due to the carelessness of drivers.

Being aware of these challenges, the N3TC has embarked on numerous initiatives to try and minimise the negative impact of these conditions. Some of these activities include the following:

- Exclusively reserved “truck lanes” for LHHVs exceeding 16 tons, and with a speed limit of 60km/h, has been introduced;
- Emergency sand strips on different sections of the pass to assist LHHVs with failing brakes;
- High visibility signage;
- Shoulders were added at steep slopes and some of the sharp corners were attended to.

As stated before, the N3 Toll Concession Pty Ltd. (N3TC) has secured the contract to act as the Concessionaire of the N3, since 2 November 1999 for a period of 30 years (Cave, *et al.*, 2011). Apart from the day-to-day running, planning, design and construction of the road, the company was also issued the mandate to construct a new route known as the De Beer’s Pass Route (DBPR), between Keeversfontein and Warden. Contractually the construction of the DBPR is supposed to commence during 2013, and has to be completed in approximately 3.5 years.

2.6.1.1 THE EFFECT OF THE DE BEER’S PASS ROUTE ON LHHV DRIVERS

The effect of moving a highway from a town normally has far reaching negative consequences, as seen in the case of Winburg in the Free State. This once thriving town has been reduced to a non-entity with limited opportunities, ever since the N1 highway has been diverted away from it. It is predicted that the same thing will happen to Harrismith, the small rural villages at Swinburn and Van Reenen, and the town of Warden. Many LHHV drivers have properties in Warden and Harrismith as it is roughly halfway between Johannesburg and Durban. Once the route is moved away from these towns it will have a negative social economic impact on them and their families.

A big outcry from a lobby group of interested and affected parties opposing the construction of the DBPR is a big concern to the N3TC management. Apart from a number of small businesses that will be affected directly, such as Nando’s, Spur, Juicy

Lucy, KFC and Mugg & Bean, the DBPR will have a devastating effect on petrol stations and more specifically on Highway Junction, which is regarded as the largest truck stop in the Southern Hemisphere.

An average of 1.5 million vehicles stops in Harrismith annually (Harrismith Chronicle, 2008:2). The economic impact that tourism and the LHHV market has on Warden and Harrismith, as a direct result of the N3 running in the close vicinity, is unimaginable.

Some areas that need further consideration but on which very little information is available, include the following:

- Economic development along the new corridor;
- Construction cost vs. the economic advantages for LHHV drivers on the new road, in relation to that on the existing road;
- Economic viability of levying additional toll fees. In other words, the impact of toll fees on the LHHV market;
- Expropriation of private land;
- The impact on LHHV drivers who have properties along the corridor.

Considering the controversy and uncertainty of the project, very little information on the progress is available.

2.6.2 HARRISMITH LOGISTICAL HUB

To alleviate the problem of traffic congestion at the Durban harbour and to limit the volume of traffic on the N3 highway and particularly on Van Reenen's Pass, the possibility of a logistical hub in Harrismith is under investigation. Harrismith is centrally positioned, roughly midway between Gauteng and Durban, connecting the N5 highway to Bloemfontein/Cape Town and the N3. The town is therefore a good option to consider as a logistic service centre.

During 2008, the then Minister of Transport, Jeff Radebe, Mr Nazir Alli, the CEO of SANRAL and Me Beatrice Marshoff, former Premier of the Free State, attended a Transport Imbizo in Harrismith, where the possibility of a logistics hub on a 300 000m^2 land in Industriqwa, was discussed. The idea is to upgrade the rail service between Harrismith and Durban. Containers will be received, stored and distributed from this new container depot. This fully integrated intermodal operation will limit the traffic

between Harrismith and Durban. LHHVs will then be utilised to transport the cargo from Harrismith to Gauteng and from Harrismith to Cape Town and other centres.

According to Neo Mvubu (2012:1), the Bremin Logistics Group offered to donate €5 million to the first phase of the Tshiame Development Vehicle Distribution Hub in Harrismith. Several similar projects have been established in countries such as Malaysia, China and some other European countries.

According to Mr Martin Gunter, the German Minister of Justice, Labour and Ports, this project will not only serve as an economic injection to the Free State Province by creating jobs, but it will also assist in moving LHHVs from the road and helping to containerise a large number of vehicles.

In addition, the plan is to partner with Transnet to further move from LHHVs to rail as a preferred mode of transport. This will be in line with the Department of Transport's strategy to revive rail goods' transportation. The current forecast is that about 29 000 jobs will be created should this project realises, with an estimated R3 billion's worth of GDP that will be generated. But on the contrary, it will have a devastating effect on the LHHV sector (Mvubu, 2012).

According to the former Fee State MEC for Economic Development, Tourism and Environmental Affairs, Mamiki Qabathe, the province wants to utilise its strategic position in the logistics sector by capitalising on its excellent geographic positioning (Anon., 2013:1). The Durban-Free State-Gauteng Corridor is one of five massive infrastructural projects that have been highlighted by the Government to boost the economy. An approximate 30 million tonnes of road freight is currently being ferried per annum on the N3 highway, linking the cities of Johannesburg and Durban. An estimated growth of freight transportation of between 200% and 250% is projected over the next 20 years. From these figures it is estimated that the volume of cargo passing through Harrismith, will increase by 25% per annum, over the next seven years. The idea will be for the Harrismith Logistical Hub to comprise of multimodal capabilities including rail, air and road (Anon., 2013:1).

2.7 SOUTH AFRICAN ROAD SAFETY DATA

Labuschagne (2008:1) alludes to the fact that improved access to accident data by researchers greatly benefits general research and development in the field of road safety. Based on this principle the N3TC has developed an Incident Reporting Information System (IRIS). Although developed by the N3TC, the IRIS is maintained by the N3TC Route Control Centre (N3-RCC). The N3-RCC is responsible for collecting and recording data of all incidents occurring on the N3 corridor. The following parameters are recorded on the IRIS database (Radebe, 2010):

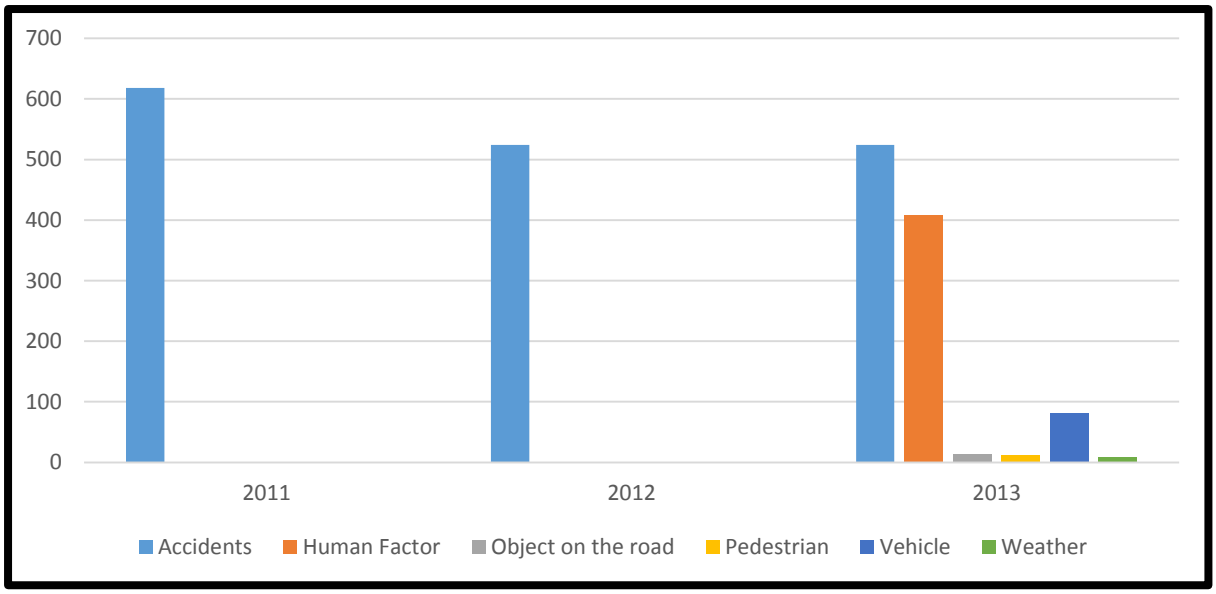
- Incident type (accident, obstruction or fire);
- Incident subtype (rolled, head-tail or single vehicle);
- Date, time and direction of incident;
- Severity of injury (fatal, serious, slight or not serious);
- Route and kilometre section;
- Vehicle/s details (type, make and model);
- Pavement conditions;
- Weather (clear, mist or overcast);
- Probable cause (human factor, object on road, pedestrian, animal or vehicle defect);
- Sub-Cause (alcohol, speeding, fatigue or mechanical);
- Dangerous goods (yes or no).

The integrity of the data is of utmost importance and several control mechanisms have been put into place to ensure that the minimum errors are made and that all relevant data are obtained. All radio and telephone calls are logged for verification purposes (Radebe, 2010:1).

From information received from the N3-RCC, a total of 524 accidents involving LHHVs have been recorded this far during 2013. Although there has been a slight decrease in the number of recorded accidents, 618 (2011) to 524 (2012) (-15.21%), the number of accidents are still unacceptably high - especially taking into consideration that the biggest contributory factor to these accidents, is the human factor (Radebe, 2013). Not less than 409 (78%) of the 524 accidents can be directly linked to the human factor

while 13 (2.5%) relates to an object in the road, 12 (2.3%) to a pedestrian or an animal, 81 (15.5%) relates to the vehicle itself and 9 (1.7%) to the weather.

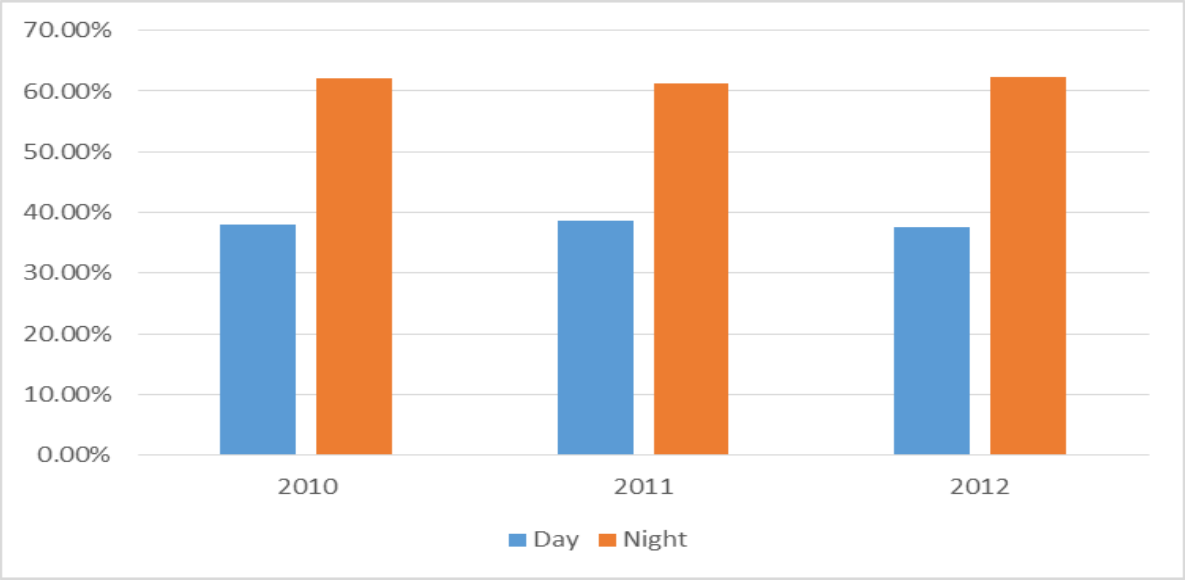
Figure 2.6 Data summary, accidents on N3: 2011 – 2013



(Radebe, 2013)

According to the report, the distribution of accidents reported over the three year period, remained fairly constant. During 2010, 37.97% of all the LHHV accidents occurred during the day and 62.03% at night. During 2011 it was reported that 38.67% happened during the day and 61.33% at night while during 2012, 37.6% of all LHHV accidents happened during the day and the remaining 62.4% occurred at night time. Even with fewer vehicles on the road, the possibility of an accident is higher during the night than during the day. The possible reasons could be driver fatigue or merely the visibility that decreases at night for drivers.

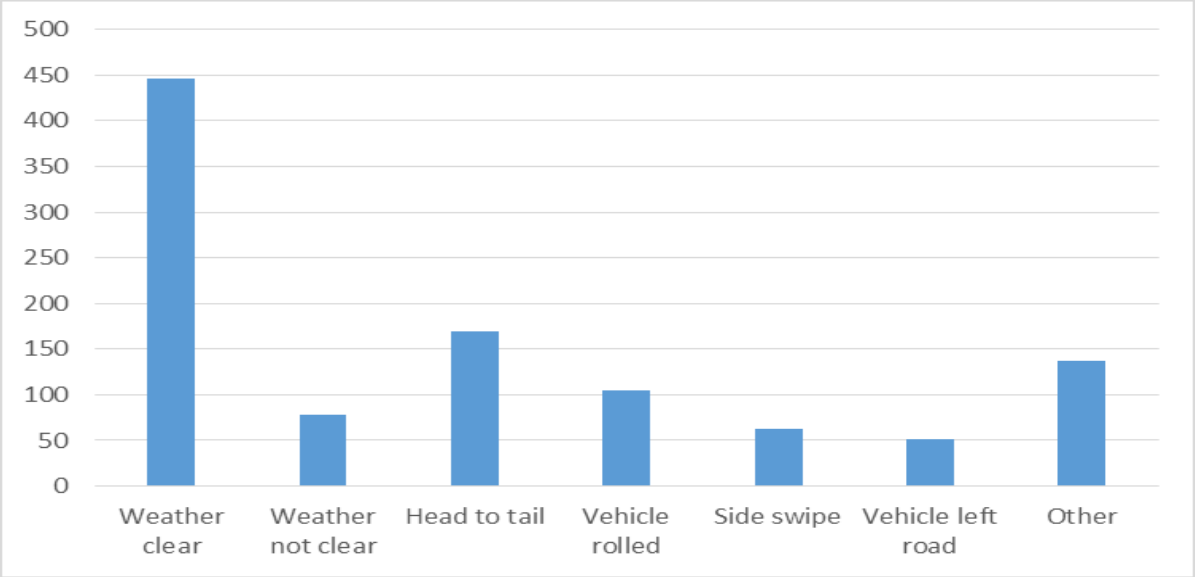
Figure 2.7 Comparison, accidents on N3: 2010 – 2012



(Radebe, 2013)

In 446 (85%) of the reported cases the weather conditions were clear. Head-to-tail collisions have been recorded as the cause of accident in 169 (32.3%) of the reported cases. In 20% of the cases (105 instances) the cause of the accident has been reported as “vehicle rolled”, while “side swipe” (one vehicle colliding with another from the side) has been reported 62 times (11.8%) and “vehicle left the road” 51 times (9.7%). These have been some of the other reasons for the high accident rate (Radebe, 2013).

Figure 2.8 N3TC Data on weather conditions and the main reasons for accidents: 2010 – 2012



(Radebe, 2013)

From the graph above it can be derived that the biggest contributor to the accident rate was head-to-tail accidents, normally associated with poor following distance or poor visibility. As the graph indicates that most of the accidents occurred during clear weather conditions, it could be assumed that the reason for most of the accidents could be diminished vigilance, possibly due to fatigue or tiredness (Venter, 2013).

2.8 SOUTH AFRICAN ROAD SAFETY ISSUES

In general a three-pronged approach is followed with respect to road safety, namely:

- Education – which includes the human factor and the drivers' attitudes towards road safety, as well as educating LHHV drivers on this subject;
- Engineering – which relates to the condition of the roads; and
- Enforcement – that refers to law enforcement agencies and firmer enforcement of the law (Ueckerman, 2013).

The human factor is by far the biggest reason for road accidents. Drowsiness, substance abuse or poor judgment, are just some of the reasons why there are so many accidents in South Africa (Radebe, 2010).

For the purpose of this paper, the following three main categories will be discussed:

- The human factor;
- Indirect non-human factors;
- The effect of company policy and procedure on the occurrence of road accidents within the LHHV transportation sector.

2.8.1 THE HUMAN FACTOR

- Fatigue

Driving a motor vehicle while under the influence of alcohol or other drugs, is a deadly combination and therefore the policing thereof is receiving priority attention. However, few people seem to realise the dangers associated with driving while fatigued.

Fatigue is a condition that affects everyone, but it is very difficult to control or to police. Although it can, as a matter of fact, not be criminalised like in the event of substance abuse, it can still be seen as one of the main contributors to road accidents and subsequent deaths on the roads (Verster, *et al*., 2011). In fact, thousands of road accidents can directly or indirectly be linked to drowsiness or to drivers actually falling asleep. Although typically associated with long-distance driving, fatigue can set in after a long day at work, an outing to the beach, or virtually any activity (Arrive Alive, 2013:1).

- What is driver fatigue?

Before the elements causing fatigue are discussed, it is important to understand what fatigue is. Although there are numerous factors that can cause driver fatigue, Dobbie (2002:1) is of the opinion that no single definition has been formulated that can adequately describe it. The following definition proofs that fatigue is more that tiredness. In fact, driver fatigue has a direct effect on alertness and work performance (Schutte, 2009:1).

Fatigue can be defined as *"increasing difficulty in performing physical or mental activities. Signs of fatigue include tiredness even after sleep, psychological disturbances, loss of energy and inability to concentrate. Fatigue can lead to incidents because workers are not alert and are less able to respond to changing circumstances. Apart from these immediate problems, fatigue can also lead to long-term health problems"* (Shaw, 2009:1).

Fatigue can also be associated with a decline in mental performance (Schutte & Maldondo, 2003:9) and/or physical performance (Nilsson *et al*., 1997:3). An obvious result of this decline in mental and physical conditions, is that it could lead to impaired driving performance (Thiffault & Bergeron, 2003:2).

Fatigue has become pervasive under LHHV drivers, because many of them work non-standard schedules, and they often fail to obtain sufficient sleep (Schutte, 2009). From a health and safety standpoint, employee fatigue is a significant concern. Over the past number of years, increasing attention has been paid to fatigue management in the LHHV industry, because of the understanding that sleepiness and fatigue are becoming endemic under drivers, contributing to human errors, and consequently to many, and more often than not, catastrophic accidents (Schutte, 2009:245).

- What causes driver fatigue?

There are a number of factors contributing to driver fatigue, including circadian rhythm (American Psychological Association, 2013); tiredness (Maldonado *et al.,* 2002:1); hours of driving; time of the day and time-on-task (Åkerstedt, *et al*., 2010); emotional stress (McDonald, 2007:1); lack of sleep or quality of sleep before driving (Åkerstedt & Landström, 1998); health issues including overeating and/or obesity (Gill & Wijk, 2004); cabin ergonomics (Schutte & Maldondo, 2003); as well as the driving environment (Thiffault & Bergeron, 2003). Each one of these factors is briefly discussed:

- Circadian rhythm

According to the American Heritage® Stedman's Medical Dictionary (American Psychological Association, 2013), Circadian rhythm, present in all humans and even

in most animals, is generated by an internal clock that is synchronised to light-dark cycles and other cues in an organism's environment. This internal clock is the reason for one to wake up at the same time every day, even without an alarm clock. Circadian rhythms can however be disrupted by changes in the daily schedule. While the process underlying Circadian rhythm is still being investigated, it is known to be controlled mainly by hormones. In humans, the internal clock is located within the brain's hypothalamus and pineal gland, which releases melatonin in response to the information it receives from photoreceptors in the retina. Night-time causes melatonin to rise, while daylight inhibits it. A Circadian dip in alertness can thus be expected to occur between midnight and 6 am.

In a study done by the CSIR on driver fatigue on the N3 between Warden and Villiers, it has been highlighted that driver fatigue plays a major role in road accidents (Venter, 2013). According to Venter, the results of this decline in performance are reduced vigilance, reduced attention or awareness and an increase in drowsiness and fatigue. Venter (2013) further alludes to the fact that the consequences of fatigue include slow reaction time, slow control of movements, decreased tolerance for other road users, poor judgement when overtaking, and loss of situational awareness. It is also considered an internal distraction for the driver that leads to poor decision making and cognitive impairment.

In this study, specific reference has been made to fatigue related accidents. In order to compile the report, a total of 790 accidents that occurred from 2007 to 2010 have been analysed. Of these 790 accidents no less than 346 involved long haul heavy vehicles. The time of the day the accidents has occurred, is highlighted in the study. It has been found that during the period in question, there have been 213 head-to-tail accidents, 195 accidents in which a single vehicle was involved, and 142 vehicles left the road causing an accident, leaving no signs where brakes were applied. In other words, there was an absence of skid marks or other signs of harsh braking. Police reports also indicated that the driver, for a few seconds, could clearly see the road ahead. In the majority of accidents the weather was good, and in some cases witnesses reported the vehicle drifting from the one lane to the other, also called 'lane drifting', prior to the accident, indicating that fatigue might have had a causal relationship to the accident.

- Tiredness

In an article done by Maldonado *et al*. (2002:9), it has been emphasised that overworked and tired LHHV drivers have an increased risk of having a sleep related road accident. This research done amongst 102 LHHV drivers across South Africa has indicated that it is evident that many of them do not get sufficient sleep to maintain their alertness. Maldonado *et al*. (2002:9) compare the results with an Australian study where it was founded that about 13% of all Australian drivers in the same industry obtain less than 4 hours sleep per day, compared to about one third of South African drivers getting less than 4 hours sleep per day. According to the survey, the majority of the drivers reported being tired on the job due to long working hours, have been working approximately 93 hours a week.

The South African Labour Relations Act (66/1995) restricts LHHV drivers to work more than 72 hours per week. However, enforcing these restrictions are extremely difficult, due to drivers wanting to work longer hours in order to supplement their income with overtime payment.

Tiredness resulting in road accidents is also aggravated by other sleeping disorders, such as hypersomnia and the apnoea syndrome (Philip, *et al*., 2010). The research has been founded on the findings of the Brain Function Research Unit at the University of the Witwatersrand, and a Canadian sleep disorder laboratory. The 102 LHHV drivers who have been interviewed during this research, have admitted that those who suffer from excessive snoring, sleep apnea or other sleep complaints such as bright lights or noise, show a two-fold increase in sleep related road accidents compared to drivers without sleep disorders.

- Emotional stress

Fatigued drivers often show symptoms of emotional stress (McDonald, 2007). Matthews distinguishes between two types of emotional stressors, namely environmental stressors and stress induced by personality factors (Matthews, 2002).

Matthews (2002) points out that "*environmental stressors are features of the environment that tax a person's ability to meet personal goals, such as poor visibility and poor road conditions. The psychological impact of stressors is moderated by*

personality factors that influence how external stimuli are interpreted in the light of driver's personal concerns".

Matthews (2002) also indicates that within specific situations, there is a symbiotic relationship between stressors and personality factors. The process that supports the choice of action and which manages perceived demands, results in two forms of outcome:

  - Subjective outcomes, such as anxiety, anger and tiredness;
  - Performance outcomes, such as impairment of psychomotor control (the ability to act without thinking like driving a motor vehicle or playing a piano), and changes in speed.
- Lack of sleep or quality of sleep before driving

Night work causes severe sleepiness, reduced performance, and increased accident risks. Short (30 minutes) sleep episodes combined with caffeine (100–400 mg), but only up to one night's loss of sleep), is still the favorite countermeasure against sleepiness. Noise as a promising method, increased light, decreased environmental temperature, and increased physical and mental activity, have not been systematically investigated yet, but might be effective as a countermeasure to falling asleep (Åkerstedt & Landström, 1998). In other words, drivers feeling sleepy might consider stopping the vehicle and performing some physical exercise, like walking around the LHHV, or doing some push-ups. Performing some kind of mental exercise such as playing Sudoku, might also help against feeling sleepy.

In 1997 a survey has been done amongst 593 LHHV drivers, randomly selected at a private truck stop and public rest areas in New York. When asked what, if anything, has discouraged their use of public rest areas in New York, 51 per cent of the surveyed drivers have cited inadequate parking. Other common responses have been the enforcement of the two-hour parking limit (28 per cent), prostitution/solicitation (16 per cent), lack of security (15 per cent), and poor quality- or expensive food (14 per cent) (Koklanaris, 2000). In South Africa there is no limitation on parking. On the contrary, in an article by Arrive Alive (2013), it is suggested that there should be Government legislation forcing drivers to stop between 11pm and 4am to sleep.

Prostitution is a big problem, not only for spreading diseases like HIV/Aids (Ajam, 2003), but also for knocking at drivers' doors, who are trying to sleep at truck stops or

other public areas. During an interview, drivers admitted that they cannot sleep properly, as there are women knocking on the cab doors all night (Platt, 2001).

- Health

Loss of sleep may be caused by health conditions, such as obstructive sleep apnea. Obstructive sleep apnea is a condition that occurs while a person is sleeping. The muscles of the throat relax and block the airway above the voice box, causing breathing to stop until the brain registers a lack of oxygen. The brain then sends a small wake-up call, which briefly wakes the sleeper. The sleeper immediately drifts back to sleep without even being aware of waking up. As this process repeats itself many times through the night, a person feels fatigued during the day (Anon., 2013).

Research that was done by the Brain Function Research Unit at the University of the Witwatersrand and a Canadian sleep disorders laboratory, has found that overworked and tired LHHV drivers, especially those who are overweight, have an increased risk of having a sleep-related road accident. The research was compiled from questionnaire-based interviews with 102 LHHV drivers across South Africa (Maldonado *et al*., 2002).

The problem appears to be global. There appears to be evidence that many LHHV drivers do not get sufficient sleep to maintain alertness. As said before, about 13% of Australian LHHV drivers sleep for less than four hours per day, while about a third works more than 72 hours per week (Maldonado *et al*., 2002). In South Africa, almost one-third reported sleeping less than 4 hours per day. It is widely accepted that both fatigue and sleep deprivation are major contributors to LHHV accidents. According to Maldonado *et al.* (2002), the South African police is of the opinion that falling asleep behind the wheel contributes to a quarter or more road accidents involving long haul heavy vehicles.

According to the survey, three quarters of LHHV drivers reported being tired on the job, due to long working hours, working approximately 93 hours a week, with half of them getting less than 5 hours of sleep per day.

For those drivers who do manage to get some sleep in their LHHV, Maldonado *et al.* (2002) report that their sleep has been interrupted mostly by noise as well as light, outside activity and extreme warm or cold conditions. Almost eight out of the 10 drivers

being surveyed complained of interrupted sleep; in this case poor sleep is associated with up to 62% of incidents where drivers nodded off behind the wheel, increasing the risk of causing a road accident.

The production of a hormone by the human body known as melatonin, is responsible for an internally generated sleep-wake cycle (Maldonado *et al.*, 2002). Melatonin, which is predominantly produced during darkness, stimulates sleep. The opposite, however, is also true. Low levels of melatonin, usually during periods of light exposure, result in a person to be awake. Most of the drivers that have been interviewed state that they start driving between 1 am and 8 am, coinciding with the period when melatonin levels are high and the stimulus for sleep is also high.

The highest incidence of sleep-related vehicle accidents, occur between midnight and 6am, matching the time of day when the Circadian dip in alertness is at its highest Radebe (2010). According to an article by the National Sleep Foundation (2013), the possibility exists to regularise the sleep-wake cycles by keeping a regular sleep time and a regular wake time. This might improve alertness and reduce sleepiness.

Another health factor playing a significant role in LHHV accidents as pointed out by Radebe (2010), includes HIV/AIDS, which is believed to be higher amongst long distance drivers than any other group. According to Radebe (2010:7), three LHHV wellness days were held during 2009 along the route in KZN. From the 521 tests that were done for blood pressure, 29% were referred for attention. Roughly about 310 tests were done for blood sugar and 19% were referred. There were 146 tests done for tuberculosis of which 4.1% were referred and 77 tests were done for HIV/AIDS of which 17% were referred for further attention. From the 214 tests done on eye sight 13% received spectacles. The results indicated that no less than 82.1% of the LHHV drivers tested over the three day period had some kind of medical condition affecting their health.

- Substance abuse

As said before, there is some evidence that a nap combined with caffeine consumption (preferably taking the coffee first, and then take a nap within 30 minutes) is more beneficial to keep drivers awake than either caffeine or a nap alone (Reyner and

Horne, 1997). Some drivers however, believe that the consumption of alcohol provides another way to stay awake (Mir, 2012:145).

For anyone who is already drowsy, the consumption of alcohol can pose a special risk. Research has shown that alcohol and the loss of sleep interact to increase the levels of sleepiness (Voinescu, *et al*., 2010), often with fatal consequences (Schutte & Maldondo, 2003).

2.8.2 INDIRECT NON-HUMAN FACTORS

Although the human factor, as indicated in the previous paragraphs, is the biggest contributor to road accidents and fatalities, the following non-human factors are also contributory to road accidents. Cabin ergonomics, highway hypnosis, and the condition of the vehicle, are just some of the factors that will be discussed in more detail:

- Cabin ergonomics

Ergonomics is derived from two Greek words: "*ergon"*, meaning work, and "*nomoi"*, meaning natural laws. Combining these two words creates a word that means the science of work and a person's relationship to that work (Adams, 2013). In other words, ergonomics are the science of making things comfortable and/or efficient.

Cabin ergonomics in this context refer to the design of the LHHV's cabin and physical stressors such as heat exposure and noise levels (Schutte, 2009). Supervisors mention that some LHHV drivers use the air-conditioners to heat the cabin above acceptable levels, especially on colder days and nights, contributing to the feeling of drowsiness. Stanton *et al.* (2000) call for ergonomics to accommodate transactions between the operator and the environment. Stanton *et al.* (2000) further allude to the fact that ergonomics tend to neglect contextual factors, limiting the generalizability of engineering solutions.

Matthews (2002:195) states that in-car information systems are a particular concern of ergonomics. According to Matthews (2002) it includes the standard displays, such as the speedometer, route-guidance systems that provide navigational information, and headway advisory systems that warn unsafe following distances.

Many LHHV manufacturers are taking cognisance of the issue regarding cab ergonomics, and the latest designs are done with this in mind. Manufacturers such as Scania utilise a high technology driver simulator as part of their research and development process in order to understand and improve conditions for drivers (Anon., 2013:1). In a study done by Powar *et al*. (2009:47), it has been emphasised that a LHHV is designed to haul for long distances. The cab is mostly equipped with a bed, audio system, air-conditioning and sometimes even a toilet. The dashboard, global positioning system and gear selectors, form part of the general interior of a typical long haul heavy vehicle (Powar *et al..* 2009).

In a study done by Fatollahzadeh (2006:1), the importance of cabin ergonomics and the comfort of drivers have been highlighted. Long distance drivers are highly exposed to work related injuries as they continuously work in a relatively static posture while interacting with the vehicle as well as the surrounding environment. The result of this static posture is that the drivers will suffer from, so called "musculoskeletal disorder", affecting mostly the upper extremities such as the neck, the shoulders and also the lower back. Pain and discomfort are significant contributors to tiredness and driver fatigue which have a compound effect on reduced vigilance and decreased alertness. This on the other hand, might result in a greater number of accidents and/or injuries and traffic violations might occur as a result of drivers feeling drowsy.

- Highway hypnosis

Another factor that plays a cardinal role in LHHV accidents, is the phenomenon sometimes referred to as "highway hypnosis". Highway hypnosis, also known as 'White Line Fever', has been defined by Shepardson (2013:1) as driving a vehicle for long distances without conciously recollecting of doing so.

From the study done by Labuschagne *et al*. (2013:1), it has been derived that highway hypnosis is a result of repetitive monotonous conditions, such as:

- Simple actions repeated;
- Familiarity of the road;
- Predictable road environment;
- Non-stimulating environment; and

- Low demanding roads, resulting in attention being directed towards inner thoughts.

According to Cerezuela *et al.* (2004:1045-1054), 'highway hypnosis' can best be described where drivers show signs of sleepiness and where there attention slips as a result of driving a vehicle continuously on a long and boring section of the road, especially when the environment is highly predictable.

This is typical to the conditions found under LHHV drivers who cover long distances on the same freeways on a daily basis, encountering very little change in the predictability of the environment.

- Condition of vehicles

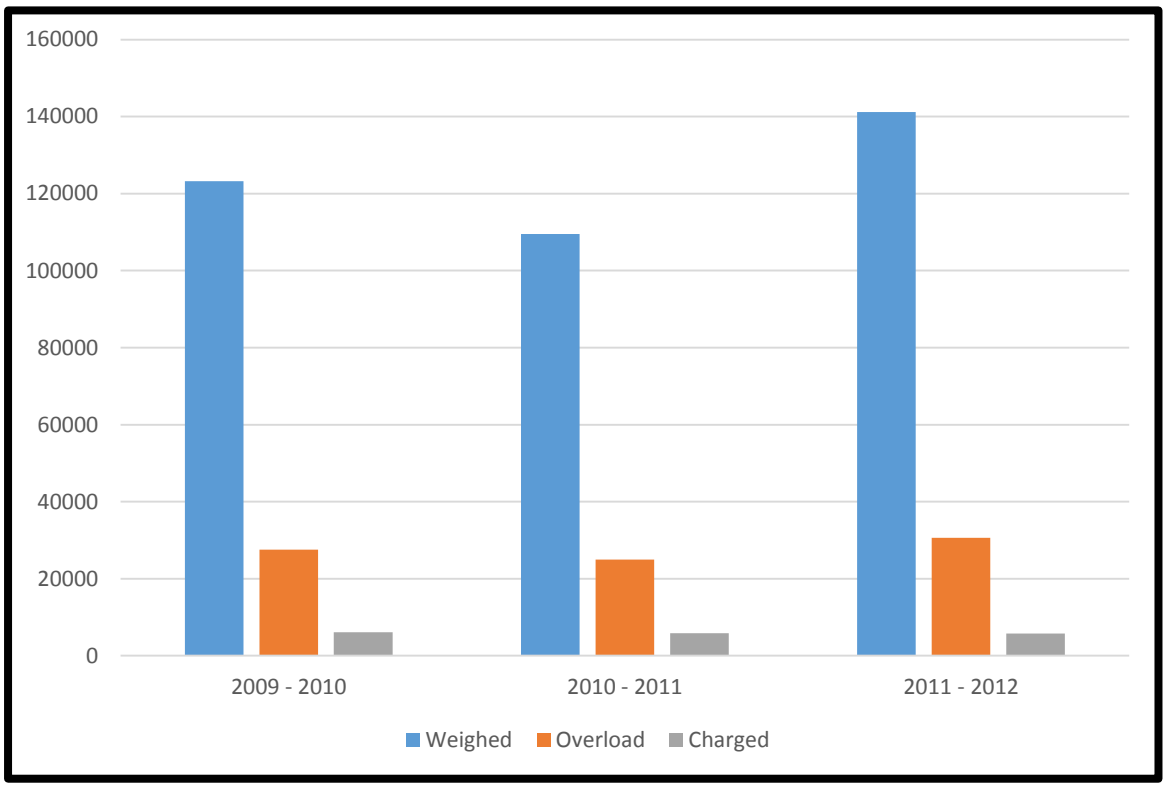
There is a direct correlation between the state of the economy and LHHV accidents. Leizerman (2013:1) is of the opinion that no regulation will stop unsafe companies and drivers to cut corners in order to reach a bigger profit. There must be a willingness towards road safety from the driver, the owner of the company, and the client (O'Leary, 2006). Some companies do not ensure that their vehicles are road worthy, some encourage overloading, and some do not attend to the poor quality of tyres.

The Field's Hill Task Team (2013:1) suggested that some LHHV drivers who are concerned about being overloaded, or who are in fact overloading, avoid driving on the safer N3, but instead choose to drive on the M13. In that way they could avoid the weighbridge at Marionhill. The weighbridge at Heidelberg is also avoided by LHHV drivers by taking the detour via Grootvlei to Heidelberg.

According to the SANRAL Annual Report (2010), overloading is a major contributor to the high road maintenance cost. Loads that do not comply with the specifications of the LHHV are regarded as safety hazards. SANRAL, the provincial law enforcement agencies and the private contracted-in weighbridge operators, form a three way partnership addressing the issue of overloading. During 2009/10 the N3TC weighed 123 243 LHHVs at the Heidelberg weighbridge. Of these, 27 528 had been found to be overloaded and 6055 drivers had been charged (Anon., 2010). During 2010/11 109 480 vehicles were weighed at Heidelberg, of which 24 921 were overloaded. During this period 5854 drivers were charged with overloading. During the period 2011/2012 inspections were performed on 141 229 LHHVs. During these inspections 30 577 were

found to be overloaded and 5766 drivers were charged. During these two periods, 2010/11 to 2011/12 there was a 13% increase in long haul heavy vehicles (Anon., 2013).

Figure 2.9 Summary: Overloading on the N3



(SANRAL Annual Report, 2013)

From the graph above it is evident that the problem of vehicle overloading is not getting any better. There has been a slight downward scale between 2009/10 and 2010/11, but during the following term the trend moved upwards again. Vehicle defects and poor vehicle conditions play a significant role in vehicle accidents and must receive priority attention (Paine, 2000:1).

2.8.3 THE EFFECT OF COMPANY POLICIES AND PROCEDURES ON THE OCCURRENCE OF ROAD ACCIDENTS WITHIN THE LHHV TRANSPORTATION SECTOR

- Business model of an average LHHV company

For the purpose of this research paper the business model of only one company is presented as a case study.

Epic Foods (Pty) Ltd was established in February 1998 and has since become a household brand, responsible for manufacturing Blossom Margarine, Canola Margarine, Olé and Z-Lite oil to name but a few.

Part of their business model entails a fleet of 24 LHHVs including 9 tankers, distributing their products to different locations throughout South Africa. The 9 tankers are predominantly en route on the N3 highway between Johannesburg and Durban, moving raw-materials as well as finished products.

During an interview with the Chief Operation Officer (COO) of Epic Foods (Pty) Ltd, Mr S Brits (2013), the following facts were established:

- Each tanker requires a capital expense (Capex) of R2 million;
- Each tanker must do at least 3 round-about trips per week, charging R17 per km in order to be economically viable;
- The total distance from Johannesburg to Durban and back is calculated to be about 1200 km;
- Sub-Contractors charge in the region of R720 per ton, and the average tanker carries 32 tons of oil;
- The sub-contractor fee will thus be R19.20 per km,

$$\frac{\text{R } 720.00 \text{ x } 32 \text{ Tons}}{1200 \text{ Km}} = \text{R } 19.20$$

- The fixed operating expenses (OPEX) comprise of the following:
    - Salaries (35%);
    - Fuel (30%);
    - Tyres and other wear and tear (7%);
    - Insurance (20%);
    - Instalment (20%);
    - Truck stops, food and toll fees (5%).

  LHHV drivers are normally getting paid a fixed salary, but are expected to drive between 8000 and 12 000 km per month. Bonuses are paid after 12 000 km, which is extremely difficult to reach.

In an article by Ueckerman (2013) it has been suggested that the high occurrence of accidents on the roads, can be related to the lack of roadworthiness of some heavy vehicles and the malpractice of some companies. Problems that have been identified, include that drivers' remuneration are performance based instead of a fixed monthly salary, incompetency of drivers due to inadequate training, the overloading of vehicles and loads that move due to inadequate securement of it. These problems can be related directly to the degree to which companies regard road safety as a priority.

- Hours of driving, time of the day and time-on-task

The risk of sleep-related accidents seems to vary with time of day, mirroring roughly the biologically based Circadian variations in sleepiness and vigilance. This means that the risk shows a peak late at night, or early in the morning, with a smaller peak in the afternoon. Although the risk of sleep- and fatigue related accidents are higher during the night than during the day, the *absolute number* of such accidents is just as high during the day as during the night, due to more vehicles driving during daytime. Depending on the company's policy, this factor could aggravate the risk of falling asleep. In other words, companies with an outcome based policy that do not regulate the hours their drivers are driving, could pose a bigger risk to road safety than a company that is concerned about the safety of their drivers limiting their driving hours. Countermeasures should therefore be put into place to address the problem of falling asleep during daytime, as well as during the night (Sagberg, *et al*., 2004).

Sagberg *et al*. (2004) also state that the risk of experiencing fatigue increases with prolonged driving, and have advised regulated rest breaks and total driving hours for professional drivers. These breaks should not exceed 30 minutes, as longer sleep may produce sleep inertia, from which the driver will need a certain time to recover. Sagberg *et al*. (2004) further noted that one has to differentiate between impairment of vigilance, fatigue, and drowsiness or sleepiness, when dealing with the energy base of performance. Impaired vigilance is mainly caused by task characteristics, while fatigue is caused by time-on-task, and sleepiness by insufficient sleep and other factors mentioned previously.

The most obvious countermeasures are variation in tasks, or roadside variability for impaired vigilance, rest for fatigue, and sleep for sleepiness.

- Safety of LHHVs and cargo

LHHV hijacking is currently a huge concern for the South African economy (Hawker, 2013:1). In the latest crime statistics released by the South African Police Services, it was indicated that hijackings of LHHVs increased with 14.9 per cent (Anon., 2013), after a decrease of -26.1% from 2011 to 2012 (Anon., 2012). Long haul heavy vehicles that are stolen in South Africa are often used in mining operartions in other parts of the world, while the freight is most of the time the main target. Very often there is a pre-order for the goods. This and the value of the goods stolen, create a big safety threat to the drivers of the LHHVs being targeted. In 80% of the cases it is high value items such as electronic goods, patinum or gold.

Heists are well planned and often orchestrated in conjuction with the drivers, the so-called ‘handovers’ (Buys, 2011:145). However, not all drivers can be accused of illegal activities or bad practices. Buys (2011:145-146) states that the majority of drivers of LHHVs who were involved as victims in hijackings, were not participating in the crime. These honest drivers are facing a serious safety risk to themselves. Buys (2011:49) alludes to the fact that in most cases drivers were not able to report the hijacking to the police immediately, as they were taken hostage most of the times. These victims face severe emotional distress with very little support (Buys, 2011:144).

Companies that are concerned about the safety of their drivers, their vehicles and their cargo, will put systems in place to minimise the risk for hi-jackings and theft, such as the new innovative ‘telematics’ system. According to Phakathi (2013), the telematics system consists of two cameras that are installed in the cab. One camera is set to view the outside of the vehicle, while the other one faces the driver. Real time footage is recorded and communicated to the fleet owners or their dedicated operations- or fleet managers.

2.9 SOCIO-ECONOMIC FACTORS

Although the life of a LHHV driver is sometimes associated with freedom and glamour, it may have an adverse effect on families. A break-down in trust and communication are just some of the elements of a marriage that are put under pressure, with the one party away on the road, sometimes for up to a week or two at a time.

Children are equally affected and the so called “Absent Father Syndrome”, is widely studied and written about (Sohbatloo, *et al*., 2013). For many decades, researchers, academics and psychiatrists, have tried to fathom the effect of fathers not directly involved in raising their children due to absenteeism.

2.9.1 THE ABSENT FATHER SYNDROME

There are many reasons why absenteeism under fathers are on the increase, of which divorce and work are probably the most common causes.

As divorce rates are on the increase, so is single parenthood and father absenteeism. This phenomenon is especially true under LHHV drivers. Due to their lifestyle and long periods away from home, the divorce rate among LHHV drivers is far higher than the national average (Reiss-Koncar, 2000). No statistics could be found with respect to the divorce rate under South African LHHV drivers, and it is suggested that this is an area that needs further exploration.

For a daughter to have a healthy self-esteem and healthy romantic heterosexual relationships, it is important to have various personal and meaningful interactions with her dad (Jackson, 2010:7). It is generally expected from fathers to model circumstantial behavour to their daughters. The skill to handle conflict, how to be independent and how to treat your spouse, is not something children will automatically acquire.

The main characteristic of a fatherless woman, according to Jackson (2010:107-108), is the tension they encounter concerning their role in heterosexual and other relationships. A negative relationship with a father has an impact on a woman’s self-concept and her communication in her romantic life.

Mancini (2010:3) continues by saying that girls and young women who have a 'dead-beat-father', are more likely to suffer from unplanned pregnancy, poverty, low-self esteem, sexually promiscuous behaviour and divorces.

In his well known and acclaimed publication "Captivating", the author claims that a father's role in a girl's life is to answer her number one biggest question, "*am I lovely*?" (Eldridge, 2005:46).

For boys on the other hand, the effect of an absent father is different to the effect on girls. The ultimate question a boy needs answered according to Eldredge (2005:61) is, "*am I a real man, do I have what it takes…*". Again, according to Eldredge, the only person that can answer this question is a dad.

The majority of LHHV drivers are pushing for overtime money which means long hours on the road, even 12 hours non-stop, resulting in severe tiredness and fatigue (Ueckerman, 2013). When they eventually get home, they are too tired to participate in the day-to-day responsibilities of a family life. Many of them will then revert to alcohol abuse in order to deal with their distress. Others will report that they just want to sleep, or to be left alone. So, even if they are at home, in a certain sense they are still "absent" from the family.

2.9.2 SEXUALLY TRANSMITTED DISEASES

Long haul heavy vehicle driving is predominantly associated with men. Their relevant solvency compared to the rest of the population, allow them a relatively higher Socio-Economic positioning, compared to the Socio-Economic profile of the communities in which they are situated (Anon., 2004).

The prevalence of the Human Immunodeficiency Virus (HIV), the Acquired Immune Deficiency Syndrome (AIDS), and Sexually Transmitted Diseases (STDs), are particularly high among LHHV drivers (Lichtenstein *et al*., 2008: 43-56). Their prevalence can be seen as a direct result of long periods away from home, their relative access to money, and the relatively easy access they have to commercial sex workers. Johnson (2003:3) is of the opinion that in developing countries such as South Africa, the economic migration plays an important role in spreading the diseases. Johnson further argues the fact that this is the reason for a higher prevalence of HIV/AIDS amongst individuals of higher socio-economic status, such as LHHV drivers.

2.10 THE ROLE OF TRUCK STOPS WITH RESPECT TO ROAD SAFETY FOR LHHVS

Truck Stops are a relatively new phenomenon in South Africa, with the Highway Junction in Harrismith being one of the first, opening its doors during 1999 by the then Minister of Transport, Mac Maharaj. During the opening, Maharaj emphasized the future role truck stops will play in the economy, and the safety of LHHV drivers. Truck Stops are best defined as a facility located next to a busy LHHV route, offering professional drivers a place to rest, something to eat, and an area for them to refresh themselves (Anon., 2013).

Following the opening of Highway Junction, Minister Jeff Radebe opened the Ventersburg Truck Stop during 2006, with several others to follow. Truck stops form part of the National Freight Logistics Strategy and serve as a value adder not only to meet the social and economic objectives of the LHHV sector, but also by empowering local communities.

2.10.1 CHARACTERISTICS OF A MODERN TRUCK STOP:

- A safe and secure area for drivers to sleep. Truck high-jacking and the theft of their cargo and diesel, pose a great concern to LHHV companies. Well lit areas protected by security personnel and camera surveillance, are very important.
- Clean bathrooms where drivers can refresh themselves. Enough toilets, showers and basins are non-negotiable for LHHV drivers.
- Affordable high quality food. A well balanced meal, consisting of protein, starch and vegetables, will not only still the driver’s appetite, but will also be beneficial to their health.
- A lounge area where drivers can relax and watch some television. Drivers enjoy to socialise with other drivers and to eat their food in a nice and clean area. Most of the drivers enjoy watching sport, thus the availability of a big screen television set, is a great advantage.
- A recreation area, including a games room and a training room that can help with stress relief. Being on the road for long hours, may result in all sorts of

physical pains. The availability of a games room and a small gym, will help the drivers to stretch those sore muscles and to clear their minds.

- A laundry area - LHHV drivers are on the road, away from home, for long periods of time and the availability of a laundry service will help them to keep their clothes clean and fresh.
- Telephones and ATMs will serve as a big convenience for LHHV drivers.
- Clinic facilities where drivers can safely undergo eye tests, blood tests, and test for diabetes and HIV/AIDS.
- Minor truck repairs and spares, such as a tyre repair centre, lights and oil. A service to monitor the lights, rear back lights and indicators before the driver leave the premises will be beneficial to road safety and may avoid possible fines from the road authorities.
- Truck wash bay, especially for drivers parking for longer periods, such as weekends and public holidays.
- Additional rooms to let. Some LHHVs are not fitted with a sleeping area, which makes it challenging for drivers to get a good night's rest. Additional rooms to rent, especially if it is affordable, will assist in this regard.
- Diesel and oil facilities. The availability of diesel and oil at competitive rates will assist a truck stop to become a preferred stop-over venue for LHHVs.
- Internet facilities with an Internet café. Social media and Internet are being utilised by LHHV drivers more often. Facebook, twitter and cell phones are their primary way of communication, and to stay in touch with their loved ones and other drivers.

2.10.2 ADVANTAGES OF A TRUCK STOP.

Apart from the obvious benefits truck stops bring to the LHHV sector, truck stops are also benefiting the local communities. In smaller towns, the benefit of the external flow of revenue, and the associated multiplier effect it has on the community, cannot be ignored. Job creation and the opportunity for local business people to piggy back on the main stream businesses are just some of the peripheral advantages of a modern truck stop.

2.11 SUMMARY

The LHHV market is still in its infant phase. It is a growing market, but there seems to be very little or old local research done on the subject. There also seems to be old and outdated legislation and not much Government involvement. The long term objective set by Government to reduce road fatalities by fifty percent, is not backed up by short-term reachable goals and proper measuring mechanisms. The magnitude of the problem is emphasised by the fact that South Africa ranked the worst out of 36 countries concerning road fatalities. Little information exists regarding the socio-economic effect on LHHV drivers and the effect that poor sleeping and drinking habits have on their work performance. The LHHV industry is a very competitive market, which force companies to receive maximum output from as little input as possible, resulting in vehicles not always being up to standard and drivers being pushed to the maximum of their abilities. This and the lack of proper Government involvement and policy execution, have an adverse effect on road safety and a subsequent increase in death tolls on the South African roads. Chapter 3 consists of an empirical research, after which the findings are evaluated and discussed.

CHAPTER 3

AN EMPIRICAL INVESTIGATION

3.1 INTRODUCTION

The long haul heavy vehicle transportation sector is a versatile industry within the South African economy. In order to develop a good understanding of the dynamics of this sector it is important to get an overview from a driver's perspective and to test this response in relation to the aspects discussed in the theoretical foundation, laid down in Chapter 2. The results of the quantitative questionnaire, the limitations and the findings will duly be discussed in this chapter. The methods and techniques used, formed the basis of the scientific procedure that has been followed to design, interpret and to report on.

3.2 RESEARCH METHODOLOGY

The research methodology that has been followed consists of a research design and a study sample design. The methodology addresses the limitations of the sample design and investigates the research techniques for data collection.

3.2.1 RESEARCH DESIGN

The research design has been in the form of a cross-sectional design by means of a quantitative questionnaire (see copy in appendix 1). The questions are driven by the theoretical research interpreted in Chapter two, as well as from expert discussions and a pilot study done amongst ten Long Haul Heavy Vehicle (LHHV) drivers. The questionnaire has been completed by 166 long haul heavy vehicle drivers. The sample size of 166 forms part of the population of more than 3500 long haul heavy vehicle drivers using the N3 highway on a daily basis (Radebe, 2013). To minimise the language barrier the questionnaires have been completed on a one-on-one basis.

Apart from the fact that it has been very time consuming, some participants failed to complete some of the more sensitive questions due to the lack of privacy, resulting in nonresponsive errors.

A total of 76 questions were posed, consisting of both open ended- and close ended questions. The measuring instrument used is a five point summated or Likert scale. Questions consisting of both categorical- and numerical variables have also applied to the questionnaire. Questions 1–9 are about the demographics of the respondents. Questions 10–16 deal with the respondents and their relation to the long haul heavy vehicles they drive. Questions 17.1–17.5 are about the conditions of the vehicles, while Questions 18 and 19 handle their remuneration. Questions 20–21 attempt to establish whether there are enough LHHV drivers in South Africa. Questions 22–23 deal with some health related issues. Questions 24.1–24.3 are about their opinion on the sexual habits of their fellow long haul heavy vehicle drivers. Questions 25.1–25.9 have been designed in order to try and understand their emotional and physical stressors while questions 26–35.5 specifically deal with their sleeping habits and the effect that the Circadian rhythm (discussed in Section 2.8.1) has on their working performance. Questions 36.1–36.9 are industry related questions designed to get a better understanding of the respondent's preferences at a truck stop. Questions 37–39 deal with safety aspects while questions 40 to 42 give the respondents the opportunity to add value to the questionnaire by means of unobtrusive suggestions or recommendations.

3.2.2 STUDY SAMPLE DESIGN

The driver population in the long haul heavy vehicle industry is very large with more than 3500 LHHVs frequenting the N3 highway per day. As mentioned by Radebe (2013), the market consists of seven main corridors in South Africa, without taking into consideration the trucks being used on shorter distances (Section 2.6). The N3 corridor is the busiest corridor in South Africa, linking Johannesburg with Durban (Qabathe, 2013). With this in mind, it was decided to do a survey on a portion of the population frequenting the N3 highway. The sample consists of 166 long haul heavy vehicle drivers and, since the questionnaires have been completed on a one-on-one basis, there has been a 100% participation rate.

The type of sampling used is convenience sampling and consisted of different genders, nationalities and age groups, giving a good understanding of the national tendency.

3.2.3 SAMPLE LIMITATIONS

Different roads might have different operating cultures, thus taking into account that the sample is not representative of all drivers in South Africa, it would be wrong to regard the findings in this research document as conclusive.

The study has been conducted during the week, which leaves room for the possibility that the responses from weekend drivers might be slightly different to that of the week drivers.

3.2.4 RESEARCH TECHNIQUES FOR DATA COLLECTION

A logical scientific approach has been followed during the research for this paper. Based on the title of this study, a problem statement has been formulated, which guided the researcher to a primary objective, followed by some secondary objectives. This empirical study posed some research questions as well as conceptual- and operational definitions on the subject.

Based on the abovementioned process, 76 research questions have been formulated in order to gather research data from the different respondents. The data has been scientifically analysed by the Statistical Consultation Services of the North-West University, Potchefstroom. Scientific data mining has been applied to identify statistical relationships to the variables found in the research.

3.3 RESEARCH FINDINGS

The research findings will be discussed per question, according to the structure of the questionnaire.

3.3.1 THE DEMOGRAPHICS OF THE RESPONDENTS.

Questions 1–9 deal with the demographics of the respondents.

As can be observed from Table 3.1, 95.8% of the sample has been male respondents.

Table 3.1 Sex of the respondents

Question 1		Frequency		Valid Percent	
Valid	Male	159		96.4	
	Female	6		3.6	
	Total	165		100.0	

In the next question concerning the ethnicity of the respondents, almost 80% are black. Considering the results from Tables 3.1 and 3.2, it is safe to assume that drivers in the transport sector are mainly black men.

Table 3.2 Ethnicity of respondents

Question 2		Frequency		Valid Percent	
Valid	White	17		10.4	
	Black	131		80.4	
	Coloured	3		1.8	
	Indian	12		7.4	
	Total	163		100.0	

The majority of the respondents are from South Africa. Table 3.3 indicates that 3% of the respondents are from Lesotho while Swaziland and “Other” are both on 6%. From the research it is clear that the respondents who have marked “Other”, are from Zimbabwe.

Table 3.3 Country of origin of respondents

Question 3		Frequency		Valid Percent	
Valid	South Africa	128		78.5	
	Mozambique	9		5.5	
	Swaziland	10		6.1	
	Lesotho	5		3.1	
	Other (Specify)	11		6.7	
	Total	163		100.0	

According to Table 3.4, more than 65% of the respondents are married or live with a life partner, while almost a quarter has indicated that they are single or divorced.

Table 3.4 Marital status of respondents

Question 4		Frequency		Valid Percent	
Valid	Married	94		57.0	
	Divorced	14		8.5	
	Single	38		23.0	
	Partner	16		9.7	
	Other (e.g. traditional)	3		1.8	
	Total	165		100.0	

The majority of the respondents are in the 31 to 41 age bracket, while very few of the respondents are younger than 21. or older than 51 years (Table 3.5).

Table 3.5 Age of respondents

Question 5		Frequency		Valid Percent	
Valid	Under 21	1		.6	
	21-31	36		21.7	
	31-41	68		41.0	
	41-51	55		33.1	
	Older (Specify)	6		3.6	
	Total	166		100.0	

From Table 3.6 it can be derived that over 30% of the respondents have between 10 and 13 years driving experience. The table also indicates that 24.7% of the respondents have more than 13 years' experience. Taking into consideration the age of the drivers it can be assumed that most drivers have started to drive LHHVs only later in their careers, which could be due to the recession, or the fact that they have worked somewhere else earlier in their careers.

Table 3.6 Driving experience of respondents

Question 6		Frequency		Valid Percent	
Valid	1-4	24		14.7	
	4-7	23		14.1	
	7-10	24		14.7	
	10-13	51		31.3	
	More (Specify)	41		25.2	
	Total	163		100.0	

Most of the respondents are between 1.6m and 1.8m tall and weigh between 82kg and 90kg. These measurements should be an average for the ergonomic factor as discussed in Paragraph 2.8.2. The question, however, is raised for the 6.6% who reported that they are taller than the average and weigh more than 100kg (Table 3.7

& 3.8). Cabin ergonomics and the lay-out of the cab might have an influence on their driving experience as the area might be too congested.

Table 3.7 Physical appearance of the respondents - Length

Question 7		Frequency		Valid Percent	
Valid	Shorter than 1.6	13		7.9	
	1.6 - 1.8	88		53.7	
	1.8 - 2.0	52		31.7	
	2.0 - 2.2	11		6.7	
	Taller (Specify)	164		100.0	

Table 3.8 Physical appearance of the respondents – Weight

Question 8		Frequency		Valid Percent	
Valid	Less 71	18		10.9	
	72 - 80	41		24.8	
	82 - 90	52		31.5	
	92 - 100	43		26.1	
	More (Specify)	11		6.7	
	Total	165		100.0	

From the results in Table 3.9, most of the respondents' education levels are up to grade twelve, but with almost an equal number who only finished school up to grade ten. A concerning 13.9% of the respondents only have grade seven.

Table 3.9 Scholastic level of respondents

Question 9		Frequency		Valid Percent	
Valid	Grade 7 and less	23		14.1	
	Up to Gr.10	66		40.5	
	Up to Gr.12	68		41.7	
	College/University	5		3.1	
	Other (Specify)	1		.6	
	Total	163		100.0	

3.3.2 RESPONDENT'S RELATION TO LHHV QUALIFICATIONS

Questions 10–16 deal with the response from the respondents regarding their driving qualifications:

An excess of 20% of the respondents have indicated that they have been involved in accidents with their LHHVs before. (The questionnaire has not included the severity

of the accidents and over what period the accidents occurred). These findings are based on Table 3.10

Table 3.10 Respondents' accident ratio

Question 10		Frequency		Valid Percent	
Valid	Yes	36		21.8	
	No	129		78.2	
	Total	165		100.0	

More than 65% of the respondents drive in excess of 7000km per month (Table 3.11). During an interview with the COO of Epic (refer to Section 2.8.3), it has been mentioned that the average kilometres travelled by LHHV drivers are between 8 000 and 12 000 per month.

Table 3.11 Average monthly distance (km) travelled

Question 11		Frequency		Valid Percent	
Valid	0 - 3000	3		1.8	
	3001 - 5000	11		6.7	
	5001 - 7000	41		25.0	
	7001 - 9000	74		45.1	
	More (Specify)	35		21.3	
	Total	164		100.0	

From Table 3.12 it is derived that the majority of the LHHVs are newer than 2008. More than a quarter are newer than 2011 which imply that most of these vehicles adhere to the latest research in cabin ergonomics (discussed in 2.8.2), resulting in a design that will accommodate even tall and heavy drivers.

Table 3.12 Year model of truck

Question 12		Frequency		Valid Percent	
Valid	Older than 2005	18		11.1	
	2005 - 2007	32		19.8	
	2008 - 2011	53		32.7	
	Newer than 2012	42		25.9	
	Not Sure	17		10.5	
	Total	162		100.0	

Table 3.13 indicates that the majority of the trucks have between 3 and 5 axles. Tankers account for 16% of the responses. This is an indication that the majority of the respondents consist of LHHV drivers.

Table 3.13 Size of the truck

Question 13		Frequency		Valid Percent	
Valid	2 Axle	11		6.7	
	3 - 4 Axle	54		33.1	
	5 Axle	53		32.5	
	Tanker	27		16.6	
	Other (Specify)	18		11.0	
	Total	163		100.0	

Almost 25% of the respondents have never been on advanced driving courses while almost 20% only attend once in 5 years. 15% of the respondents are not sure about the frequency of their attendance of advanced driving courses, while 3% indicates that they attend on a monthly basis and 34% attends once a year (Table 3.14). This low rate is a concerning factor that will be addressed under recommendations (Par. 4.4)

Table 3.14 Respondents' status with respect to advanced driving courses

Question 14		Frequency		Valid Percent	
Valid	Never	41		25.5	
	Monthly	5		3.1	
	Once a Year	57		35.4	
	Once every 5 years	33		20.5	
	Not Sure	25		15.5	
	Total	161		100.0	

From Table 3.15 it is evident that, although a Public Drivers Permit (PDP) is compulsory for professional drivers, almost 8% do not have one or is not sure.

Table 3.15 Respondents' status with respect to PDP

Question 15		Frequency		Valid Percent	
Valid	1	153		92.2	
	2	6		3.6	
	3	7		4.2	
	Total	166		100.0	

All drivers but one have reported that they have the correct driver's license, namely a code EC for the LHHV they are driving (Table 3.16).

Table 3.16 Respondents' status with respect to a driver's license

Question 16		Frequency		Valid Percent	
Valid	B	2		1.2	
	C	6		3.6	
	EB	153		92.7	
	EC	4		2.4	
	Other (Specify)	165		100.0	

3.3.3 LHHV ROADWORTHY METRICS

Questions 17.1–17.5 deal with the condition of the LHHVs:

Almost 93% of the respondents have reported that the brakes of their vehicles are in good condition. Six of the respondents reported that the brakes of their LHHVs are not fully functional, which pose a great risk for accidents to happen (Table 3.17).

Table 3.17 Condition of the brakes of the trucks

Question 17.1		Frequency		Valid Percent	
Valid	Strongly Disagree	2		1.2	
	Disagree	4		2.4	
	Not Sure	6		3.6	
	Agree	87		52.4	
	Strongly Agree	67		40.4	
	Total	166		100.0	

According to Table 3.18, almost 89% of the respondents have reported that the lights of their LHHVs are fully functional. Fifteen respondents have reported that the lights of their LHHVs are not fully functional, which pose a great risk for accidents to happen.

Table 3.18 Condition of the lights of the trucks

Question 17.2		Frequency		Valid Percent	
Valid	Strongly Disagree	3		1.8	
	Disagree	12		7.2	
	Not Sure	4		2.4	
	Agree	79		47.6	
	Strongly Agree	68		41.0	
	Total	166		100.0	

The interesting factor, according to Table 3.19, is that over 20% of the drivers have reported that their tyres are not in a good condition or they that are not sure about the condition of their tyres. Bearing in mind the findings in the literature study (Section 2.8.2), this fact is of great concern, as poor quality of tyres is a great contributor to road accidents.

Table 3.19 Condition of the tyres of the trucks

Question 17.3		Frequency		Valid Percent	
Valid	Strongly Disagree	8		4.8	
	Disagree	22		13.3	
	Not Sure	7		4.2	
	Agree	67		40.4	
	Strongly Agree	62		37.3	
	Total	166		100.0	

According to Table 3.20, 9% of the respondents have reported that the windows of their LHHVs are not in a good condition.

Table 3.20 Condition of the windows of the trucks

Question 17.4		Frequency		Valid Percent	
Valid	Strongly Disagree	4		2.4	
	Disagree	11		6.6	
	Not Sure	7		4.2	
	Agree	86		51.8	
	Strongly Agree	58		34.9	
	Total	166		100.0	

About 5% of the respondents have reported that they overload their vehicles (Table 3.21). Bearing in mind the results of the literature study (Section 2.8.2), overloading is a major contributor to road maintenance cost.

Table 3.21 Respondents' opinion on overloading

Question 17.5		Frequency		Valid Percent	
Valid	Almost Never	84		50.9	
	Seldom	47		28.5	
	Often	27		16.4	
	Almost Always	7		4.2	
	Total	165		100.0	

3.3.4 REMUNERATION AND AVAILABILITY

Questions 18–19 deal with the remuneration of the respondents and their opinion on whether there are enough LHHV drivers or not.

Over 85% of the respondents have reported that they work on an incentive basis where it will benefit them to work longer hours. The 13.9% who have reported “Other” are being paid per load (Table 3.22).

Table 3.22 Respondents’ remuneration structure

Question 18		Frequency		Valid Percent	
Valid	Per Hours	8		4.8	
	Per Kilometre	28		17.0	
	Salary + Overtime	74		44.8	
	Salary + Bonus per Kilometre	32		19.4	
	Other (Specify)	23		13.9	
	Total	165		100.0	

In light of their incentive scheme, it comes as no surprise that over 70% of the respondents are often- or always working overtime for extra money. See results in Table 3.23.

Table 3.23 Respondents’ likeliness to work overtime

Question 19		Frequency		Valid Percent	
Valid	Almost Never	25		15.2	
	Seldom	21		12.8	
	Often	83		50.6	
	Almost Always	35		21.2	
	Total	164		100.0	

About 20% of the respondents are of the opinion that there are not enough LHHV drivers in South Africa, 26% are not sure, but the majority of the respondents agree (35%) or strongly agree (17%) that there are enough truck drivers in South Africa (Table 3.24).

Table 3.24 Respondents' opinion on the market for truck drivers

Question 20.1		Frequency		Valid Percent	
Valid	Strongly Disagree	7		4.3	
	Disagree	28		17.2	
	Not Sure	43		26.4	
	Agree	57		35.0	
	Strongly Agree	28		17.2	
	Total	163		100.0	

According to Table 3.25, more than 60% of the respondents have been offered jobs at other companies over the past 24 months. This high rate puts a question mark on the validity of the responses as per question 20. If 60% were offered jobs by other companies, it might be an indication that there is a shortage of good drivers in the market.

Table 3.25 Head hunting of respondents

Question 21		Frequency		Valid Percent	
Valid	Within last 6 months	34		20.9	
	Within 12 months	32		19.6	
	Within 18 months	15		9.2	
	Within 24 months	19		11.7	
	Never	63		38.7	
	Total	163		100.0	

3.3.5 THE HEALTH OF LHHV DRIVERS

Questions 22 – 23 deal with some health related issues:

Almost 45% of the respondents never visit a clinic or visit the clinic only once a year (Table 3.26). Bearing in mind the medical results of the drivers obtained during the wellness days held in 2009 (Section 2.8.1), this is a highly concerning factor.

Table 3.26 Visits to doctors

Question 22		Frequency		Valid Percent	
Valid	Never	22		13.3	
	Monthly	19		11.4	
	Once in 3 Months	40		24.1	
	Once in 6 months	32		19.3	
	Yearly	53		31.9	
		166		100.0	

According to Table 3.27, more than 8 per cent of the respondents do not know about the clinics that are situated at truck stops next to the N3, and 44% of the respondents never visit these clinics.

Table 3.27 Visits to wellness clinics

Question 23		Frequency		Valid Percent	
Valid	Never	73		44.5	
	Monthly	37		22.6	
	Once a Year	34		20.7	
	Once every 2 years	6		3.7	
	I don't know about it	14		8.5	
	Total	164		100.0	

3.3.6 SEXUALITY AND THE LHHV DRIVER

Questions 24–24.3 deal with the opinion of respondents on the sexual preferences of LHHV drivers.

More than 65% of the respondents are of the opinion that other truck drivers require the services of sex workers on a regular basis (Table 3.28). This is in line with the findings of the literature study (Section 2.9.2).

Table 3.28 Opinion on sex workers

Question 24		Frequency		Valid Percent	
Valid	Almost Never	36		22.2	
	Seldom	16		9.9	
	Often	60		37.0	
	Almost Always	50		30.8	
	Total	162		100.0	

The majority of respondents (51%) are of the opinion that truck drivers seek female companionship, while 7% think male. About 11% indicated they were not sure (Table 3.29).

Table 3.29 Opinion on sexual preferences

Question 24.1		Frequency		Valid Percent	
Valid	Male	13		8.6	
	Female	85		56.3	
	Both	19		12.6	
	Not Sure	34		22.5	
	Total	151		100.0	

With respect to the frequency of seeking sex workers (Table 3.30), 26% of the respondents indicated 2–3 times a week, 18% are of the opinion that it is daily and 16% indicated once a week. Derived from these responses, it can be assumed that the use of sex workers is a fairly common phenomenon under LHHV drivers.

Table 3.30 Opinion on the frequency that sex workers are used

Question 24.2		Frequency		Valid Percent	
Valid	Daily	30		19.5	
	2-3 Times a week	43		27.9	
	Once a week	27		17.5	
	Once in two weeks	9		5.8	
	Not Sure	45		29.2	
	Total	154		100.0	

Table 3.31 indicates that condoms are by far the preferred precaution against sexually transmitted diseases (STDs), with 77% in favour thereof. However, bearing in mind the high prevalence of STDs under LHHV drivers (Section 2.9.2), the fact that 23% are not pro-condoms, is concerning.

Table 3.31 Opinion on contraception

Question 24.3		Frequency		Valid Percent	
Valid	Require same person	10		6.5	
	Condoms	128		83.1	
	Shower	6		3.9	
	Gel	2		1.3	
	Other (Specify)	8		5.2	
	Total	154		100.0	

3.3.7 STRESS RELATED FACTORS

Questions 25.1-25.9 deal with some factors that might lead to stress among the respondents.

The inside and lay-out of the truck causes stress to 42% of the respondents. The fact that most of the trucks are relatively new is probably the reason why the cabin is not a stress factor for all of the respondents (Table 3.32).

Table 3.32 Inside lay-out and space of the truck as a stressor

Question 25.1		Frequency		Valid Percent	
Valid	Strongly Disagree	22		13.5	
	Disagree	50		30.7	
	Not Sure	21		12.9	
	Agree	52		31.9	
	Strongly Agree	18		11.0	
	Total	163		100.0	

Other road users are the biggest cause for stress under LHHV drivers, with 83% of them who either agree or strongly agree (Table 3.33). Other road users do not consider LHHVs on the road and are frustrated with them.

Table 3.33 Other road users as stressors

Question 25.2		Frequency		Valid Percent	
Valid	Strongly Disagree	6		3.6	
	Disagree	13		7.9	
	Not Sure	8		4.8	
	Agree	80		48.5	
	Strongly Agree	58		35.2	
	Total	165		100.0	

The hours that they drive account for stress amongst 62.7% of the respondents, with almost 30% who disagree or strongly disagree (Table 3.34).

Table 3.34 Hours driving as a stressor

Question 25.3		Frequency		Valid Percent	
Valid	Strongly Disagree	13		7.8	
	Disagree	38		22.9	
	Not Sure	11		6.6	
	Agree	76		45.8	
	Strongly Agree	28		16.9	
	Total	166		100.0	

According to table 3.35, the treatment they receive from their superiors, accounts for stress amongst just more than half (54.9%) of the respondents.

Table 3.35 Treatment from supervisors as a stress factor

Question 25.4		Frequency		Valid Percent	
Valid	Strongly Disagree	10		6.1	
	Disagree	56		34.1	
	Not Sure	8		4.9	
	Agree	61		37.2	
	Strongly Agree	29		17.7	
	Total	164		100.0	

Family life seems to be the factor that is the least likely to cause stress to the respondents, with only about 27% who either agree or strongly agree (Table 3.36).

Table 3.36 Family as a stressor

Question 25.5		Frequency		Valid Percent	
Valid	Strongly Disagree	24		14.5	
	Disagree	77		46.7	
	Not Sure	19		11.5	
	Agree	35		21.2	
	Strongly Agree	10		6.1	
	Total	165		100.0	

The long distances and boring road where there is no change or excitement, according to Table 3.37, accounts for stress amongst half of the respondents (50.6%).

Table 3.37 Boring road as a stressor

Question 25.6		Frequency		Valid Percent	
Valid	Strongly Disagree	16		9.8	
	Disagree	51		31.1	
	Not Sure	13		7.9	
	Agree	68		41.5	
	Strongly Agree	16		9.8	
	Total	164		100.0	

Less than half of the respondents (48.5%) indicated that the weather conditions give them stress (Table 3.38). It needs to be taken into consideration that this survey has been done over a three-day period during October, while the weather conditions have been fine.

Table 3.38 Weather conditions as a stressor

Question 25.7		Frequency		Valid Percent	
Valid	Strongly Disagree	18		10.9	
	Disagree	53		32.1	
	Not Sure	14		8.5	
	Agree	64		38.8	
	Strongly Agree	16		9.7	
	Total	165		100.0	

Loading and off-loading are the second highest reason for stress among the respondents, due to the time wasted while waiting. In Table 3.39, no less than 72% either agree or strongly agree.

Table 3.39 Loading and off-loading as a stressor

Question 25.8		Frequency		Valid Percent	
Valid	Strongly Disagree	5		3.0	
	Disagree	28		16.9	
	Not Sure	14		8.4	
	Agree	81		48.8	
	Strongly Agree	38		22.9	
	Total	166		100.0	

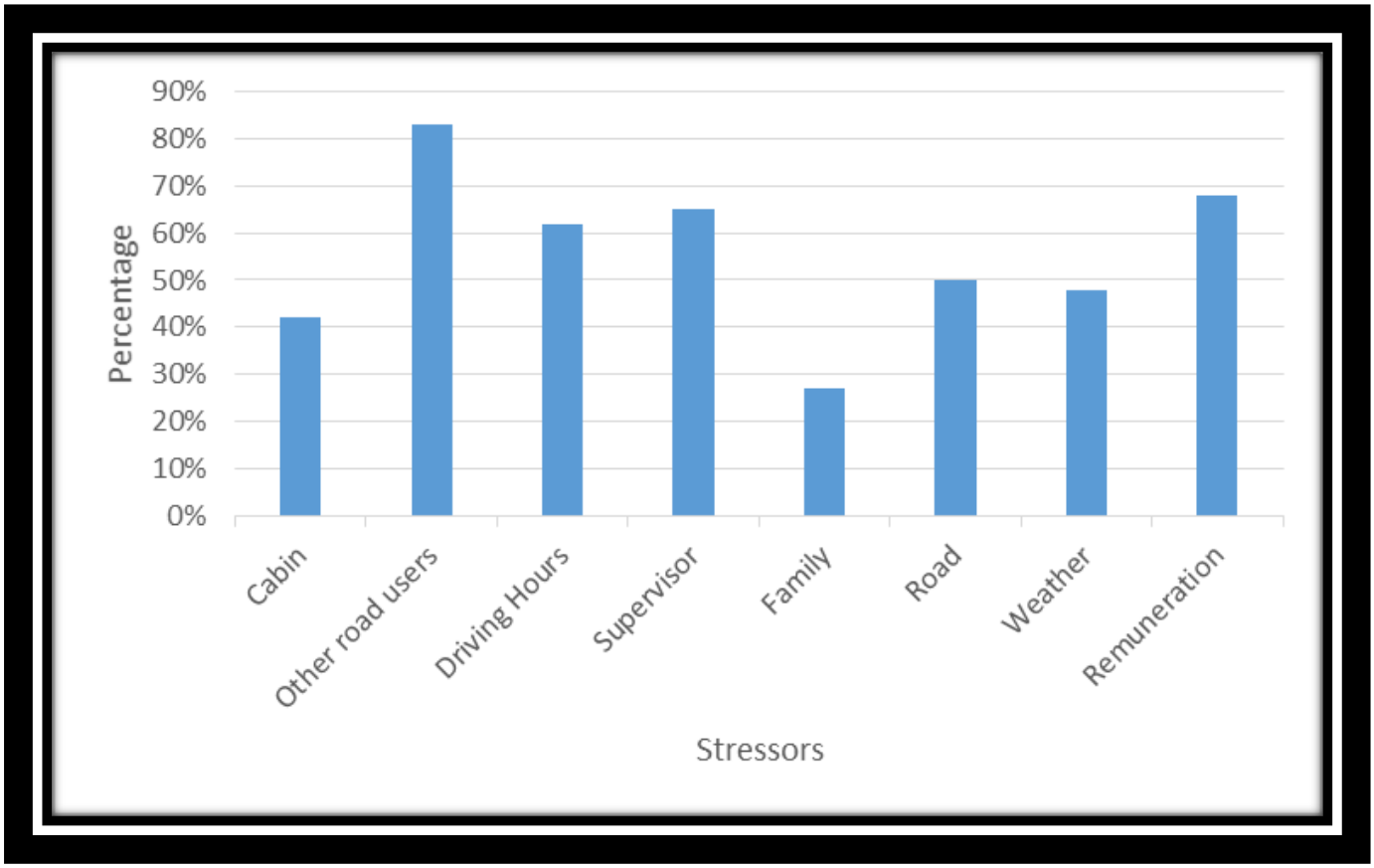
According to Table 3.40, their remuneration is the third highest stressor among the respondents, with 68% of them who either agree or strongly agreed.

Table 3.40 Remuneration as a stressor

Question 25.9		Frequency		Valid Percent	
Valid	Strongly Disagree	5		3.0	
	Disagree	37		22.3	
	Not Sure	12		7.2	
	Agree	77		46.4	
	Strongly Agree	35		21.1	
	Total	166		100.0	

Figure 3.1 summarises the factors leading to stress among LHHV drivers, and have been compiled by adding and rounding the “Agree” and “Strongly Agree” percentages from Tables 3.32 – 3.40.

Figure 3.1 Summary of stress factors among LHHV drivers



(Source: Own compilation)

Figure 3.1 is a summary indicating the role different factors play, contributing to stress amongst LHHV drivers. By examining Figure 3.1, it is evident that “Other road users”

are the biggest cause for stress, while “Family” plays the lowest role concerning stress factors.

3.3.8 SLEEP RELATED FACTORS

Questions 26–32 relate to the Circadian rhythm as discussed in Chapter 2 (see 2.8.1):

Although almost half of the drivers (49.3%) reported that they feel drowsy behind the wheel (Table 3.41), just more than a third of them (34.1%) have confirmed that they might fall asleep while driving – see Table 3.42.

Table 3.41 Possibility of feeling drowsy while driving

Question 26		Frequency		Valid Percent	
Valid	Almost Never	29		17.9	
	Seldom	53		32.7	
	Often	66		40.7	
	Almost Always	14		8.6	
	Total	162		100.0	

Table 3.42 Possibility of falling asleep while driving

Question 27		Frequency		Valid Percent	
Valid	Almost Never	52		31.7	
	Seldom	56		34.1	
	Often	43		26.2	
	Almost Always	13		7.9	
	Total	164		100.0	

Just over 60% of the drivers have reported that energy drinks help them to stay awake, while 9% strongly disagree (Table 3.43). The truth is that most of the drivers rely heavily on energy drinks to keep them awake, which might be detrimental to their health and safety.

Table 3.43 Energy drinks as a countermeasure against drowsiness

Question 28.1		Frequency	Valid Percent
Valid	Strongly Disagree	15	9.0
	Disagree	31	18.7
	Not Sure	18	10.8
	Agree	68	41.0
	Strongly Agree	34	20.5
	Total	166	100.0

The preferred method of staying awake is to drink coffee, with over 82% of the respondents confirming that they consume coffee in order to stay awake (Table 3.44).

Table 3.44 Coffee or tea as a countermeasure against drowsiness

Question 28.2		Frequency	Valid Percent
Valid	Strongly Disagree	8	4.8
	Disagree	13	7.9
	Not Sure	8	4.8
	Agree	99	60.0
	Strongly Agree	37	22.4
	Total	165	100.0

The least favourable method is to consume alcohol. What is concerning though, is that there are still almost 9% of the respondents considering alcohol as a favourable method to stay awake, while just as many indicated they were not sure (Table 3.45).

Table 3.45 Alcohol consumption as a countermeasure against drowsiness

Question 28.3		Frequency	Valid Percent
Valid	Strongly Disagree	83	50.0
	Disagree	53	31.9
	Not Sure	16	9.6
	Agree	11	6.6
	Strongly Agree	3	1.8
	Total	166	100.0

Just over 75% of the respondents admit that taking a powernap (short sleep of less than 30 minutes) is favourable to stay awake. Only about 7% of the respondents strongly disagree (Table 3.46).

Table 3.46 Powernaps as a countermeasure against drowsiness

Question 28.4		Frequency		Valid Percent	
Valid	Strongly Disagree	11		6.7	
	Disagree	10		6.1	
	Not Sure	16		9.8	
	Agree	100		61.3	
	Strongly Agree	26		16.0	
	Total	163		100.0	

Fresh air seems to be a good remedy against tiredness, as just over 80% of the respondents are of the opinion that to open the windows is a good counter-measure for drowsiness (Table 3.47).

Table 3.47 To open the window as a countermeasure against drowsiness

Question 28.5		Frequency		Valid Percent	
Valid	Strongly Disagree	5		3.0	
	Disagree	17		10.2	
	Not Sure	9		5.4	
	Agree	114		68.7	
	Strongly Agree	21		12.7	
	Total	166		100.0	

Less than 64% of the respondents, according to Table 3.48, are of the opinion that it helps them to stay awake if they turn up the radio.

Table 3.48 Turning up the radio as a countermeasure against drowsiness

Question 28.6		Frequency		Valid Percent	
Valid	Strongly Disagree	6		3.6	
	Disagree	28		17.0	
	Not Sure	9		5.5	
	Agree	105		63.6	
	Strongly Agree	17		10.3	
	Total	165		100.0	

About 57% of the respondents have reported that they turn up the air conditioners in order to stay awake (Table 3.49). Due to time constraints, the opinion of supervisors that some LHHV drivers use the air-conditioners to heat the cabin above acceptable levels on colder days (Section. 3.8.2), could not be tested.

Table 3.49 Turning up the air conditioner as a countermeasure against drowsiness

Question 28.7		Frequency		Valid Percent	
Valid	Strongly Disagree	12		7.2	
	Disagree	46		27.7	
	Not Sure	13		7.8	
	Agree	80		48.2	
	Strongly Agree	15		9.0	
	Total	166		100.0	

According to Table 3.50, singing or talking to oneself could be seen as a countermeasure to stay awake, by only 53% of the respondents.

Table 3.50 Sing or talk to yourself as a countermeasure against drowsiness

Question 28.8		Frequency		Valid Percent	
Valid	Strongly Disagree	10		6.1	
	Disagree	54		32.7	
	Not Sure	12		7.3	
	Agree	77		46.7	
	Strongly Agree	12		7.3	
	Total	165		100.0	

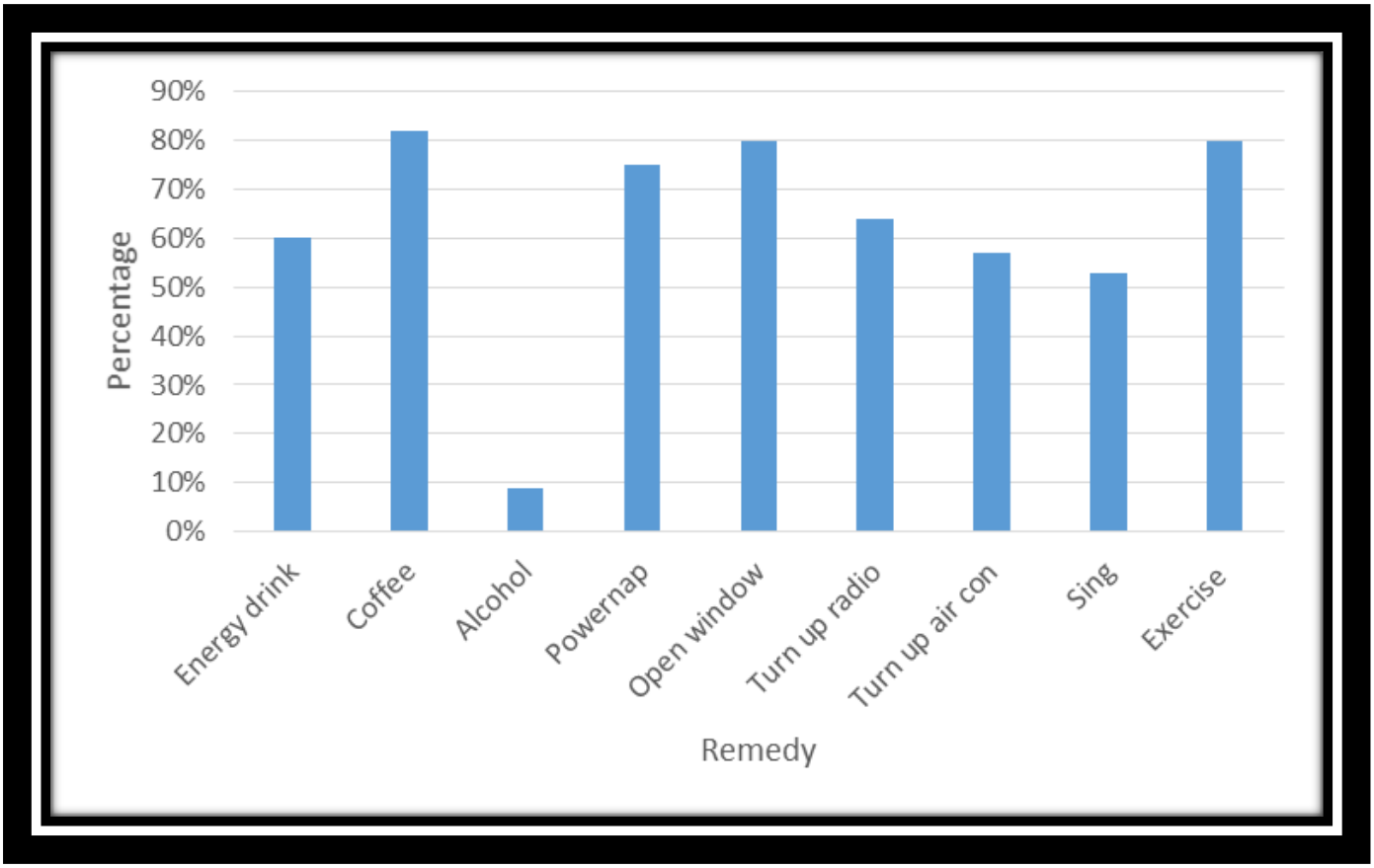
To stop driving and to walk around the truck or to do some exercise is a preferred method of fighting drowsiness, by just over 80% of the respondents (Table 3.51).

Table 3.51 Exercise as a countermeasure against drowsiness

Question 28.9		Frequency		Valid Percent	
Valid	Strongly Disagree	8		4.8	
	Disagree	16		9.7	
	Not Sure	6		3.6	
	Agree	116		70.3	
	Strongly Agree	19		11.5	
	Total	165		100.0	

Figure 3.2 summarises the remedies for tiredness among LHHV drivers and has been compiled by adding and rounding the “Agree” and “Strongly Agree” percentages from Tables 3.43–3.51.

Figure 3.2 Summary of remedies for tiredness



(Source: Own compilation)

Figure 3.2 is a summary of activities LHHV drivers believe to be countermeasures for tiredness and the effectiveness thereof. From Figure 3.2 it is easy to derive that the consumption of alcohol is the least favourable-, while “coffee”, “to open the window” and “exercise”, are the most favourable methods for staying awake.

3.3.9 SLEEPING HABITS OF LHHV DRIVERS.

Questions 29–35.5 deal with the sleeping habits of the respondents.

There are about 48% of the respondents who reported that their power naps (short sleep) normally last for half an hour, while more than 25% take longer breaks (Table 3.52). Bearing in mind the results of the literature study that powernaps longer than 30

minutes are counterproductive (Section 2.8.1), this poses a concern to whether the drivers are aware of this fact or not.

Table 3.52 Duration of powernaps

Question 29		Frequency		Valid Percent	
Valid	5 minutes	3		1.9	
	10 minutes	11		6.9	
	15 minutes	23		14.5	
	30 minutes	80		50.3	
	Other (Specify)	42		26.4	
	Total	159		100.0	

About half of the respondents admit that they snore while they sleep (Table 3.53), while almost 55% of the respondents report they set their alarm clock to wake them up (Table 3.54). Excessive snoring might be a sign of sleep apnea, which is a medical condition causing interrupted sleep and tiredness (Section 2.8.1).

Table 3.53 Snoring under LHHV drivers

Question 30		Frequency		Valid Percent	
Valid	Almost Never	48		29.6	
	Seldom	31		19.1	
	Often	52		32.1	
	Almost Always	31		19.1	
	Total	162		100.0	

Table 3.54 Setting of alarm clocks to wake up

Question 31		Frequency		Valid Percent	
Valid	Almost Never	39		23.5	
	Seldom	36		21.7	
	Often	39		23.5	
	Almost Always	52		31.3	
	Total	166		100.0	

Half of the respondents, (50.3%) according to Table 3.55, admit to feeling tired when they wake up. A power nap that lasts longer than 30 minutes, have an adverse effect causing the sleeper to feel more tired when waking up (Section 2.8.1). According to the discussion at question 29 *supra*, about 25% of the respondents take a powernap

of longer than 30 minutes. The pressure on drivers to work longer hours also causes less sleep which might be a sign of sleep deprivation.

Table 3.55 Tiredness among LHHV drivers

Question 32		Frequency		Valid Percent	
Valid	Almost Never	40		24.2	
	Seldom	42		25.5	
	Often	61		37.0	
	Almost Always	22		13.3	
	Total	165		100.0	

As indicated by Table 3.56, the majority of the drivers, (47%) stop to sleep between 9pm and 11pm, while about 64% of them start to drive between 4am and 6am (Table 3.57), resulting in an average stop period of between 4 and 6 hours. Taking into consideration the time spent on making or buying food, to shower and to buy other things, sleeping times are reduced to the minimum.

Table 3.56 Stop driving times

Question 33		Frequency		Valid Percent	
Valid	6pm - 8:59pm	23		13.9	
	9pm - 10:59pm	78		47.0	
	11pm - 11:59pm	34		20.5	
	00am - 01am	23		13.9	
	Other (Specify)	8		4.8	
	Total	166		100.0	

Table 3.57 Start driving times

Question 34		Frequency		Valid Percent	
Valid	10pm - 11:59pm	3		1.8	
	00am - 01:59am	2		1.2	
	02am - 03:59am	42		25.5	
	04am - 05:59am	107		64.8	
	Other (Specify)	10		6.1	
	Other (Specify)	1		.6	
	Total	165		100.0	

A concerning factor is that, as indicated by Table 3.57, almost 80% of the respondents report that they do not or seldom sleep at home. Bearing in mind that more than 65% of the respondents have indicated that they are married or lived with someone (Table

3.4), thus being away from home so often will put pressure on their marriages and family life.

Table 3.58 Place of rest - home

Question 35.1		Frequency		Valid Percent	
Valid	Almost Never	94		57.0	
	Seldom	36		21.8	
	Often	27		16.4	
	Almost Always	8		4.8	
	Total	165		100.0	

Only 35% of the respondents have indicated that they sometimes sleep at the company depot/yard (Table 3.59).

Table 3.59 Place of rest – depot/yard

Question 35.2		Frequency		Valid Percent	
Valid	Almost Never	78		47.3	
	Seldom	30		18.2	
	Often	32		19.4	
	Almost Always	25		15.2	
	Total	165		100.0	

As indicated by Table 3.60, 25% of the respondents admit that they sometimes sleep next to the road due to an insufficient number of truck stops or because of truck stops being full. Some drivers will also use the money given to them by their companies for paying to sleep at truck stops, for personal use. This pose a big risk for drivers, the vehicles and the cargo, and raises the question whether there are enough, well positioned truck stops on the route.

Table 3.60 Place of rest – next to the road

Question 35.3		Frequency		Valid Percent	
Valid	Almost Never	77		47.0	
	Seldom	48		29.3	
	Often	27		16.5	
	Almost Always	12		7.3	
	Total	164		100.0	

About 42% of the respondents have indicated that they sleep at garages or in towns next to the road on a regular basis (Table 3.61).

Table 3.61 Place of rest – garages or towns

Question 35.4		Frequency		Valid Percent	
Valid	Almost Never	51		31.1	
	Seldom	43		26.2	
	Often	51		31.1	
	Almost Always	19		11.6	
	Total	164		100.0	

Bearing in mind that this survey has been done at a truck stop, 90% of the respondents in Table 3.62 report that they often or always sleep at a truck stop.

Table 3.62 Place of rest – truck stops

Question 35.5		Frequency		Valid Percent	
Valid	Almost Never	3		1.8	
	Seldom	9		5.4	
	Often	70		42.2	
	Almost Always	84		50.6	
	Total	166		100.0	

3.3.10 REQUIREMENTS FOR A MODERN TRUCK STOP

The primary role of a truck stop is to cater as a safe, secure and quiet place to sleep to drivers. The better the amenities cater for the needs of the drivers, the more likely the drivers will be to stop at a specific truck stop. Questions 36.1–36.9 deal with the requirements for a truck stop.

There are 74% of the respondents who are in favour of a games room (Table 3.63).

Table 3.63 Preferences on amenities at truck stops – games room

Question 36.1		Frequency		Valid Percent	
Valid	Strongly Disagree	9		5.5	
	Disagree	18		11.0	
	Not Sure	13		8.0	
	Agree	87		53.4	
	Strongly Agree	36		22.1	
	Total	163		100.0	

Extra rooms to rent are favoured by 42.7% of the respondents (Table 3.64). An extra room to rent is favoured especially by the drivers of the trucks that do not have a sleep cabin.

Table 3.64 Preferences on amenities at truck stops – extra room to rent

Question 36.2		Frequency		Valid Percent	
Valid	Strongly Disagree	46		28.0	
	Disagree	33		20.1	
	Not Sure	14		8.5	
	Agree	51		31.1	
	Strongly Agree	20		12.2	
	Total	164		100.0	

A braai facility at a truck stop is favoured by more than 73% of the respondents (Table 3.65).

Table 3.65 Preferences on amenities at truck stops – braai facilities

Question 36.3		Frequency		Valid Percent	
Valid	Strongly Disagree	14		8.4	
	Disagree	19		11.4	
	Not Sure	11		6.6	
	Agree	87		52.4	
	Strongly Agree	35		21.1	
	Total	166		100.0	

Contrary to Table 3.28, where 65% of the LHHV drivers are of the opinion that drivers seek companionship from sex workers on a regular basis, the majority of the respondents (75%) according to Table 3.66, have indicated that they do not want sex workers at the truck stops.

Table 3.66 Preferences on amenities at truck stops – sex workers

Question 36.4		Frequency		Valid Percent	
Valid	Strongly Disagree	53		32.1	
	Disagree	41		24.8	
	Not Sure	28		17.0	
	Agree	32		19.4	
	Strongly Agree	11		6.7	
	Total	165		100.0	

Over 60% of the respondents have indicated that they are in favour of a wash bay for LHHVs at a truck stop (Table 3.67).

Table 3.67 Preferences on amenities at truck stops – wash bay for trucks

Question 36.5		Frequency		Valid Percent	
Valid	Strongly Disagree	16		9.7	
	Disagree	24		14.5	
	Not Sure	24		14.5	
	Agree	83		50.3	
	Strongly Agree	18		10.9	
	Total	165		100.0	

According to Table 3.68, a laundry service is the 3rd most important service the respondents require at a modern truck stop (71%).

Table 3.68 Preferences on amenities at truck stops – laundry

Question 36.6		Frequency		Valid Percent	
Valid	Strongly Disagree	19		11.4	
	Disagree	22		13.3	
	Not Sure	9		5.4	
	Agree	91		54.8	
	Strongly Agree	25		15.1	
	Total	166		100.0	

Derived from Table 3.69, recreation at a truck stop is required by 65% of all the respondents, while Table 3.70 indicates that Internet access is required by 53% of the respondents.

Table 3.69 Preferences on amenities at truck stops – gym

Question 36.7		Frequency		Valid Percent	
Valid	Strongly Disagree	16		9.6	
	Disagree	27		16.3	
	Not Sure	15		9.0	
	Agree	81		48.8	
	Strongly Agree	27		16.3	
	Total	166		100.0	

According to Table 3.70, 54% of the respondents are in favour of Internet access at truck stops, which is an indication of how the social media has an influence, also on this industry.

Table 3.70 Preferences on amenities at truck stops – Internet

Question 36.8		Frequency		Valid Percent	
Valid	Strongly Disagree	14		8.6	
	Disagree	40		24.5	
	Not Sure	21		12.9	
	Agree	68		41.7	
	Strongly Agree	20		12.3	
	Total	163		100.0	

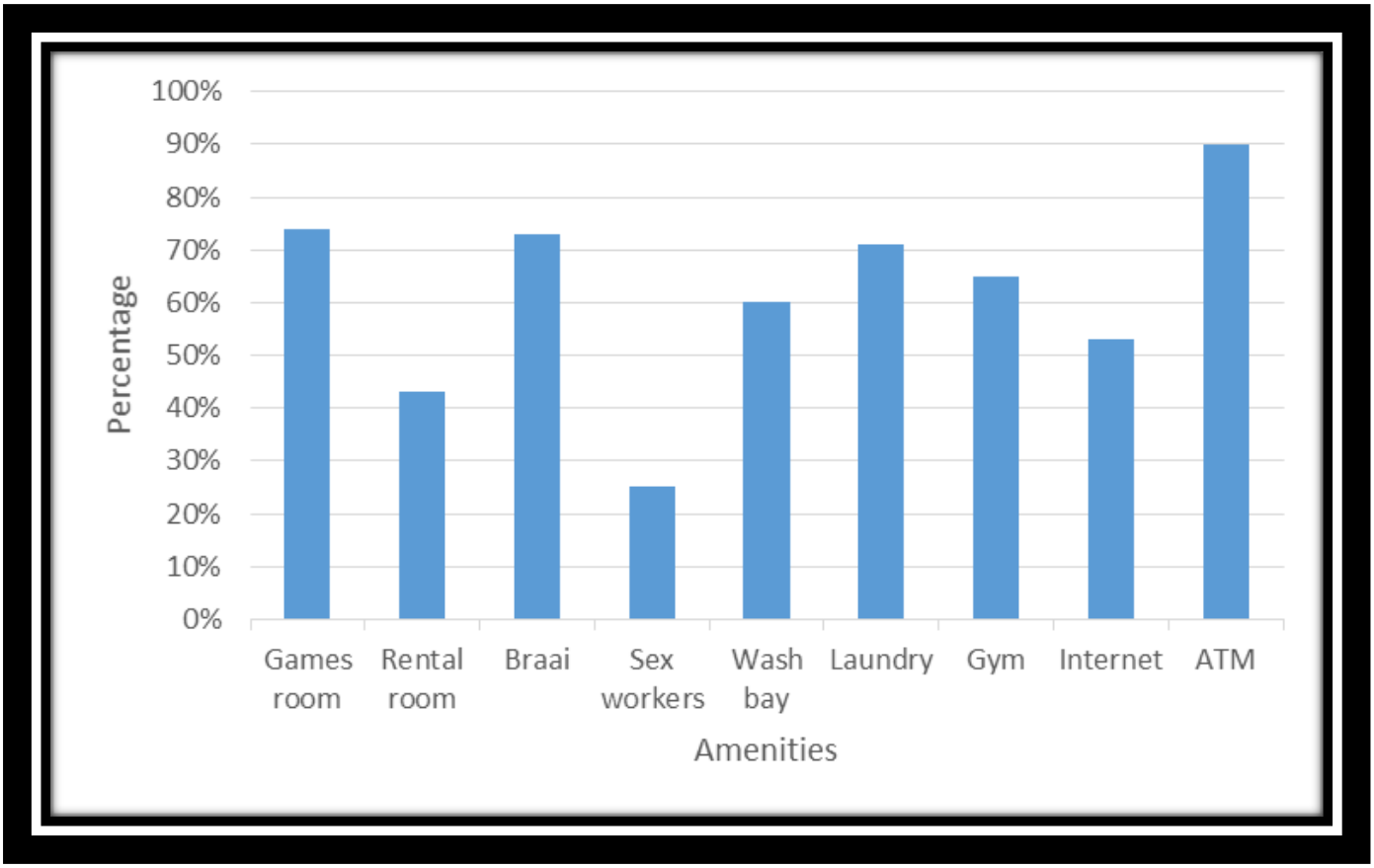
An automatic bank teller machine (ATM) is the most important additional facility at truck stops, as almost 90% of the respondents are in favour of it (Table 3.71).

Table 3.71 Preferences on amenities at truck stops – ATM

Question 36.9		Frequency		Valid Percent	
Valid	Strongly Disagree	3		1.8	
	Disagree	8		4.8	
	Not Sure	7		4.2	
	Agree	87		52.4	
	Strongly Agree	61		36.7	
	Total	166		100.0	

Figure 3.3 which summarises the amenity preferences amongst LHHV drivers, have been compiled by adding and rounding the “Agree” and “Strongly Agree” percentages from Tables 3.63–3.71.

Figure 3.3 Summary of the amenity preference among LHHV drivers



(Source: Own compilation)

From Figure 3.3, which is a summary of the preferences of LHHV drivers concerning a modern truck stop, it can be derived that an ATM is the biggest requirement under the respondents, while the least important requirement is for sex workers. A laundry service, a games room and a braai area, are almost equally important.

3.3.11 SAFETY OF LHHV DRIVERS

Questions 37–39 deal with the personal safety aspects of LHHV drivers.

According to Table 3.72, almost 80% of the respondents are of the opinion that it is dangerous to drive a truck.

Table 3.72 Danger involved in driving a LHHV

Question 37.1		Frequency		Valid Percent	
Valid	Strongly Disagree	3		1.8	
	Disagree	16		9.7	
	Not Sure	14		8.5	
	Agree	78		47.3	
	Strongly Agree	54		32.7	
	Total	165		100.0	

According to Table 3.73, almost 75% of the respondents believe that there is a possibility that they might get robbed of their trucks or their cargo. Tables 3.74 and 3.75 are an indication that 21% of the respondents have been robbed of their trucks and/or their cargo before.

Table 3.73 Possibility to get robbed

Question 37.2		Frequency		Valid Percent	
Valid	Strongly Disagree	9		5.5	
	Disagree	18		10.9	
	Not Sure	12		7.3	
	Agree	90		54.5	
	Strongly Agree	36		21.8	
	Total	165		100.0	

Table 3.74 History of previous robberies - LHHVs

Question 38		Frequency		Valid Percent	
Valid	Yes	35		21.1	
	No	130		78.3	
	Not sure	1		.6	
	Total	166		100.0	

Table 3.75 History of previous robberies - cargo

Question 39		Frequency		Valid Percent	
Valid	Yes	35		21.2	
	No	129		78.2	
	Not sure	1		.6	
	Total	165		100.0	

3.3.12 OPEN-ENDED QUESTIONS

Questions 40 to 42 have given the respondents the opportunity to add value to the questionnaire, by means of unobtrusive suggestions or recommendations:

- On the question of what the single most important factor is that contributes negatively to them as drivers, the respondents reiterate the fact that they experience other road users as very negative. Some of the other responses have included being away from home, to drive after hours and the waiting time at the harbour.
- On the question of what the single most important factor is that contributes positively to them as drivers, the responses have included that “at least they have a job”. Some of the other responses have included that it is nice to see new places, the freedom to be on the road and “to drive a lorry” (sic).
- On the question if they have any suggestions to improve the safety on the roads for truck drivers, some of the respondents have suggested fixed rest periods from 11pm–4am, dedicated driving lanes for LHHVs, a speed limit of 85km/h for LHHVs, minimum driving hours controlled by Government, and compulsive co-drivers.

3.4 PRINCIPLE COMPONENT FACTOR ANALYSIS

A principle component analysis (PCA) is a technique used to reduce large sets of data, so that a factor analysis can be performed and underlying dimensions can be identified. PCA studies linear relations among variables. The largest Eigenvalues correspond to the principle components that are associated with most of the co-variability among a number of observed data. The PCA technique has been applied for questions 17 and 25.

From the principle component factor analysis for question 17 that deals with the LHHV metrics, one factor has been extracted explaining 59% of the variance.

From the principle component factor analysis with Oblimin Rotation done on question 25 that deals with the factors that might act as stressors under LHHV drivers, two factors have been extracted explaining 51.9% of the variance.

From the pattern matrix which represents the linear contribution of the variables (Table 3.76), it is clear that two different components can be identified in relation to question 25 that deals with stress factors. Component 1 relates to the boring long road, weather conditions, driving hours, treatment from superiors, family life and the inside of the

truck, and are referred to as EXFAM conditions. Component 2 relates to other road users, loading and off-loading and their remuneration, and are referred to as ROL conditions.

Table 3.76 Factor Pattern Matrix Variable

Factors identified by LHHV drivers giving them stress	Component	
	1	2
Boring long road	.856	
Weather conditions	.841	-.342
Driving hours	.602	.344
Superior treatment	.554	.299
Family life	.499	
Inside of truck	.478	.331
Other road users		.785
Loading and off-loading		.727
Remuneration		.467

3.4.1 RELIABILITY AND VALIDITY

The Cronbach's Alfa test, which, according to Welman, *et al*., (2005), measures the internal consistency of a test, is found to be at an acceptable level if it is above 0.7. The results of all three factor analysis and the inter-correlated mean are indicated in Table 3.77.

Table 3.77 Results of Cronbach's Alpha test and Inter Correlated Mean

		Chronbach's Alpha	Inter Correlated Mean
Question 17	Condition of truck	0.857	0.621
Questions 25 (1, 3 - 7)	EXFAM	0.788	0.382
Questions 25 (2, 8 - 9)	ROL	0.547	0.288

From table 3.77, it is clear that the Chronbach's Alpha tests for "Condition of truck" (.857) and for "EXFAM" (.788) are at an acceptable level. The result for ROL is too low to be acceptable but it must be borne in mind that only three questions have been tested. The inter-correlated mean, which is supposed to measure between .15 and .55, is at .288 at an acceptable level.

3.4.2 MEAN AND STANDARD DEVIATION

Derived from table 3.78, it is clear that the mean for condition of truck at 4.12 out of a possible 5, is very high. The mean for EXFAM (3.07) and ROL (3.78) out of a possible 5, is above average high. The standard deviation in all three instances, are low, indicating a small range around the mean.

Table 3.78 Mean and Standard Deviation

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Condition of Truck	166	1.00	5.00	4.1235	.80139
EXFAM	166	1.00	5.00	3.0697	.86722
ROL	166	1.00	5.00	3.7831	.78527

The p-value can be seen as a conditional probability whereas if the p-value is less than 0.05, when there is a difference, but otherwise it cannot be said that there is a difference.

3.5 ASSOCIATIONS WITH DEMOGRAPHIC VARIABLES

For the purpose of this feedback the gender will be excluded, as only 6 females contributed to the research. Furthermore Coloureds will also be excluded as only 3 Coloureds participated.

Table 3.79 Mean and Standard Deviation: LHHV metrics and factors giving stress

		N	Mean	Std. Deviation
Condition of truck	1	17	4.5147	.68163
	2	131	4.0821	.82883
	4	12	4.0417	.68119
	Total	160	4.1250	.81167
EXFAM	1	17	2.9314	1.02919
	2	131	3.0667	.85665
	4	12	3.2083	.88513
	Total	160	3.0629	.87421
ROL	1	17	3.9608	.88099
	2	131	3.7150	.78460
	4	12	4.1389	.62697
	Total	160	3.7729	.79073

From Table 3.80 it can be seen that the p-value is larger than 0.05. (Section 3.6)

Table 3.80 P-Value: Questions 17 and 25

		Sum of Squares	df	Mean Square	F	Sig.
Condition of vehicle	Between Groups	2.907	2	1.453	2.240	.110
	Within Groups	101.843	157	.649		
	Total	104.750	159			
EXFAM	Between Groups	.550	2	.275	.357	.701
	Within Groups	120.966	157	.770		
	Total	121.516	159			
ROL	Between Groups	2.646	2	1.323	2.147	.120
	Within Groups	96.770	157	.616		
	Total	99.416	159			

3.5.1 From the analysis, the following questions with order could be derived, which enabled a Spearman's rank correlation coefficient to be performed. Table 3.81 indicates that there is a positive correlation between the age and the driving experience, as well as the weight of the respondents. In other words, the older the respondents, the more driving experience they have and the heavier they weigh. It can also be derived from Table 3.81 that there is a negative correlation of -.333 between the age of the respondents and their level of education. In other words the older the respondents, the less likely they are to have higher levels of education.

Table 3.81 Spearman's rank correlation coefficient

		Age
Age	Correlation Coefficient	1.000
	Sig. (2-tailed)	
	N	166
Driving experience	Correlation Coefficient	.567**
	Sig. (2-tailed)	.000
	N	163
Length	Correlation Coefficient	.105
	Sig. (2-tailed)	.183
	N	164
Weight	Correlation Coefficient	.324**
	Sig. (2-tailed)	.000
	N	165
Education	Correlation Coefficient	-.333**
	Sig. (2-tailed)	.000
	N	162

3.6 ASSOCIATION WITH RELATED QUESTIONS

The *t*–test compares two groups with each other, comparing the means of two samples in relation to the variation in the data (expressed as the standard deviation of the difference between the means). In order to compare more than two groups the analysis of variance (ANOVA) is used to compare the means. In Table 3.82, Question 10 (Have you ever been involved in a truck accident) have been compared to Questions 17.1–17.5 (Factor: Conditions of truck), and Questions 25.1, 25.3–25.7 (Factor 1: EXFAM), as well as Questions 25.2, 25.8–25.9 (Factor 2: ROL). The mean in all three instances are 4.1 out of a possible 5 for "Condition of truck", 3 out of possible 5 for EXFAM and 3.8 out of a possible 5 for ROL. The mean for all three are thus medium to high.

Table 3.82

Group Statistics

	Have you ever been involved in a truck accident	N	Mean	Std. Deviation	Std. Error Mean
Condition of truck	1	36	4.1111	.82904	.13817
	2	129	4.1298	.79923	.07037
EXFAM	1	36	3.1926	.78016	.13003
	2	129	3.0346	.89302	.07863
ROL	1	36	3.7500	.86327	.14388
	2	129	3.7984	.76537	.06739

From Table 3.83, the *p*-values (sig. (2-tailed)), are all bigger than the level of significance (α) set to 0.05 with "Condition of truck" .904, "EXFAM" .303, and "ROL" .762. It can therefore not be said that there is a difference, as the null hypothesis cannot be rejected.

Table 3.83 Levene's test for Equality of Variances

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Condition of truck	Equal variances assumed	1.061	.305	-.123	163	.902
	Equal variances not assumed			-.121	54.507	.904
EXFAM	Equal variances assumed	.711	.400	.963	163	.337
	Equal variances not assumed			1.040	62.974	.303
ROL	Equal variances assumed	.403	.526	-.326	163	.745
	Equal variances not assumed			-.305	51.364	.762

3.7 AN EMPIRICAL INVESTIGATION ON FATIGUE

The empirical investigation includes the following:

- If there is a correlation between the number of kilometres travelled and drivers attending advanced driving courses.

The results are that the correlation coefficient between the average kilometres and frequency of advanced driving courses, is too low at 0.054 to be of any significance, therefore no correlation could be found (Table 3.84).

Table 3.84 Correlation between Average Kilometres and Advanced Driving Courses

			Average KM	Frequency of advanced driving courses
Spearman's rho	Average Kilometres	Correlation Coefficient	1.000	.054
		Sig. (2-tailed)		.500
		N	164	160
	Frequency of advanced driving courses	Correlation Coefficient	.054	1.000
		Sig. (2-tailed)	.500	
		N	160	161

- To establish whether there is a correlation between drivers working overtime and the number of kilometres driven. The results are that the correlation coefficient is too low at 0.102 to be of any significance therefore no correlation could be found (Table 3.85).

Table 3.85 Correlation between Average Kilometres and Frequency of Overtime

			Average Km per month	Frequency of overtime
Spearman's rho	Average Km per month	Correlation Coefficient	1.000	.102
		Sig. (2-tailed)		.198
		N	164	162
	Frequency of overtime	Correlation Coefficient	.102	1.000
		Sig. (2-tailed)	.198	
		N	162	164

- To establish if there is a correlation between respondents working overtime, respondents feeling drowsy, and the likelihood of falling asleep while driving.

The results are that the correlation coefficient is above 0.2 for question 19 (Frequency of working overtime), and question 27 (Likeliness of falling asleep), as well as question 26 (Likeliness of feeling drowsy), which makes it significant. There is thus a positive correlation between drivers working overtime and drivers feeling drowsy and might fall asleep (Table 3.86).

Table 3.86 Correlation between Frequency of Overtime, Drowsiness and Falling asleep

			Frequency of overtime	Likeliness to feel drowsy	Likeliness to fall asleep
Spearman's rho	Frequency of overtime	Correlation Coefficient	1.000	.167*	.208**
		Sig. (2-tailed)		.035	.008
		N	164	160	162
	Likeliness to feel drowsy	Correlation Coefficient	.167*	1.000	.474**
		Sig. (2-tailed)	.035		.000
		N	160	162	161
	Likeliness to fall asleep	Correlation Coefficient	.208**	.474**	1.000
		Sig. (2-tailed)	.008	.000	
		N	162	161	164

- To establish if there is a correlation between respondents who are overweight, with respondents who visit the doctor or the clinics. The results are that although the coefficient is not at 0.2, it is at -0.184 and 0.194, close enough to be of significance. What is interesting, is that it is negatively correlated, which indicates that the more overweight the respondents, the less likely they are to visit the wellness clinics situated along the N3 (Table 3.87).

Table 3.87 Correlation between Weight, visits to Doctor and Clinic

			Weight	Frequency of Doctor Visits	Frequency of Clinic Visits
Spearman's rho	Weight	Correlation Coefficient	1.000	.045	-.184*
		Sig. (2-tailed)		.568	.018
		N	165	165	164
	Frequency of Doctor Visits	Correlation Coefficient	.045	1.000	.194*
		Sig. (2-tailed)	.568		.013
		N	165	166	164
	Frequency of Clinic Visits	Correlation Coefficient	-.184*	.194*	1.000
		Sig. (2-tailed)	.018	.013	
		N	164	164	164

- To establish what the effect of snoring is on the drowsiness or sleepiness of the respondents. The results are that the correlation coefficient is higher than 0.2, which makes it significant. It can thus be assumed that there is a positive correlation amongst drivers that snore, drivers feeling tired when the wake up, drivers feeling drowsy and drivers who might fall asleep behind the wheel (Table 3.88).

Table 3.88 Correlation between Feeling drowsy, Falling asleep, Snoring and Feeling tired when waking up

			Likeliness to feel drowsy	Likeliness to fall asleep	Do you snore	Are you tired when awake
Spearman's rho	Likeliness to feel drowsy	Correlation Coefficient	1.000	.474**	.320**	.402**
		Sig. (2-tailed)		.000	.000	.000
		N	162	161	158	161
	Likeliness to fall asleep	Correlation Coefficient	.474**	1.000	.245**	.331**
		Sig. (2-tailed)	.000		.002	.000
		N	161	164	160	163
	Do you snore	Correlation Coefficient	.320**	.245**	1.000	.253**
		Sig. (2-tailed)	.000	.002		.001
		N	158	160	162	162
	Are you tired when awake	Correlation Coefficient	.402**	.331**	.253**	1.000
		Sig. (2-tailed)	.000	.000	.001	
		N	161	163	162	165

- Cross-tabulations have also been run between the various variables to determine if there is a correlation between the country of origin and education levels.

According to Table 3.89, the dependent variable, (Question 3, Country of origin) goes on the left and the independent variable (Question 9, Education levels) goes on the top. For the purpose of this exercise question 2, (Country of origin) has been split in two, where "1" is South Africa with 125 respondents, and "2" is the rest of the countries with 34 respondents. A total therefore of 159 respondents. If Table 3.91 is compared with the questionnaire (Appendix 1), it is derived that from the 125 respondents 22 (17.6%) have an education level of up to Gr.7, 53 (42.4%) up to Gr. 10, 45 (36%) up to Gr.12 and 5 (4%) up to college/university level. From other countries (respondents "2"), 1 (2.9%) has an education level up to Gr. 7, 13 (38.2%) up to Gr.10, 20 (58.8%) up to Gr.12 and none at college/university level.

Table 3.89 Cross-tabulation between Country of origin and Level of Education

Question 2			Question 9: What is your level of education				Total
			1	2	3	4	
From which country do you come	1	Count	22	53	45	5	125
		% within Q3	17.6%	42.4%	36.0%	4.0%	100.0%
	2	Count	1	13	20	0	34
		% within Q3	2.9%	38.2%	58.8%	0.0%	100.0%
Total		Count	23	66	65	5	159
		% within Q3	14.5%	41.5%	40.9%	3.1%	100.0%

The Cramer's V and Phi measures of association, calculate the strength of the relationship between two variables in the case of Phi, and two or more variables in the case of Cramer's V. The variables have measured between 0.00 (No Relationship) and 1.00 (Perfect Relationship). As the cross-tabulation in Table 3.90 consists of only two variables, the Cramer's V and the Phi, variables are measuring the same on .236, which is at a moderately acceptable level, indicating that the respondents from other countries, tend to have higher levels of education than their South African peers.

Table 3.90 Cramer's V and Phi Nominal variables

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.236	.031
	Cramer's V	.236	.031
N of Valid Cases		159	

3.8 SUMMARY

The purpose of Chapter 3 has been to investigate, from an empirical perspective, the South African LHHV drivers in order to profile them from a safety perspective. The responses from the respondents have been comprehensive, and although it is a relative small sample of the LHHV population, the results can easily be applied to the LHHV market. The only concern is the negativity from the respondents with respect to sex workers at a modern truck stop. The concern is whether or not the phenomenon, 'socially desirable responses' that relates to respondents giving answers which they believe to be socially acceptable, had an effect on the answers given, as the questionnaires have been completed on a one-on-one basis.

One aspect of the study that stands out is the possibility of overconfidence bias amongst LHHV drivers. With 50% of the respondents admitting to being tired behind the wheel, but only 30% of them considering the possibility of falling asleep while driving, the possibility exists that some respondents fail to realise the limits of their abilities.

The information gathered from this research can successfully be compared with the findings in the literature review. These findings are discussed in more detail in the next chapter.

CHAPTER 4

CONCLUSIONS AND RECOMMENDATIONS

4.1 INTRODUCTION

During this research the magnitude of the South African transport sector and the role it plays within the South African economy, has once again been highlighted. South Africa, as a developing country, forms an integral part of the BRICS. The building of roads and road safety form part of the National Development Plan. It is acknowledged by the Government that the South African road fatalities are at an unacceptable high level and that it is costing the economy millions per year. The Road Traffic Management Corporation (RTMC), which is the coordinating arm of the Department of Transport (DoT), has a goal to reduce the road fatalities by half over a thirty year period. South Africa has a strong and well developed economy with a projected growth rate of 3%. This growth is bound to lead to growth within the transport sector.

4.2 MAIN FINDINGS

Bearing in mind the magnitude of the problem, it has been disturbing to learn how little research has been done on the subject of long haul drivers within the transport sector. One of the best researched articles on this subject has been done by Maldonado, *et al*. in 2002. Very little follow-up research, however, could be found. On the contrary, transport and transport related research is a well-studied field in the Americas, Europe, Australia and even in certain countries in Africa.

The transport industry is quite dynamic. With record sales and projections of growth figures exceeding the inflation rate, this industry forms the backbone of the South African economy. However, it has also been found that it is a cut-throat industry, with low margins and high risks. Many companies in this sector are forced to cut corners in order to show a profit. Economies of scale play a cardinal role in this sector, as high

operating expenses (OPEX) and low profit margins force companies to grow bigger in order to spread the risk.

Findings from the literature study show little commitment from National Government, Local Governments, Parastatals, and companies within the transport sector, to address this problem. Although legislation exists, it dates back to the mid 1990's. The Ghana conference that was held in 2007 is one of the best recorded strategic conferences of its kind, but yet again it dates back more than five years.

The RTMC's target period to reduce road fatalities by half is bound to expire by the year 2020. No indication could be found that this target will be met.

There are many articles written on the subject of road safety with good suggestions and positive feedback, especially by the Arrive Alive campaign, but no evidence could be found that these suggestions are receiving consideration from the responsible departments. The Arrive Alive campaign is specifically launched to serve as a communication media between the Government and the general public.

From the empirical research, it is suggested that truck driving in South Africa is seen as an entry level job. Long haul heavy vehicle drivers are generally not paid well, thus they need to work long hours to subsidise their income. Education levels are low and little effort is spent on further education. Although most drivers report that they are in possession of a public drivers permit (PDP), only a few of them go on regular advanced driving courses.

Although most of the respondents are of the opinion that there are enough LHHV drivers in South Africa, a great number of them have reported that they have been head-hunted during the last two years, which leave the impression that there might be a gap in the market for skilled drivers.

From the research, it is clear that the prevalence of sex workers is high among LHHV drivers. Most of the respondents, however, have reported that they do not want sex workers at truck stops. These responses could be bias, as most of the questionnaires have been completed on a one-on-one basis. Based on the research results, the question arises if LHHV drivers are given enough family time, and if they are sufficiently informed about the dangers of sexually transmitted diseases (STDs).

From the literature study it was suggested that about a third of the South African LHHV drivers sleep less than four hours in a 24 hour cycle. During the empirical study about 37% of all respondents have reported that they still feel tired when they wake up, which is in line with the national standard of sleep deprivation under drivers. 60% of drivers report that they sleep away from home while working, while less than 5% of the respondents sleep at home. From a social perspective these are devastating statistics taking into consideration that more than 65% of the respondents are either married or live with a life partner.

As about 83% of all respondents report that other road users give them stress, it can be derived that there might be a lack of tolerance from the general road users towards trucks.

4.3 EVALUATION OF STUDY

4.3.1 MAIN OBJECTIVE

The main objective of this study has been to profile the safety needs of the South African truck transportation sector.

The literature study sets a proper foundation for the empirical research to follow. From the literature study the researcher could derive international trends and standards that could be tested and evaluated in the South African context. Although truck driving is an international concern, and there are many similarities concerning their safety, the literature review has indicated that South Africa is not as pro-active in combating this phenomenon as the rest of the world.

The empirical study has presented valuable information regarding truck drivers and the safety issues they face while performing their duties. Valuable suggestions stemmed from this study, both from a literature, as well as an empirical perspective.

Considering the above, the main objective has been met.

4.3.2 SECONDARY OBJECTIVES

The following secondary objectives stemmed from the main objective:

- To compile and understand the profile of a typical truck driver within the South African commercial freight transportation sector;
- To determine the aggravating factors compounding to the increased number of road accidents involving long haul heavy vehicles;
- To determine the role of human behaviour with respect to drivers' own safety and the safety of their cargo;
- To investigate the effectiveness and efficiency of current legislation and the efforts made by role players in relation to long haul heavy vehicle drivers perspectives thereof;
- To determine the role company owners play in ensuring driver safety; and
- To investigate the socio-economic effect long haul heavy vehicle driving has on the country, communities and families.

Both the literature review, as well as the empirical study, have succeeded in addressing these secondary objectives.

The profile of a typical truck driver from a literature perspective, is typical to that of the respondents in this study.

From the literature study, one could derive that driver fatigue plays a prominent role in road accidents. This fact was underlined by the fact that most of the respondents in this study admit that they do not get enough sleep and that they still feel tired when they wake up.

Human behaviour, and to take personal responsibility for the result people want in life, is a concern of modern society. This fact was reiterated by the lack of personal responsibility the respondents take. Very few of them visit clinics or doctors on a regular basis and even less take steps to academically improve themselves. Due to their need for extra money, few of the respondents regard sufficient sleep, a healthy diet and/or exercise as important.

From the literature review it is clear that the current legislation is very old. On the contrary, it seems as if the steps taken by SANRAL, the provincial law enforcement agencies and the private contracted-in weighbridge operators, are bearing fruit as, according to the empirical study, most respondents report that they do not overload their vehicles.

From both the literature review as well as from the empirical research, no evidence could be found that companies in the LHHV sector regard their human assets as important. However, it needs to be stated that this was not a factor that was specifically researched during this study.

From both the literature review as well as from the empirical research, it is clear that the socio-economic state of drivers in the LHHV sector needs urgent attention.

4.4 RECOMMENDATIONS

- In an article by Arrive Alive (2013), compulsive rest periods for LHHV drivers from 23pm to 4am has been suggested. Numerous drivers have suggested the same thing. It is recommended that the Government take cognisance hereof and implement it with immediate effect.
- It is recommended that the decrease in road fatalities be prioritised to a daily tendency, until it reaches satisfactory levels. Currently, the only evidence of this tendency being prioritised is seen over the festive seasons such as Christmas and Easter.
- It is further recommended that legislation and the execution thereof must be non-bias and effective to such an extent that it will level the playing field for all companies within this sector. Companies that want to cut corners by overloading or non-compliance of traffic regulations must be called to task.
- In order to reach their goal of reducing the road fatalities by half, it is recommended that short-term, measurable goals be put into place and reported on, on a weekly basis.
- It is recommended that the industry be centrally regulated with respect to minimum wages, maximum driving hours and training. Regular spot checks from officials must be conducted until the levels of LHHV drivers reach a satisfactory level. The 0% alcohol level for professional drivers must be implemented, and regular health tests must be conducted with compulsory medical clearance certificates filed on the employee's file. Regular spot checks should be conducted by officials, until satisfactory levels are reached.

- It is recommended that there must be a bigger awareness under truck drivers concerning the effect of poor eating-, drinking-, sleeping- and sexual habits with regard to their own personal safety.
- It is also recommended that there must be an awareness campaign amongst the general public as well as truck drivers in order to create mutual tolerance for each other.
- It is lastly recommended that dedicated truck lanes and more public rest areas and truck stops be considered (Ueckerman, 2013).

4.5 AREAS FOR FURTHER RESEARCH

It is suggested that the following areas need further consideration:

- Company's attitude towards driver safety, and their social responsibility to the social-economic welfare of their workers;
- The study could be extended to other parts of the country and also to weekend drivers;
- The divorce rate among LHHV drivers and the effect of the absent father syndrome on families.

4.6 CONCLUSION

Although the South African transport sector is quite dynamic, little is known about the, so called "Siele-op-wiele", or freely translated to English, "Souls-on-wheels". It is a sector of the market where the people within the sector forms a close community with their own slang language and unique habits and even their own radio program on "Radio Sonder Grense", called "Siele op wiele". It is a sector where the social media such as Facebook, Twitter, Whatsapp and cell phones are becoming the norm, but where the old citizens band radio (CB Radio) still exists. It is a sector that captures the imagination of the nation to such an extent that there are even songs written about them (Smith, 2012).

But it is also a dangerous sector to work in and little recognition is asked and very little given. This study intended to shed some light on the transport sector, but after all is said and done, it is still the lonely drivers and their trucks pushing for the next up- and downhill, that remains.

This study does not intend to be conclusive, but rather serves as a foundation for others to excel and to improve on it, and to better the working conditions of the men and women rolling their wheels around the clock in order to turn the wheels of the economy of South Africa.

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APPENDIX A – QUESTIONNAIRE

This questionnaire will take only a few minutes to complete. The aim is to profile truck drivers from a safety perspective and we hope this will eventually add value to the Long Haul Heavy Vehicle Industry. All that is expected from you is your honest answer and your **confidentiality is guaranteed**. This Questionnaire is completed anonymous. Your co-operation is appreciated. Please answer all questions by marking the appropriate block x

1 What is your sex?

Male	Female

2 To which ethnic group do you belong to?

White	Black	Coloured	Indian	Other (Specify)

3 From which country do you come from?

South Africa	Mozambique	Swaziland	Lesotho	Other (Specify)

4 Married status

Married	Divorced	Single	Partner	Other (e.g. traditional)

5 How old are you? (in Years)

Under 21	21-31	31-41	41-51	Older (Specify)

6 Driving Experience with a truck(in Years)

1-4	4-7	7-10	10-13	More (Specify)

7 How tall are you? (in Meter)

Shorter than 1.6	1.6 - 1.8	1.8 - 2.0	2.0 - 2.2	Taller (Specify)

8 How much do you weigh? (in Kilogram)

Less 71	72 - 80	82 - 90	92 - 100	More (Specify)

9 What is your level of education?

Grade 7 and less	Up to Gr.10	Up to Gr.12	College/University	Other (Specify)

10 Have you ever been involved in a truck accident?

Yes	No

11 What are the average kilometres that you drive per month?

0 - 3000	3001 - 5000	5001 - 7000	7001 - 9000	More (Specify)

12 What year model is your truck?

Older than 2005	2005 - 2007	2008 - 2011	Newer than 2012	Not Sure

13 How many axles do your horse and trailer have

2 Axle	3 - 4 Axle	5 Axle	Tanker	Other (Specify)

14 How often do you go on advanced driving or safety courses?

Never	Monthly	Once a Year	Once every 5 years	Not Sure

15 Do you have a Public Driving Permit (PDP)?

Yes	No	Not Sure

16 What code drivers licence do you have?

B	C	EB	EC	Other (Specify)

17 To what extent do you agree or disagree with the following statements?

17.1 Your truck's Brakes are fully functional

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

17.2 Your truck's Lights are fully functional

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

17.3 Your truck's Tyres are in good condition

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

17.4 Your truck's Windows are in good condition

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

17.5 Do you over-load your truck

Almost Never	Seldom	Often	Almost Always

18 Remuneration: How do you get paid?

Per Hours	Per Kilometre	Salary + Overtime	Salary + Bonus per Kilometre	Other (Specify)

19 How often do you work overtime for extra money?

Almost Never	Seldom	Often	Almost Always

20 To what extent do you agree with the following statement?

20.1 There are enough truck drivers available in South Africa

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

21 When last did another company offer you a job as a truck driver?

Within last 6 months	Within 12 months	Within 18 months	Within 24 months	Never

22 How often do you go for check-ups at a doctor or a clinic? (e.g. Blood pressure, eye test, HIV, TB etc.)

Never	Monthly	Once in 3 Months	Once in 6 months	Yearly

23 How often do you visit the Wellness Clinics that are situated along the N3?

Never	Monthly	Once a Year	Once every 2 years	I don't know about the Clinics

24 In your opinion, do truck drivers use the services of sex workers?

Almost Never	Seldom	Often	Almost Always

24.1 If "Yes", what do you think is their preference?

Male	Female	Both	Not Sure

24.2 How often do you think are they requiring the services of sex workers?

Daily	2-3 Times a week	Once a week	Once in two weeks	Not Sure

24.3 What precaution do you think they are taking against Sexually Transmitted Disease? (STD), e.g. HIV Aids

Require same person	Condoms	Shower	Gel	Other (Specify)

25 What is the possibility that the following factors can give you stress?

25.1 The inside and lay-out of the truck gives me stress

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

25.2 Other road-users give me stress

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

25.3 The hours that I drive give me stress

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

25.4 The way my boss / controller treats me gives me stress

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

25.5 My family life gives me stress

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

25.6 The boring long road gives me stress

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

25.7 The weather conditions on the road give me stress

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

25.8 The loading / off-loading gives me stress

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

25.9 My remuneration (salary) gives me stress

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

26 How likely is it that you feel drowsy while driving?

Almost Never	Seldom	Often	Almost Always

27 How likely is it that you might fall asleep while driving?

Almost Never	Seldom	Often	Almost Always

28 In your opinion, does the following methods help you to stay awake when you feel drowsy?

28.1 Drink an energy drink

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

28.2 Drink coffee or tee

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

28.3 Drink alcohol

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

28.4 Stop driving and take a power nap

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

28.5 Open the windows to get fresh air

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

28.6 Turn up the radio

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

28.7 Turn up the air conditioner

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

28.8 Sing or talk to yourself

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

28.9 Stop driving and walk around the truck or do some exercise

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

29 How long do you normally take a power nap (short sleep)?

5 minutes	10 minutes	15 minutes	30 minutes	Other (Specify)

30 Do you snore when you sleep?

Almost Never	Seldom	Often	Almost Always

31 Do you set an alarm clock to wake you up?

Almost Never	Seldom	Often	Almost Always

32 Do you still feel tired when you wake up?

Almost Never	Seldom	Often	Almost Always

33 What time do you normally **stop** driving to take a rest / break?

6pm - 8:59pm	9pm - 10:59pm	11pm - 11:59pm	00am - 01am	Other (Specify)

34 What time do you normally **start** to drive?

10pm - 11:59pm	00am - 01:59am	02am - 03:59am	04am - 05:59am	Other (Specify)

35 Do you sleep at the following places while working (while driving your truck)?

35.1 At your own home

Almost Never	Seldom	Often	Almost Always

35.2 At your company depot / yard

Almost Never	Seldom	Often	Almost Always

35.3 Next to the road

Almost Never	Seldom	Often	Almost Always

35.4 At garages or in towns

Almost Never	Seldom	Often	Almost Always

35.5 At a truck stops

Almost Never	Seldom	Often	Almost Always

36 To what extent are the following facilities important at a truck stop?

36.1 A Games Room

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

36.2 Extra Rooms to Rent

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

36.3 Braai Facilities

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

36.4 Sex Workers

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

36.5 Wash bay for Trucks

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

36.6 Laundry Service

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

36.7 Gym to train or exercise

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

36.8 Internet Access

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

36.9 Auto bank facility

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

37 To what extent do you agree or disagree with the following statements?

37.1 Driving a truck is a dangerous job

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

37.2 It is likely (possible) that I will get robbed from my truck or my cargo

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

38 Have you ever been robbed from your truck

Yes	No

39 Have you ever been robbed from your cargo

Yes	No

40 What is the single most important factor contributing negatively to you as a driver? _____

41 What is the single most important factor contributing positively to you as a driver? _____

42 Do you have any suggestions to improve the safety on the roads for truck drivers? (30 words or less)