Towards greener transport and sustainable travel behaviour: The case of the South African government vehicle fleet.

by

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DECLARATION

By submitting this dissertation electronically, I declare that the entirety of the work contained therein is my own, original work, that I am the sole author thereof (save to the extent explicitly otherwise stated), that reproduction and publication thereof by Stellenbosch University will not infringe any third-party rights and that I have not previously in its entirety or in part submitted it for obtaining any qualification.

Date: December 2022

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ABSTRACT

Business travel is one of the mechanisms used by various organisations to conduct business activities that are in line with their operational objectives. As in the private business sector, the South African government departments also travel to various locations to support service delivery in accordance to the Public Service Act(Department of National Treasury, 2017). Travel activities are predominately characterised by the use of motor vehicles powered by petrol or diesel engines. Petrol and diesel engines produce emission and later greenhouse gasses which cause global warming(Santos, 2017). According to Ducharme Consulting(2018), the South African government owns and operates a fleet of over 39 000 vehicles across all nine provinces. This number excludes an additional 55 000 vehicles which is owned and operated by the South African Police Service (SAPS) (Ducharme Consulting, 2018). With the risk posed by the effect of global warming, the South African government should change from traditional travel to greener and sustainable travel behaviour in order to reduce the negative externalities caused by its dependence on fossil-fuel road transportation to fulfil its mandate.

The intension of this study is to investigate the vehicle fleet and related travel activities of the South African government departments in relation to green transportation and sustainable travel behaviour. The aim is to understand to what extent the departmental vehicle fleet and travel behaviour is aligned with a greener and sustainable transportation system. Through this study it is envisaged to encourage greener transport and sustainable travel behaviour within government to reduce greenhouse emissions.

The study collected data through the use of questionnaires and obtained financial data from National Treasury RT62/68 monthly reports. The questionnaires collected data from National Government Transport Officers and the data from National Treasury RT62/68 monthly reports was obtained from service providers who manage and administer the government subsidised motor vehicles.

The findings revealed that government does not consider environmental impacts when travelling nor when procuring motor vehicles for service delivery activities. The questionnaire findings and data collected from service providers who administers government subsidised motor vehicle scheme revealed a total fleet of 7980 and only 0.14% of the total fleet are electric vehicles (EV). The amount of litres of fuel consumed by this identified vehicle is 20 797 580.20. Lack of environmental considerations is also demonstrated by the choice or the preferred make of the vehicle.

The preferred vehicle is a 4x2 bakkie with an engine capacity of 2151-2500 cubic centimetre (cc). The preferred make represents 29.61% of the total government subsidised motor vehicles as compare to the most cost effective and fuel efficient make which represents only 0.19% of the total government subsidised motor vehicles. The preferred vehicle make is not fit for purpose as bakkies by design and specifications are meant to carry a payload in business.

The findings also revealed unsustainable travel behaviour based on the incurred travelling fuel costs for twelve months amounting to R293 661 173.00 and lack of policy interventions which is demonstrated by the absence of CO_2 emission mitigating directives within the National Government Transport policy and end user departments.

Government as a key stakeholder and public policy maker should begin transforming its own vehicle fleet to lead the transition to a greener and sustainable transport system. The need for the use of economical, fuel efficient and electrified motor vehicles that is integrated with effective transport management is crucial for sustainable transportation and development, therefore government should lead by example.

ABBREVIATIONS AND TERMINOLOGY

A-S-I approach	–	Avoid Shift improve approach
CO_2	–	Carbon dioxide
EPA	–	U.S. Environmental Protection Agency
EV	–	Electric Vehicle
GDP	–	Gross Domestic Product
GHG	–	Greenhouse gasses
GTS	–	Green transport strategy
ICT	–	information and communications technology
IRTAD	–	International Traffic Safety Data and Analysis
NDOT	–	National Department of Transport
NMT	–	Non-motorised transport
SOVs	–	Single Occupancy Vehicles
SUV	–	Sport Utility Vehicle
TBCP	–	Travel Behaviour Change Program
UNCED	–	United Nations Conference on Environment and Development
UNEP	–	The United Nations Environment Programme
WCED	–	World commission on environment and development

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CHAPTER 1

INTRODUCTION

"Governments are among the largest consumers in an economy. The public sector on average spends 45%-65% of their budgets on procurement. Given this substantial purchasing power, governments have enormous leverage to stimulate and drive markets for sustainable production and consumption when they make a determined effort to purchase 'green' products and services. Adopting such an approach is a smart form of procuring goods and service – it not only improves the efficiency of public procurement but also uses the public market power to bring about significant environmental and socio-economic benefits"

(Sustainable Energy Africa, 2012)

1.1 Statement of purpose

The purpose of this study is to determine how sustainable business travel within South African government departments is and to what extend the government fleet is adopting greener transport technologies.

1.2 Background and motivation

Climate change and global warning poses a great threat to humankind. As mentioned by Ngongeh, Idika & Ibrahim Shehu (2014) global warming which is mainly caused by greenhouse gases (GHG) is responsible for the increase in temperature on the planet and these temperature increase is causing diseases to manifest in new regions which were previously not known for infections.

Global warming is not only causing diseases but also other environmental problems. According to Cline (2008), as he directly express it , "in the long list of potential problems from global warming, the risks to the world agriculture stand out as among

the most important". Cline (2008) further indicated that it has been noted that most developing countries will suffer more in the agriculture sector due to the impact of global warming than developed and industrial countries.

As GHG increases, many countries and scientist around the world started to research extensively on climate change and possible mitigating factors to reduce GHG. One of the biggest sectors that contributes to global warming is the transportation sector through the production of carbon dioxide (CO_2) emissions. The United State Department of Transportation report prepared by Greene, Baker & Plotkin (2011) emphasized the vital role of transport in the economy and quality of life. The report also indicated that transportation has made the US to be more reliant on oil. A U.S. Environmental Protection Agency (EPA) (2021) report furthermore indicated that transport is responsible for more than a quarter of U.S. emissions of the greenhouse gases as reflected in figure 1.

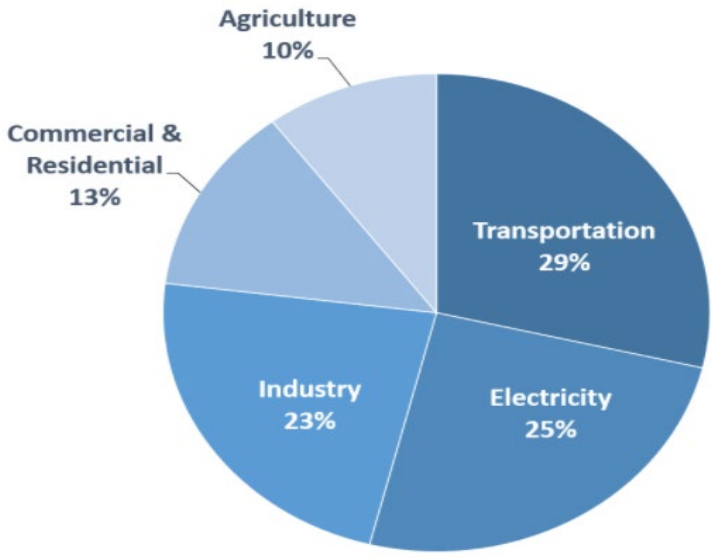

FIGURE 1: THE TOTAL US GREENHOUSE GAS EMISSIONS BY ECONOMIC SECTOR IN 2019
Source(EPA, 2021)

The EPA (2021) also distinguishes greenhouses gas emissions from fossil fuel combustion by sector and fuel type. Figure 2 indicate that petroleum used in the transportation sector is the biggest contributor to CO_2 emissions.

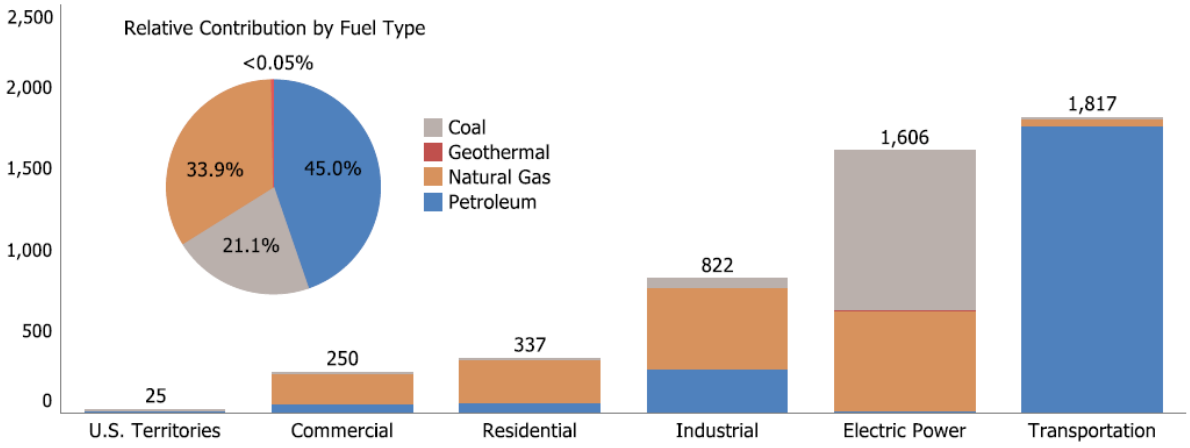

FIGURE 2: 2019 CO_2 EMISSIONS FROM FOSSIL FUEL COMBUSTION BY SECTOR AND FUEL TYPE
Source(EPA, 2021)

The Global Business Travel Association (Sims, 1994) wrote that "all means of travel and transport, car fleets, rail travel to aviation, have an impact on the environment and not only through greenhouse gas (GHG) emissions but also through noise, waste and land occupancy".

A World Bank report prepared by Faiz, Weaver & Walsh (1996) stated that there is an overwhelming increase in motor vehicles powered by petrol or diesel engines in developing countries and yet there is no balance of mixed transport modes that include non-motorised transport and rail in high-volume corridors. This notion of increased use of motorised transport and limited use of emission control technologies, led to motor vehicles emerging as the largest source of urban air pollution in the developing world. Other negative impacts of motor vehicle use include accidents, noise, congestion and increased energy consumption (Faiz, Weaver & Walsh, 1996). A World Bank report authored by Gorham (2022) indicated a rapid growth in urbanisation and motorisation across developing countries. The benefit of increased motorisation will translate into high access to good and services due to enhanced mobility but the future sustainability question must be address now (Gorham, 2022).

South Africa is ranked 13th globally with regards to its GHG emission contribution (Olojede, 2021). According to Oladunni, Mpofu & Olanrewaju (2022), South Africa is the largest contributor of emission in Africa and responsible for 1.2% of global emissions. Locally, the South African transport industry is the second highest GHG contributor and is responsible for over 23% emissions after the energy sector purely

due to motorised transports' reliance on fossil fuel (Oladunni, Mpofu and Olanrewaju, 2022).

Olojede (2021) indicated that the Greenhouse Inventory for South Africa for the period 2000 to 2010, revealed an increase in GHG emissions from transport by 32% from 36,016 Gg CO_2eq in 2000 to 47,607 Gg CO_2eq in 2010. South Africa has the highest motor vehicle per capita in Africa, with 12 884 727 motor vehicles being registered in South Africa by the end of June/July 2021 (ENatis, 2021).

Due to the climate change, many countries have begun to change their approach towards how they travel in general. Interventions by the National Department of Transport (NDoT) to reduce Greenhouse Gases (GHG) are well documented in the Green Transport Strategy for South Africa (GTS) (2018-2050) (DoT, 2018). According to the Green Transport Strategy (GTS), road-based transport in South Africa is responsible for 91.20% of the total emissions within the entire transport sector in the country. The vision of the GTS is to substantially reduce GHG emissions and other environmental impacts from the transport sector by 5% by 2050.

1.3 Aims and Objectives

The aim of this research paper is to examine the South African government department's travel activities in relation to greener transport and sustainable travel behaviour. The research question is therefore:

To what extent is the South African government departments motor vehicle fleet transforming towards greener transport and sustainable travel behaviour?

The objectives is to:

- Document the motor vehicle procurement plan
- Analyse the total number of vehicles in service
- Determine the use of alternatives like the use of telecommunications that reduces travel
- Assess policy interventions

1.4 Structure of dissertation

In Chapter 2, the literature review marks the beginning of the dissertation by comprehensively reviewing academic journals and industry reports. The literature review starts by discussing the concepts of sustainable development and the green economy. This chapter provide the background about what sustainable development and the green economy entails and how it progresses to introduce sustainable travel behaviour and greener transport. Secondly, the literature review chapter will then define what constitutes green and sustainable transport. Definitions will provide components of sustainable transport and why sustainable travel behaviour is important. Furthermore, this chapter will reveal how sustainable transport and green transport relates to each other. Thirdly it will review policy documents that attempts to address the on-going concern about greenhouse gases from transport activities. Lastly the literature review will discuss methods of discouraging travel by changing travel behaviour.

The literature review chapter will be followed by an overview of the case study in chapter 3. The case study chapter will discuss the use of motor vehicles by the government departments in response to service delivery. This chapter will explain the role of government departments in relations to the provision of services to the community to provide a clear understanding on the magnitude of the government vehicle fleet and travel within government. The focus will be on the size of the fleet, kilometres travelled, government policy documents, as well as funding and expenditure. Furthermore, this chapter will introduce the role of the national transport forum in line with the management of the government vehicle fleet.

In chapter 4, the method used to collect data will be explained. The aims and the objectives of the research data collection will be explored. The key stakeholders in the management of the vehicle fleet and travel in government will be identified. These stakeholders have a direct influence in the government fleet operations and related activities. Two data collection instruments was used to collect data. The first one was questionnaires, which was directed to the Transport Officers which are officials appointed by government departments to manage transport operation including fleet.

The second instrument collects existing data from the service providers to support the administration of the subsidised government motor vehicles.

Chapter 5 reveals the findings from the questionnaires and existing data as explained in chapter 4. The findings indicate the sustainability of travel within government by revealing government Transport Officer's response to green initiatives, how green the government fleet currently is and lastly how sustainable is the use of subsidised government motor vehicles scheme.

The discussion and implications of the research findings will be discussed in chapter 6. The key findings will be explained in accordance to the research aims and objectives. The research findings' implications will pave a way to create more platforms to raise awareness in government on the impact of using motor vehicles powered by fuel on the environment. The awareness will translate in transforming the government vehicle fleet into a greener and sustainable transportation system. The dissertation will conclude in chapter 7 by reflecting on the thesis objectives and proposing reform to accelerate the adoption of greener and more sustainable transport.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

In chapter one, road based travel was identified as responsible for 91.20% of the total emissions within the entire transport sector in South Africa (DoT, 2018). The focus was on the use of motor vehicles as a means of transport. Green transport and sustainable travel was introduced in response to increasing greenhouse gas emissions.

The purpose of this chapter is to provide a broad understanding on the concept of green transport, sustainable travel and to demonstrate how the two concepts interrelates with one another. Secondly, to explain why it is crucial to implement green and sustainable travel solutions.

The literature review chapter begins by detailing the process used to obtain past papers and other relevant material to unpack the elements of green transport and sustainable travel.

In order to understand these two concepts clearly, green travel and sustainable travel, the following will be discussed:

- Sustainable development
- The importance of green transport
- Government policies on transport and the environment
- Greenhouse gases

2.2 Literature review process

Various sources were reviewed to expand the body of knowledge from different point of views. The main keywords and themes were identified during the research aims and objectives construction.

Various authors who researched extensively about green transport and sustainable travel were identified. Government policies concerning environmental issues were also reviewed to understand the government's standpoint on green solutions particularly on transportation.

2.3 Overview of green transport and sustainable travel behaviour

2.3.1 Sustainable development and the green economy

Before going deeper into the concepts of green and sustainable transport, it is important to provide a little history about the green economy and sustainable development. In 1983, the World Commission on Environment and Development (WCED) was organized by the United Nations. The main purpose of this commission was to address environmental problems that affect social development and the economy as a whole. In 1987 the commission published a report titled *"Our Common Future".* Keiner (2005) said sustainable development was proposed by the WCED report as a concept that maybe applied to resolve developmental economic and environmental problems.

As defined by WCED (1987), sustainable development is a development that meets the needs of the present generation without compromising the ability of the future generation in meeting their own needs. The 1992 United Nation Conference on Environment and Development (UNCED), made it compulsory for member nations to have a sustainable development strategy and incorporate policy measures outlined in the Rio Declaration and Agenda 21. Agenda 21 is a comprehensive plan of action to be taken globally, nationally and locally by organizations of the United Nations system, governments, and major groups in every area in which humans impact the environment.

Although many governments implemented sustainable development strategies and solutions, there was still an on-going concern about environmental impact and economic development. According to UNDESA (2012), to support sustainable development, the green economy was proposed as more countries were searching for effective ways of dealing with climate change. The green economy concept gained more attention that warranted expansion in the literature by many authors from different countries including the UN conference on Sustainable Development which convened in 2012.

UNDESA (2012) indicated that there are about eight different definitions of what constitute the green economy, but the one which has been quoted by many authors is defined by the United Nations Environmental Programme (UNEP). The UNEP(2013) defines green economy as “one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. It is low carbon, resource efficient, and socially inclusive”(UNEP, 2013).

2.3.2 Sustainable and green transport definitions

The above section provided the history and background about the concepts of sustainable development and the green economy. These two concepts gave birth to sustainable travel and green transport.

Sustainable transportation has been identified by most authors and researchers to be one of the most important drivers in reducing greenhouse gases. The subject on sustainability of transport has been expanded in line with “goal 13” of the United Nations Sustainable Development Goals that seek to protect the environment and move towards a green economy.

This paper will provide definitions from different authors on sustainable transport, identify common themes and elements from the definition and lastly demonstrate how sustainable transport relates to green transport.

Definition 1 - Sustainable transportation is a transportation system that is capable of delivering required capacity and performance, uses inexhaustible

energy source, is compatible with the desired lifestyle, and is clean and affordable (Wadhwa, 2000) .

Definition 2 - Committee of the European Union defines sustainable transport as a system that meets the basic needs of individuals and society by accessing it in a safe manner, consistent with human health and ecosystems and fulfils the requirements of capital values within and between generations. It is affordable and efficient, it offers a choice of modes of transport and supports a thriving economy; it reduces emissions and waste taking into account the planet's capacity of absorption, minimises the use of non-renewable resources, limits the consumption of renewable resources to sustainable levels, recycles and reuses their components, minimises land use, and reduces noise (Sztangret, 2020).

Definition 3 - Sustainable transportation as, "…a set of transport activities together with relevant infrastructure that, collectively, does not leave problems or costs for future generations to solve or bear present builders and users of the system should pay such costs today (Gerike and Koszowski, 2017).

Definition 4 - Sustainable transport means mobility, non-reliance on fossil fuel, reliable and affordable transport; non-harmful to people, the environment and not causing climate change (Thaba, 2016).

From the above definitions we can identify common elements of sustainable transport from four different authors. The key elements derived from the definitions will be reviewed below.

2.3.3 Elements of sustainable transportation

The first element relates to environmental impact and protection. According to Wadhwa(2000), unsustainable development in road transportation displays major problems in the protection of life on the planet. Sztangret (2020) quoted the Europe 2020 strategy to highlight the need of a technological progress within the transport

sector that aimed at reducing resource consumption and lower emission of greenhouse gases and other substances. By reducing the demand for transportation, reduction in the use of scarce resource will be achieved and less environmental impact will be experienced. (Gerike and Koszowski, 2017). Thaba (2016) addressed the issue on the environmental impact by pointing out the daily use of motor vehicles. As mentioned by Thaba (2016) motor vehicles pollute the air, create traffic congestion and is at risk of accidents.

Klimach & Ogryzek (2020) summarises what has been indicated by the above authors by stating that sustainable transport attempts to provide efficient transport system that reduces the destructive impact of motor vehicles on the environment. Furthermore, Klimach & Ogryzek (2020) pointed out that the attention is “on both the control of harmful emissions and the promotion of sustainable means of transport such as public transport, bicycles or car sharing”.

The second element relates to health and desirable life. Unsustainable transportation is associated with negative externalities that increase emissions every time when transport is used. Thaba (2016) said, it is for this reason that unsustainable transport is considered an unhealthy lifestyle. Gerike & Koszowski (2017) added by stating quality of life will improve as more people start to walk, cycle and make use of efficient integrated public transportation. Increase in walking and cycling as a means of transport and frequent use of integrated public transport will decrease kilometres travelled by motor vehicles and that will contribute to a reduction in traffic congestion and air pollution. Sustainable transportation will stimulate the restoration of health and the integrity of earth’s ecosystem will be maintained (Sztangret, 2020).

As pointed out by Wadhwa (2000), other than producing greenhouse gases, road transportation affects the wellbeing of travellers due to delays resulted from traffic congestions. Delays and long travelling times may cause stress to travellers especially those who are in hurry with limited time on their hands. Wadhwa (2000) pointed out that there is evidence that suggest other health problems and frustrations maybe caused by the unsustainability of transport.
Mundorf, Redding & Bao (2018) concur what the above authors have echoed that the promotion of sustainable transport features is crucial to not only planners and

designers of the transportation system but also for public health researchers and policymakers.

Public Health is defined as “the art and science of preventing disease, prolonging life and promoting health through the organized efforts of society” (Acheson, 1988).

Sustainable transportation can improve public health by creating an efficient transport system that includes Non-Motorised transport which will allow people to walk and cycle freely in a clean and less polluted community environment that is exposed to more green spaces.

The last element relates to economic impact. Sustainable transportation services should be affordable and operating at minimal costs. It becomes more important as transport affects all sectors in the economy. Unsustainable transportation causes economic problems particularly as mention by Gerike & Koszowski (2017) to the GDP of the nation. The concern is on traffic congestion as it causes delays and long travelling times which affect personal and corporate productivity. Gerike & Koszowski (2017) quoted Christiana Figures, who was the executive secretary of the United Nations Framework Convention on Climate Change, in her opening statement made at the UN Commission on Sustainable Development on May 2011 that Shanghai lost 10% and Bangladesh 1.5% of the country’s GDP respectively because of traffic congestion.

Sustainable Transport encourages efficient transportation and the benefit is not only on the reduction of traffic congestion but also helps with the reduction of poverty by increasing individual participation on economic activities (Gerike and Koszowski, 2017). Based on a research study conducted by Sztangret (2020), the following, under the dimensions of sustainable transport development is a course of action: (i) electromobility, (ii) interoperability and integrity of the transport system, (iii) transport optimization and intermodality and lastly (iv) full competition.

Wadhwa (2000) provided a different perspective on the impact on the economy where the focus was on the use of motor vehicles. According to Wadhwa (2000), motor vehicles provided flexibility and liberty for travellers. The flexibility and liberty are

experienced at a significant cost to society. “These costs are measured in damages, injuries and death due to road accidents, delays, energy dependence and above all, the collateral damage to the environment” (Wadhwa, 2000). For instance, according to the International Traffic Safety Data and Analysis Group (IRTAD) IRTAD (2020) with reference to motor vehicle accidents in South Africa, the high number of motor vehicle accidents and its associated costs has an enormous impact on the South African society. These high numbers of motor vehicle accidents negatively affect socio-economic development and the wellbeing of the citizens. The IRTAD (2020) report further revealed that in 2017, an estimated R162.05 billion was lost in the South African economy due to motor vehicle accidents which amounted to 3.5% of the GDP.

The economic costs of road accidents include the loss of lives, pain, grief and sorrow (IRTAD, 2020). To understand the South African road accident severity, Figure 3 indicates road fatalities per 10 000 registered vehicles in 2018 for 36 countries where South Africa reflects the highest numbers.

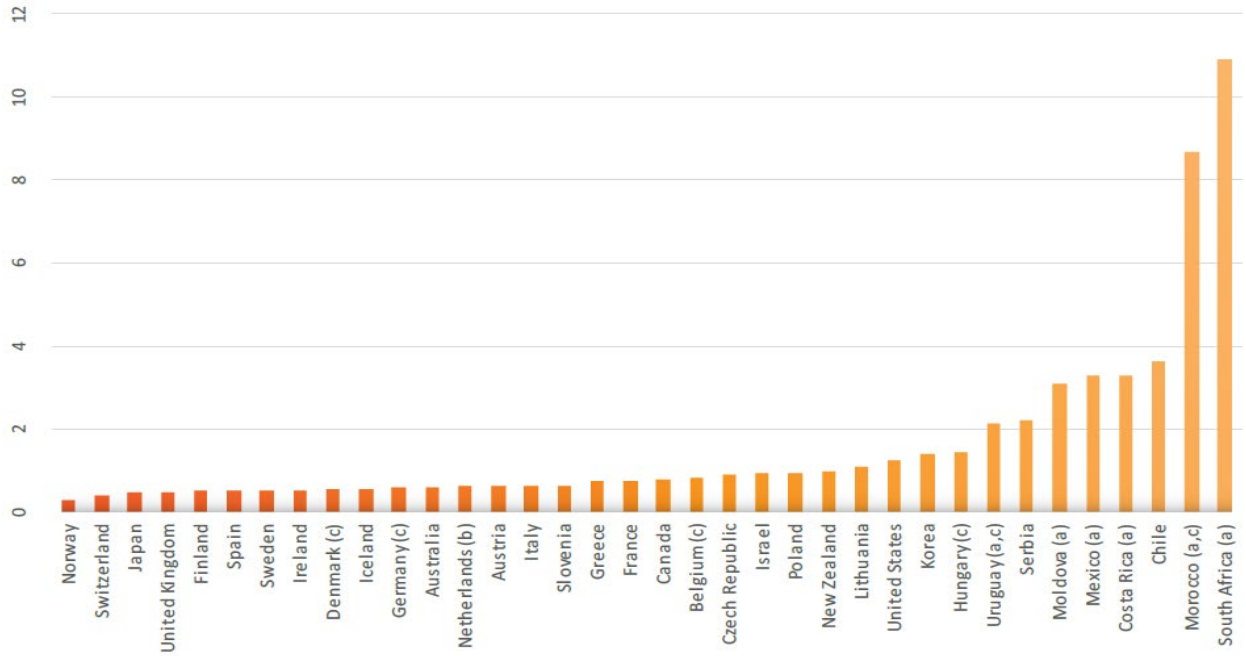

FIGURE 3: ROAD FATALITIES PER 10 000 REGISTERED VEHICLES, 2018
Source (Road Safety Annual Report , 2020)

Thaba (2016) reflects on the economic impact from the associated cost inherited from motor vehicle ownership. Whether the motor vehicle has been purchased by an individual or an organisation, motor vehicles are not cheap. Thaba (2016) states that motor vehicles requires ongoing maintenance, motor vehicle insurance and

sometimes tracking devices maybe required. These transactions affect individual's disposal income and cash flow for corporates. Saving can be realised when more efficient transportation is utilised and saved funds can be shifted and prioritised on more productive assets or towards innovative solutions.

As indicated by Mosaberpanah & Khales (2013), transport and the economy cannot be separated. A well-defined, planned and designed transportation system creates a platform for efficient flow of goods and services that benefit the economy. Better access to markets and employment opportunities will be achieved.

The discussion above on the key components of sustainable transport will now serve as a basis to illustrate how it relates to green transport. According to Kitthamkesorn & Chen(2017) , sustainable transportation seeks to reduce motor vehicle emissions by introducing new green concepts and promoting the use of green(er) transportation. More detailed concepts about green transport will be discussed below.

2.4 The importance of green transport solutions

Green transport has been seen by most researchers and governments as an important component of sustainable transport, social economics and environmental protection.

Li (2016) mentioned that green transportation is an important means for easing traffic congestion and solving urban pollution and environmental problems of major international cities, which actively promote green travelling and public transport, and shifts from being vehicle-oriented to being human-oriented. Chris Bradshaw back in 1994, proposed walking, bicycles, public transport, shared vehicle, rail transport, low-pollution vehicles, such as dual-energy vehicles, natural gas vehicles and electric vehicles as future green transportation.

One of the reasons why green transport is seen as appealing and environmentally friendly is because of greenhouse gases which cause problems into our ecological system, economy and health. According to Van Mierlo, Messagie & Rangaraju (2017), as CO_2 emissions continue to increase due to motor vehicles usage, the transport system should be changed to address this issue. Therefore, green transport should

be one of the strategies used to lower the ecological emissions (Van Mierlo, Messagie and Rangaraju, 2017).

As explained by Modak (2011) the provision of green transport as a means of sustainable transport involves human power, animal power, smart design, walking, cycling, electric cars, solar powered vehicles and promotion of carpooling. One of the key elements of the green transport is to promote NMT. According to Mokitimi & Vanderschuren (2017) the aim of the NMT initiatives is to "promote safe, healthy, affordable, convenient, efficient and environmentally-friendly modes of transport". NMT involves all types of movement excluding movement powered by fuel.

Kampman, Delft & Braat (2011) expressed the use of technology to facilitate the move towards sustainable transport by introducing electric and plug-in hybrid vehicles. They furthermore state that electric and plug-in hybrid vehicles have the potential to reduce CO_2 emissions and improve local air quality.

2.4.1 Non-motorised transport

Non-Motorized Transportation as explain by Vanderschuren (2012) is an active and human-powered transport system. According to Mat Yazid, Ismail & Atiq (2011) NMT is a means of transportation and travel that doesn't use an engine or motor for movement. This includes walking and cycling, and using small-wheeled transport (skates, skateboards, push scooters and hand carts) and wheelchair. The most common NMT is walking and cycling which will be discussed in the section below.

2.4.1.1 Walking

Before the evolution of sophisticated transportation mechanisms, people used to walk to various destinations for different reasons. Walking was the first mode of transport, but as times change and societies started to move away from traditional ways of doing things to new innovative and modern methods, the need for other modes of transportation emerged. In most cases, we start our journey by walking to public transport facilities. Wigan (1995) mentioned that the term "pedestrian" refers to a mode of transport and is the most widespread mode of movement.

According to Olszewski (2007) previously walking was regarded as a minor mode in transportation planning but now things are changing as the importance of walking as a “green” and healthy mode of travel is being recognised. Olszewski (2007), further explain potential benefits of walking as it is environmentally friendly and can improve an individual’s health.

2.4.1.2 Cycling

Cycling as a means of transport is regarded as a sustainable way to travel without polluting the environment. Many countries are beginning to appreciate the importance of cycling because of its benefits. Cycling is now appearing in government’s transport related policies, as indicated by Heesch, Giles-Corti & Turrell (2014), the Australian National Cycling Strategy calls for government action priorities to increase cycling which will be supported by actions to promote effective cycling, improve bicycle infrastructure and end-of-trip facilities, and last allow for integration of cycling into the overall transportation system and land use planning.

As more people travel and commute on bicycles, a reduction in motor vehicle travel will be experienced. But not only a reduction in traffic, also a reduction in air pollution and the physical health of users will improve. Fraser & Lock (2011) quoted a Dutch study that revealed people who moved from motor vehicles to bicycle use benefited. “The beneficial effects of increased physical activity are substantially larger than the potential mortality effect of increased inhaled air pollution and increased traffic accidents” (Fraser and Lock, 2011).
The Netherlands is a classic example when it comes to the role of bicycles, especially in the city of Amsterdam. Harms & Kansen (2018) indicated that 25% of daily mobility in The Netherlands can be attributed to the use of bicycles. Figure 4 indicates Home-Work-Home trips in Amsterdam increased since 2016 and shows bicycles as the preferred mode of transport.

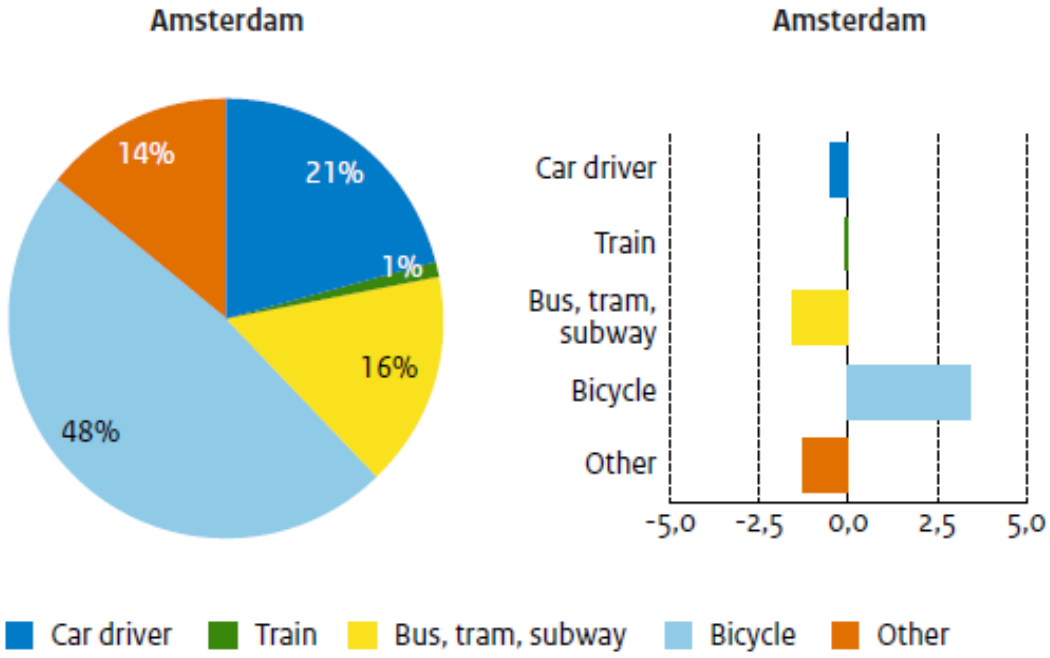

FIGURE 4: MODAL SPLIT OF HOME-TO-WORK TRIPS IN AMSTERDAM IN 2016 (LEFT) AND MODAL SHIFTS SINCE 2005 (IN PERCENTAGE POINTS, RIGHT)
Source: (Harms and Kansen, 2018)

Figure 5, indicates that the Netherlands has the highest use of bicycles as compared to fourteen (14) different countries of which eleven (11) is in Europe.

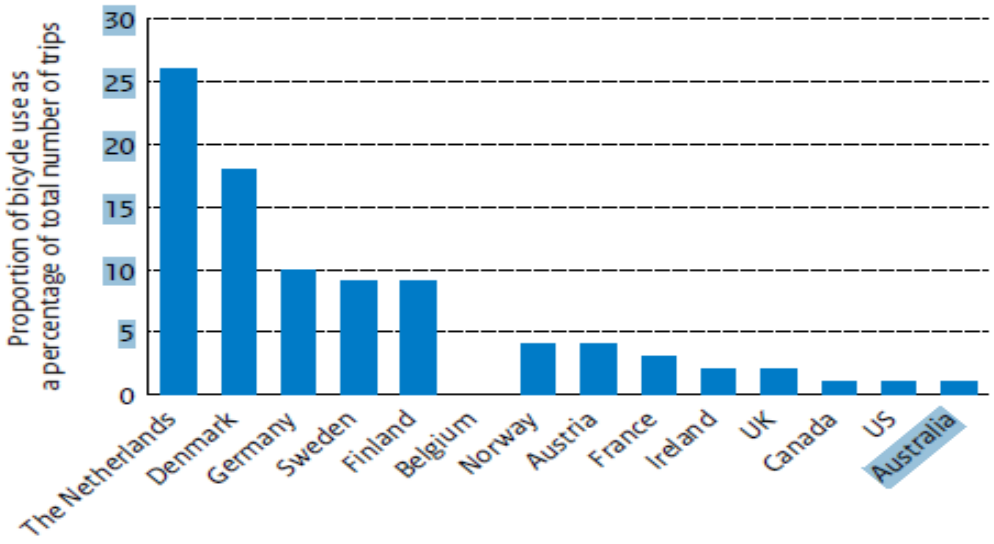

FIGURE 5: PROPORTION OF BICYCLE USE AS A PERCENTAGE OF TOTAL NUMBER OF TRIPS IN SEVERAL COUNTRIES.
Source: (Harms and Kansen, 2018)

2.4.1.2.1 Electric Bicycle (E-Bikes)

Innovation and technology introduced electric bicycle (E-bikes) ideally for longer distance trips that normally requires the physical strength of a person (human power) to reach to the destination faster than when a normal bicycle is used. As explained by Ramadhan and Dinata (2021), E-bikes are combination of a bicycle as a means of transportation and the electric components as a driving force support. Ramadhan and Dinata (2021) further indicated that the bicycle can still be used without the support of the electrical components but with electrical components, the human power is reduced drastically.

As indicated in paragraph 2.4.1.2, the role of bicycles in transportation is important and necessary. According to Salmeron-manzano and Manzano-agugliaro (2018) bicycles evolved from been old-fashioned recreational product to a less polluting means of transport and for this reason, the introduction of e-bikes paved the way to support public transport in large cities worldwide.

Dias *et al.*, (2017) acknowledges the potential of e-bikes to decarbonisation transport in European cities. To fully understand the market, further research studies must be conducted to understand users' preferences and the scope of factors that can contribute modal shift from motor vehicles to e-bikes(Dias *et al.*, 2017).

2.4.1.2.2 Electric Scooters (E-Scooters)

Closely linked to the e-bikes, is electric scooters (E-Scooters).Hardt and Bogenberger (2019) mentioned that electric powered scooters (e-scooters) recently gained popularity in European cities due to the following benefits, namely, low excessive emissions and noise, convenient dimensions that assist with easing traffic congestion, emissions, and parking.

2.4.2 Electric vehicles

Walking and cycling offers sustainability on a shorter trip. Practically when a person walks in excess of 15 kilometres and cycle in excess of 25km in a single trip to work, it becomes physically straining because of exhaustion. Due to the practical distance that can be covered while walking and cycling , Wigan (1995) explained how walking

and cycling can be used to access other transport facilities and modes to reach destination.

Electric vehicles (EV) gained attention especially for longer trips that could not be accessed by walking and cycling. It was mentioned in an article by Helmers & Marx (2012) that EV's have been identified as future mobility which has the potential to reduce emission and energy using technological components. Struwig, F. W. & Stead (2001) indicated two main types of EVs: (i) battery electric vehicles (BEV) that use only batteries for energy storage and must be plugged in to be recharged, and (ii) plug-in hybrid electric vehicles (PHEV) that have both batteries and liquid-fuel storage and refuelling systems.

One of the EV benefits mentioned by Sanguesa et al. (2021) is that they do not produce CO_2 emissions nor nitrogen dioxide (NO2). But the vehicles still requires electricity, which if electricity is generated by coal or other unsustainable energy sources line in South Africa, then it will still produce GHG emissions overall. The other negative side to it, is that the battery manufacturing affects its carbon footprint. Sanguesa et al. (2021) further pointed out that "the energy cost per kilometre is significantly lower in EVs than in traditional vehicles, as shown in Figure 6".

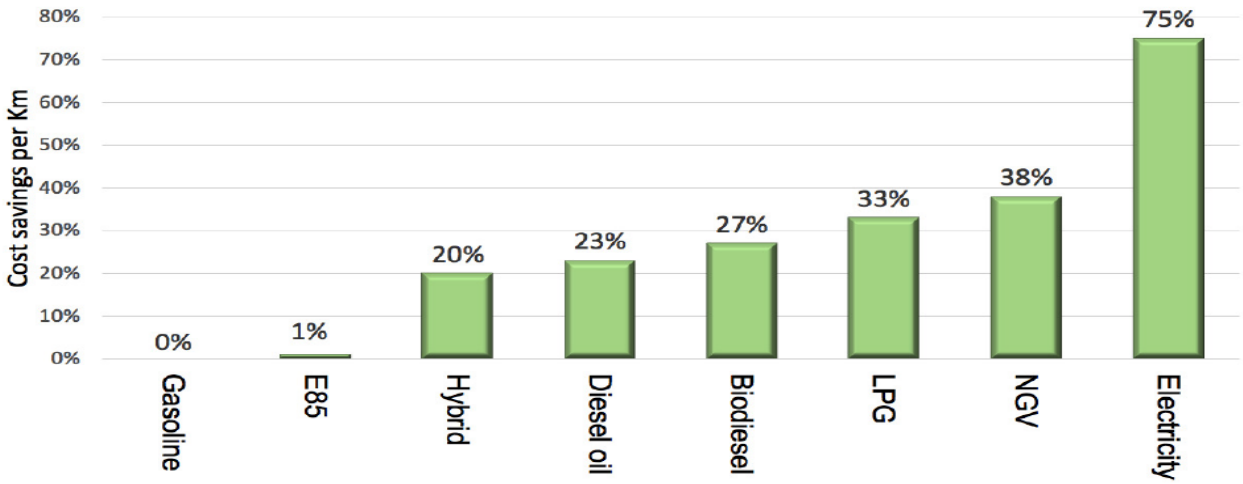

FIGURE 6: COMPARISON OF SAVINGS IN COST PER KILOMETRE OFFERED BY VEHICLES POWERED BY GASOLINE, ETHANOL (E85), HYBRID, DIESEL OIL, BIODIESEL, LIQUEFIED PETROLEUM GAS (LPG), NATURAL GAS VEHICLE (NGV), AND ELECTRICITY

Source: (SANGUESA *ET AL.*, 2021)

2.4.3 The cost and sustainability of fuel

This section discusses the economic implications, impact and sustainability of fuel. For the purpose of the study, fuel refers to both petrol and diesel. Fuel is made from crude oil.

“Fuel is required for an engine to produce work. Reciprocating internal-combustion engine types are classified by the manner by which this fuel is ignited: e.g., spark ignition (SI) or compression ignition (CI). The specific effects of changing a given fuel property depend upon many detailed parameters of the engine and combustion strategy in which the fuel is used, as well as the conditions over which the engine is operated” (Mueller, Cannella and Kalghatgi, 2014).

2.4.3.1 Oil price volatility

Price volatility is an economic term that simply refers to fluctuations in prices over a given period. According to Putra et al. (2021), price volatility is one of the indicators that can sense market uncertainty, which has the potential to affect people’s welfare. Volatility indicates how much and how quick price changes over time and also unpredictable change maybe noted (Putra *et al.*, 2021). Price volatility has a negative effect on the financial performance of the country, for instance, the research paper findings by Guerineau & Ehrhart (2012) revealed that volatility of commodity prices on both import and export commodities negatively affects tax revenues. As Guerineau & Ehrhart (2012) expresses it in the research findings, price volatility has a detrimental effect on the public finances of the developing countries.

One of the most unstable commodities in the world is crude oil. Peng, Li & Drakeford (2020) mentioned that uncertainties in crude oil markets creates price instability that can cause economic instabilities. Peng, Li & Drakeford (2020) further indicated that volatilities in oil prices are now greater than before and have created an increase in instability in the oil market. The international oil price fluctuations have increased; Figure 7 shows the average annual OPEC crude oil price from 1960 to 2020. Peng, Li & Drakeford (2020) pointed out that uncertainty as a result of fluctuations in oil prices

will hinder economic development by increasing the cost of production, complicate the investment decisions and also cause a negative impact on economic activities.

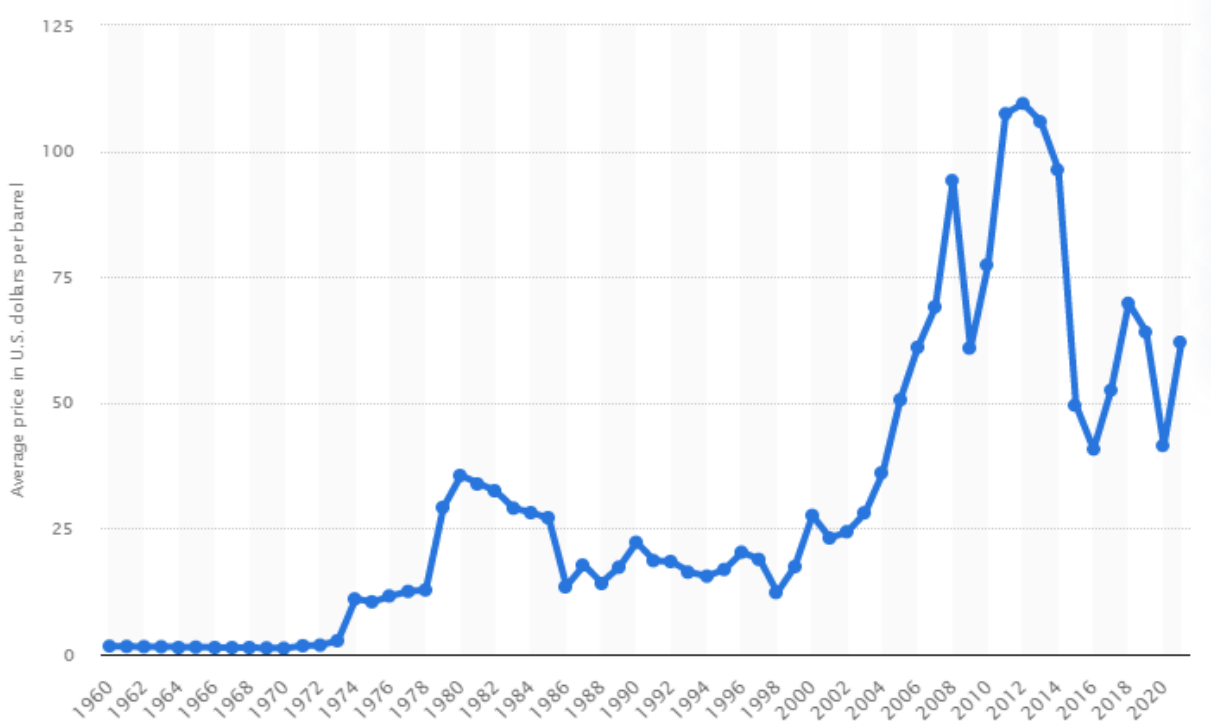

FIGURE 7: AVERAGE ANNUAL OPEC CRUDE OIL PRICE FROM 1960 TO 2020 (IN U.S. DOLLARS PER BARREL)
Source: (Statista 2021)

Crude oil prices are directly linked to petrol and diesel prices. Motor vehicles rely heavily on fuel to keep the engine running. Ebrahim, Inderwildi & King (2014) states that various economic sectors particularly the transport sector are dependent on oil-derived fuels to operate and this factor has left the global economy vulnerable to several macroeconomic side effects. Crude oil is an important source of energy that keeps the economy going at a high-cost price. As stated by Payne, Dutzik, Tony & Figdor (2009), the United States of America is one of the biggest consumers of the world crude oil which is costly to everyday life of the citizens. The same can be said about South Africa's motor vehicle usage and also as one of the biggest consumers of crude oil in Africa. Figure 8 represent Oil consumption in selected African countries as of 2021 (in 1,000 barrels per day), while Figure 9 shows the South African Oil consumption and production (1980-2021).

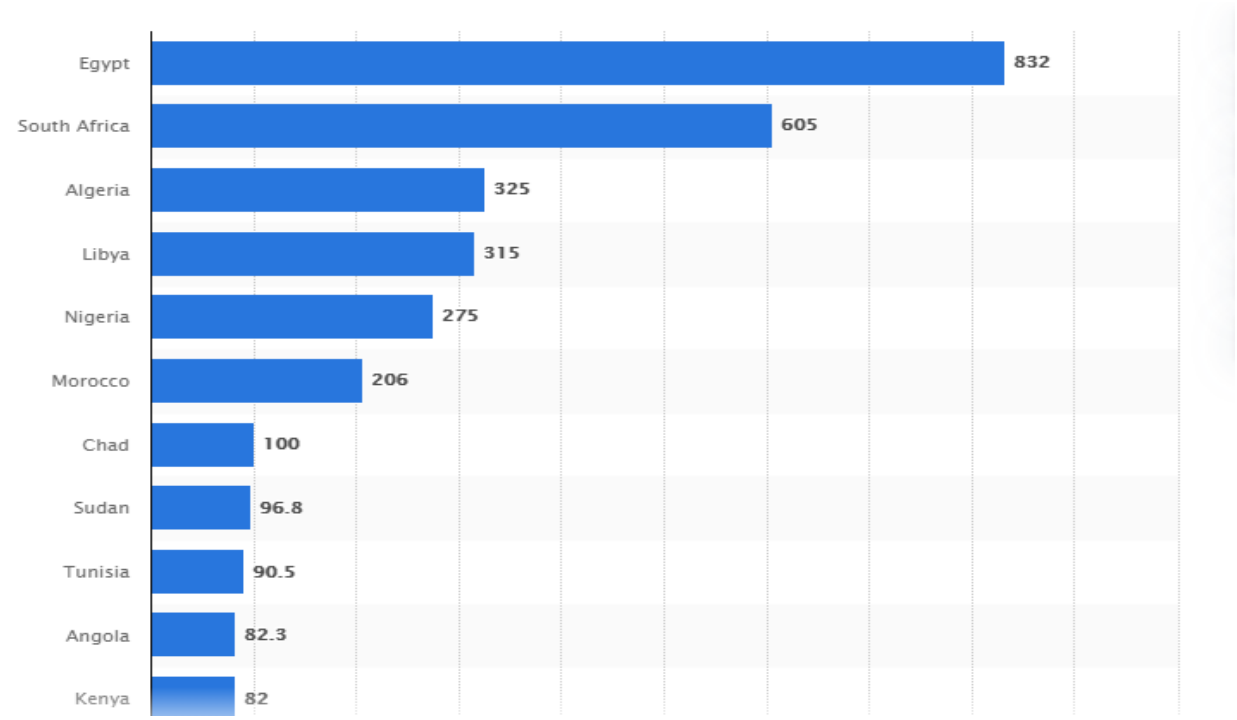

FIGURE 8: OIL CONSUMPTION IN SELECTED AFRICAN COUNTRIES AS OF 2021 (IN 1,000 BARRELS PER DAY)
Source: Statista 2021

The South African consumption of oil indicates an increase since the 80's and it has been rising since. Figure 9 confirms the trend.

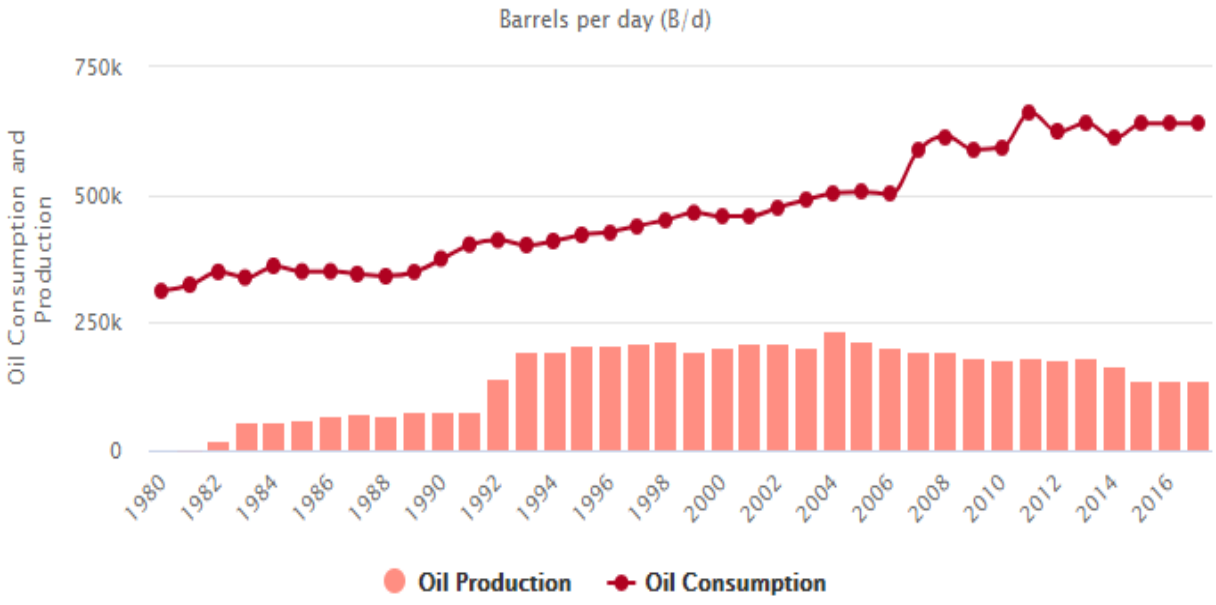

FIGURE 9: SOUTH AFRICA OIL CONSUMPTION AND PRODUCTION (BARRELS PER DAY)
Source:(https://www.worldometers.info/oil/south-africa-oil/#oil-consumption)

2.4.3.2 The impact of fuel cost on the fleet / transport industry.

The impact of fuel cost in transport industry is enormous. The fuel cost is an inherited cost in the transport industry which has a huge impact on the overall operating cost. Better transport and fleet management may improve fuel consumption and minimise the overall operational costs. According to Gohari et al. (2018), in the modern world, oil price remains the main problem affecting transportation cost which contributes to more than 50% of total operational costs. Meixell & Norbis (2008) mentioned that some of the biggest challenges in transportation include the high unstable fuel prices that increases the transportation rates.

Fuel also affects the vehicle selection, as stated by Peng, Li & Drakeford (2020) that the increase in the sale of new vehicles with low fuel capacity engine whether by private companies or government agencies was affected by an increase in fuel prices. As Qamar (2020) points it out, an increase in fuel prices will increase transportation costs and cause a shift from the use of inefficient to efficient motor vehicles.

Abate (2014) stated that the road transport industry is sensitive to fluctuations in fuel prices as operators tend to move towards making use of shorter hauls than longer ones. In other words, when fuel prices increase, consignment traffic is rearranged towards short haul specialisation. Another reason for the sensitivity is the effect of commensurate fuel tax increases that force truck operators to make operational changes to gain competitive advantage, reduce cost and generate revenue.

Aviation is also affected by changes in fuel prices. Morrison et al. (2010) stated that jet fuel prices affect the air transportation on; “(i) the supply-side, through pricing and scheduling, networks and fleet; and (ii) the demand-side, through the economy”. The main contributor to changes in fuel price is changes in the price of crude oil.

The fluctuations in crude oil prices reflects unsustainability of the oil market. Bezdek (2020) mentioned that the peaking of crude oil characterises a liquid fuel problem and not an “energy crisis”. Countries should take initiative steps in finding the solutions to act against the peaking oil. Technology advancement may create new ways to be less reliant on fuel.

2.4.4 Economic Externalities

In economics literature, the concept of externalities was introduced and explained to address some of the problems associated with market failures. Islam (2019) describes market failure as a situation where price mechanism fails to cover the cost and benefits of goods/services provided and consumed in a market. The provision of transport has such a problem of not capturing the true cost of providing a particular service. Riha et al. (2022) indicated that environmental impacts caused by transportation are studied in conjunction with the theory of externality where classifications are made between positive externalities which occur because of the positive impact of transport on promoting trade, commuting, employment and supporting economic development, and the negative externalities which are refers problems associated with emissions and traffic congestions.

Since this research study is about green and sustainable transport, a particular attention will be given to negative externalities and how government intervenes to address negative externalities.

2.4.4.1 Negative Externalities

It has been mentioned above that a green transport system is the one that supports and accelerates sustainable transportation and development. As explained by Bongardt & Schaltenberg (2012) , green transportation is not only about the reduction of greenhouse emissions, air pollution, noise and space consumption but also about the reduction of poverty and support economic growth.

Dobes (1998) said transport services by its nature are “good” as they are able to contribute to the production process and personal consumption. The transport sector in South Africa contributed 6.5% to the GDP (DoT, 2017), this figure signifies the importance of transport in the economy. However, Dobes (1998) added that community costs due to negative transport externalities are not deducted from GDP figures.

The “bad” side of transportation is in relation to negative externalities because they affect the environment through the generation of emissions, traffic congestions, road damage, noise, accidents and etc. Mankiw (2000) further mentioned that negative externality arises when the actions of some people create costs, cause harm or discomfort to those that are not involved. According to Dobes (1998); externality costs are social costs of an activity affecting the society as a whole.

“*Social costs are the sum of the costs of resources used by individuals in that activity (private costs), and the value of any loss in the community’s welfare due to costs imposed by the activity on other individuals (public costs) who are not directly involved”* (Dobes, 1998). Delucchi (2004) states that the social cost that occurred as a result of transportation comprises of internal, nonmarket, or unpriced costs like air pollution costs, as well as private or market costs, such as the cost of vehicles themselves.

Anas & Lindsey (2011) explained the effect of negative urban road transportation externalities in three ways. Firstly, the greenhouse gas emissions costs due to motorised transport from both private and public vehicles are borne globally, and secondly, urban road transportation air pollution and noise affects other road users locally. Lastly, although the costs of congestion (time delays and extra fuel consumption), accidents, and infrastructure damage are largely borne by motorists collectively, there is still an externality that individual motorists increase these costs for other motorists.

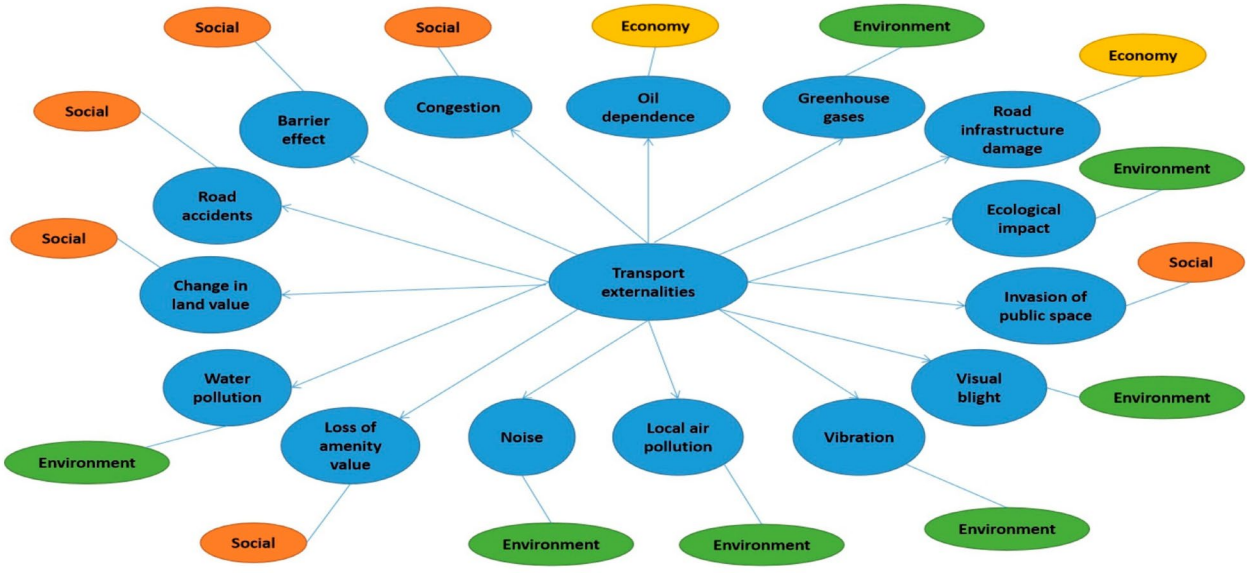

FIGURE 10: THE NEGATIVE EXTERNALITIES OF TRANSPORT
Source: (Chatziioannou *et al.*, 2020)

South Africa is not in isolation when it comes to negative externalities. Where there are emissions from exhaust systems, negative externalities are expected. To address the cost associated with negative externalities due to transportation activities, the South African government introduced certain policy measures to reduce societal costs and manage negative externalities.

2.4.4.2 Government interventions

Negative externalities are a form of market failure that need to be addressed in broader context to stabilise the market. Santos (2017) mentioned that the market is incapable of reaching an efficient equilibrium because of negative externalities, when the total benefit of road transport is maximised (there is no way of increasing any road user's benefit without reducing another's). The problem of inefficient equilibrium can be solved by applying corrective instruments, such as Pigouvian taxes or cap-and-trade systems that are able to achieve efficiency or decrease the degree of the inefficiency.

Timilsina & Dulal (2011) provided two policy instruments that can be implemented to address urban road transportation externalities. The first instrument is fiscal policy which is concerned with pricing. Fiscal policy instrument consists of fuel taxes, vehicle taxes, emission and/or pollution taxes, congestion charges or toll taxes, and subsidies (Timilsina and Dulal, 2011). The second instrument is regulatory policy which deals with policies to regulate the type of vehicle (efficient engine) needed on the road, clean fuel and also about legal instruments to change behaviour of individuals, firms, or both by enforcing technical standards or mandates (Timilsina and Dulal, 2011).

As mentioned earlier in this paper, South Africa is not exceptional to the effect of negative externalities. The South Africa government introduced the following transport-related environmental taxation and fiscal policy instruments to address negative externalities (DoT, 2018).

a) **Fuel Taxation** – include petrol, diesel and biodiesel which are classified as fuel levy goods and zero-rated for value added tax (VAT) purposes.

b) **Carbon Taxation** - it was proposed by National Treasury as a key mitigating instrument in a context of wider climate change policy response to internalise the negative externality costs arises from greenhouse gas emissions. Carbon tax will affect the prices of goods and services in a sense that emission-intensive goods will be more expensive than less emissions-intensive goods. The carbon tax that are associated with GHG emissions that comes from petrol and diesel will be incorporated into the current fuel tax regime as an add-on.

c) **Vehicle Taxation** - it is a CO_2 emission tax on new motor vehicle sales. Ad valorem-based tax and a higher tax will be imposed on those who bought bigger vehicles than those who bought small vehicles.

As mentioned previously in this paper, one of the bad sides of transport is negative externalities which damages the road infrastructure that will need costly routine maintenance. Van Rensburg & Krygsman (2020) noted in their research study that in most European research, emphasis is on the correct price setting for the road infrastructure use. The European research also pays a particular attention on the internalisation of the external cost due to transport negative externalities and the principle of marginal social cost pricing appears to be a preferred pricing alternative to recover costs from road users (Rensburg and Krygsman, 2020b).

Although appropriate policy measures are introduced to reduce negative externalities, Riha et al. (2022) indicated that the use of additional taxes and subsidies can lead to other unintended consequences which might have greater negative economic impacts than the externalities themselves. According to Riha et al. (2022); a common way of dealing with externalities is by employing the theories of an economist Arthur Pigou. The Pigouvian theory focuses on the use of various taxes and subsidies to limit the “social costs” and prohibits certain activities, in contrast.

Contrary to Pigouvian theory, the environmental Kuznets theory states that when economic development deteriorates the environment, after a certain level of economic growth, social activities will improve its relationship with the environment and adjustments will be reached to reduce environmental degradation (Riha *et al.*, 2022).

Another perspective in relation to the South African emission tax , Vosper & Mercure (2016) conducted an assessment study on the effectiveness of South Africa's emissions-based purchase tax for private passenger vehicles using a consumer choice modelling approach. The study discovered that the emissions reduction achieved through the tax instruments were insignificant as compared to the increases in fleet emissions associated with the growing vehicle market. The tax policy alone is not sufficient to reduce emissions, however significant reduction can be achieved by including low- and zero-carbon vehicle technologies.

It is clear from the above that the implementation of taxes will generate revenue to the authorities, but the real impact will be achieved by utilising green and carbon free technologies. Since government is one big institution responsible for the implementation of policy instruments that deals with the reduction of GHG emissions, it should consider making policy provisions that will support the procurement of a less polluting fleet which is environmentally friendly.

2.5. Policy documents

Various governments in the world call for the reduction of CO_2 emission. They have published policy documents that strategically seek to resolve environmental problems, reduce traffic congestion and improve social development.

The South African National Department of Transport published the Green Transport Strategy (GTS) for South Africa: (2018-2050). The GTS will be the cornerstone of policy development within the transport sector for the lowering of GHG emissions, the contribution of transport to the green economy, the promotion of green sustainable mobility and the uptake of cleaner and more efficient technologies (DoT, 2018).

The South African National Department of Environmental Affairs published the South African Low-Emission Development Strategy 2050. This strategy is the result of the Paris Agreement which the United Nations Framework Convention on Climate Change held in Paris in December 2015. "Article 4" of the agreement sets out Nationally Determined Contributions as the instrument countries must develop to present their

part of the global effort to “each global peaking of greenhouse gas emissions as soon as possible… on the basis of equity and in the context of sustainable development and efforts to eradicate poverty” (Department of Environmental Affairs, 2018).

The South African National Development Plan 2030 further states that sustainable development is not only about the sustainability of the economy and society but also about the sustainability of the environment.

The European Commission published The European Green Deal strategy which “calls for a 90% reduction in greenhouse gas emissions from transport in order for the EU to become a climate-neutral economy by 2050, while also working towards a zero-pollution ambition. To achieve this systemic change, they need to (1) make all transport modes more sustainable, (2) make sustainable alternatives widely available in a multimodal transport system and (3) put in place the right incentives to drive the transition (Mulvaney, 2019).

2.6 International Government Fleet Policy Documents

The use of motor vehicles to render public service is practices by governments around the world. In order for government to manage their fleet and transport operation effectively and efficiently, mandatory policy documents are published to be used by various government institutions or department as they render public service. For the purpose of this dissertation, two international government motor vehicle policy documents were reviewed, namely:

i. WA Government Fleet Policy and Guidelines, published December 2019 (Australia)

ii. State of California Fleet Handbook, published September 24, 2019 (U.S.A)

2.6.1 Western Australia - Government Fleet Policy and Guidelines

The policy document was published by the state of Western Australian Department of Finance. The policy document obligates the heads of the government departments to

manage government vehicles efficiently and optimally according to the rules of this handbook.

The policy document instructs the government departments with 50 or more vehicles to develop Strategic Fleet Management Plan to create the most effective fleet that is fit for purpose and meets operational requirements. The Strategic Fleet Management Plan must include the following (WA department of Finance, 2017):

- Assessment of the current fleet;
- Performance/utilisation of the current fleet;
- Analysis of the current and future operational requirements; and
- Progress in the following:
  - Minimising whole of vehicle life costs;
  - Rationalising fleet size; and
  - Minimising whole of vehicle life costs

It is also expected that the government departments to define their operational needs:

- To refine their vehicle utilisation
- To consider alternative ways of travelling
- To come up with ways to reduce their fleet size without compromising service delivery

Procurement Plan - The selection and acquisition of new vehicle will be informed by Electronic Decision Aid(eDA) which is a system designed to assist the heads of dept. with a list of vehicle with the lowest “whole of life cost”(WA department of Finance, 2017).

Electronic Decision Aid(eDA) has factored in the motor vehicle benchmark formula which was create by the Australian National Department of Greenhouse and Energy. Government departments are expected to report to the Australian National Department of Greenhouse and Energy on emissions generated by their travel activities.

2.6.2 State of California Fleet Handbook

The handbook was published by the State of California Department of General Service. This handbook unlike the Australian handbook where the head of the institution has been given the power to manage the fleet, sub-units are responsible for fleet and transport operation and reports to the Department of General Service.

According to the State of California fleet handbook (2019), the mission is to provide cost-effective and environmentally conscious travel, transportation, and asset management services. The handbook promotes the following:

- the purchase and use of alternative fuel vehicles (compressed natural gas,
- plug-in hybrid electric vehicles, and
- battery electric vehicles [BEVs]) and
- increased fuel efficiency in the state's fleet.

2.7 Reducing the need to travel

The need to travel can be reduced by changing the behaviour of the travel, introduce more online communication and lastly reorganisation and better travel plans. To change the behaviour of how people travel is not an easy task but Covid 19 has provided some opportunities to think differently about travel.

Change in travel behaviour has been studied by many authors and behaviourist. Ruiz et al. (2018) are amongst the authors who analysed a Travel Behaviour Change Program (TBCP). TBCP was introduced with the purpose to reduce the use of motor vehicles by " giving information on transport alternatives, suitable support, motivation and disincentive programs for using the car (Ruiz *et al.*, 2018).

Another example in relations to change in travel behaviour, Behrens et al. (2015) presented a conference paper titled "A Travel Behaviour Change Framework For The City Of Cape Town". The concern was about the growth in Single Occupancy Vehicles (SOVs) in the city of Cape Town. It was highlighted in the conference paper that the

implementation of The Travel Demand Management (TDM) strategy to impose financial changing on SOV can achieve reduction in SOV daily usage.

Online communication is also important component to reduce the need for transport. A person can choose to communicate via Skype or Zoom rather than travelling to the location. This type of communication relies mostly on information technology and communication. It is cheaper and convenient than travel especially in cases where it is not necessary to be at the location.

Encouraging work from home and introducing incentives may change travel behaviour. Working from home has been enforced by Covid 19 lockdown restrictions. Covid 19 lockdown restrictions also offered some relief on the environment as indicated on Figure 10 where the improvement in the atmosphere especially can be seen on the airspace satellite.

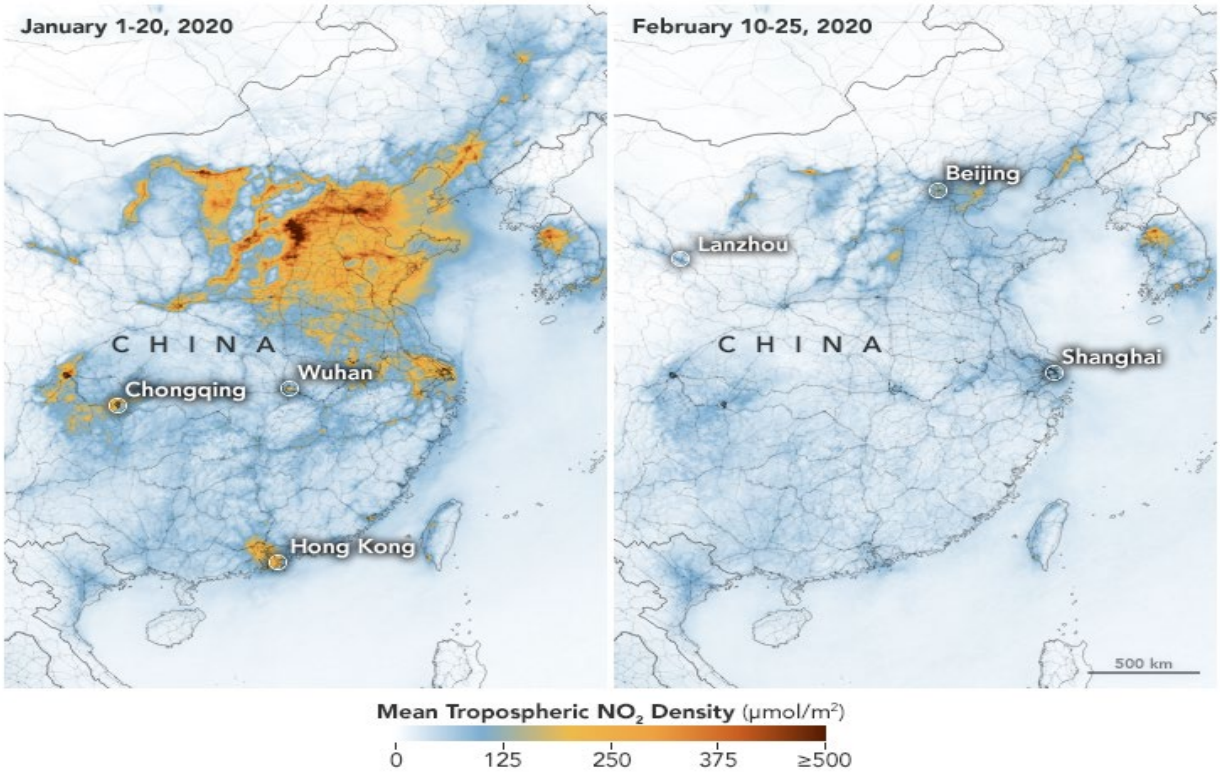

FIGURE 11: SATELLITES IMAGES – REDUCED LEVELS OF ATMOSPHERIC NITROGEN DIOXIDE (NO_2) OVER CHINA DUE TO COVID-19 LOCKDOWN RESTRICTIONS
Source: Tropospheric Monitoring Instrument (TROPOMI) on ESA's Sentinel-5 satellite
Image credit: Josh Stevens / NASA Earth Observatory

Employers can intentionally discourage travel by asking employees to work from home. Working from home requires connectivity to the network so that employees can work remotely. Employers should provide Information and Commutation Technology (ICT) equipment to work from home and incentivise the use of private equipment they use for work purposes.

2.8 Conclusion

The literature revealed important components of green transport and sustainable travel behaviour from various authors who are knowledgeable about the concept. The literature provided different definitions from various authors and common themes were identified to clearly understand the components and its applications. Authors demonstrated extensively how unsustainable travel affects our day-to-day life negatively. They provided definitions to illustrate how sustainable travel does not only reduce CO_2 emissions but provide a cheaper way to travel.

It is clear from the literature that much has to be done and action has to be taken immediately as growing concern on the environment continues. Authors emphasised global collaboration as a starting point to address CO_2 emissions. With the theme/report "*Our Common Future"*, it was clear that the world suffers from the same environmental impact and common goals should be achieved. Although countries have common goals, it is expected that each country should play their part by introducing strategies and policies at national level to reduction of CO_2 emissions and achieve world common goals.

The use of motor vehicles powered by diesel or petrol has been identified by the literature as one of the biggest producers of greenhouse emissions. Not only does the motor vehicles pollute, but the literature also revealed that motor vehicles cause traffic congestions, accidents, damage to the infrastructure and disproportionate utilisation of packing space.

Green transportation was also identified as sustainable transportation due to its less impaction on the environment. Green transportation is focused on the use of EV and

other NMT system. The concept of greening expands even further to green buildings and public transport infrastructure.

CHAPTER 3

CASE STUDY

3.1 Introduction

In the previous chapters, unsustainable transportation system was recognised by various authors as the cause of modern transport problems and how a move towards more sustainable and green transportation can resolve problem associated with unsustainable transportation. The literature chapter provided a better understanding entailing the elements of sustainable transportation.

The following key elements of sustainable transport were studied and discussed:

- Sustainability
- Economic impact
- Environment impact
- Green transportation

The case study chapter focuses on the role of motor vehicles in government departments particularly with the aim to assess its sustainability. This chapter will further explain and introduce travel and fleet operations within government departments. Operational policy tools, funding and expenditure in government will also be discussed.

3.2 The role of government

The government departments are responsible for the provision of various public services to the community at large. Shittu (2020) defines public service as “the activities and services done in any government capacity in the interest of the public

domain and for the benefit of the general public. Such services include policing, defence, healthcare, education, etc."

Since this paper is to establish the extent to which government travel activities are green and sustainable, transportation will be discussed in a context of public administration and service delivery.

3.3 Motor Vehicle as a tool for service delivery

As mentioned in the previous chapters, motor vehicles play a crucial role to move people from point A to B. Government officials travel to various areas to provide public services. In most cases, government officials make use of department motor vehicles or subsidised motor vehicles when they travel.

The South African Department of Transport (DoT) published the following Government Motor Transport handbook and Subsidised motor vehicle circular to regulate the use of motor vehicles within government. The Government Motor Transport Handbook (2019) describes "transport in the department as a tool by which service is delivered and therefore management of the resource rests with the manager responsible for service delivery" while the government subsidised motor vehicle circular (2003) states that "The provision of a Subsidised Vehicle to an officer is deemed a work facility, which enables them to undertake essential and approved official journeys in those cases where the use of other available transport is neither practical nor economical".

Government travel can be referred to business travel and according to Transport for London (2012) document, business travel is undertaken by an employee during the course of the working day to fulfil either operational duties (the requirements of their function) or non-operational needs (for example, travel to internal meetings and training). The cost of this activity is therefore paid for by an organisation rather than the individual.

Ducharme Consulting (2018) reported the total government department fleet size to approximately 39 886 vehicles over three years as indicated on Table 1. The total fleet is for both national and provincial government department. The total fleet size has been increasing with 4.6% from 2014/15 and 1% from 2015/16.

TABLE 1: GOVERNMENT VEHICLE FLEET IN SOUTH AFRICA

Financial Year	2014/15	2015/16	2016/17
Total Vehicle Fleet	37731	39448	39886
	-----	4.6% increase	1% increase

Source: (Ducharme Consulting, 2018)

TABLE 2: TOTAL NUMBER OF VEHICLES BY VEHICLE TYPE

Vehicle type	2014/15	2015/16	2016/17
Sedan	16 402	17 111	16 885
Light Delivery Vehicle (LDV)	12 121	12 451	12 807
Mini-bus/panel van	3 229	3 416	3 501
Ambulance	3 080	3 432	3 475
Heavy Commercial Vehicle (HCV)	1 203	1 175	1 184
Sedan high spec	574	629	754
Sports Utility Vehicle (SUV)	537	556	659
Medium Commercial Vehicle (MCV)	411	473	433
Bus	174	205	188
	37 731	**39 448**	**39 886**

Source: (Ducharme Consulting, 2018)

Government departments make use of other provisions to travel or to transport goods and services as indicated in table 3 below. Table 3 indicate auxiliary services which includes car rentals, kilometre allowance, shuttle services, subsidised vehicles and lastly courier services which are not included in the total vehicle fleet number mentioned in table 1. The cost of auxiliary services is over R6 billion as indicated in table 3.

TABLE 3: TOTAL AUXILIARY SERVICES

Financial year	2014/15	2015/16	2016/17	Total
Travel and Subsistence	**R1 745 466 995**	**R1 723 099 798**	**R1 713 334 509**	**R5 181 901 302**
Car Rental	R109 397 289	R96 152 010	R96 750 076	R302 299 375
Km Allowance	R1 499 679 094	R1 510 485 635	R1 492 795 935	R4 502 960 664
Shuttle services	R136 390 612	R116 462 153	R123 788 498	R376 641 264
Subsidised vehicles	**R306 437 011**	**R334 594 652**	**R245 090 328**	**R886 121 991**
Courier	**R133 521 745**	**R126 435 001**	**R124 287 427**	**R384 244 173**

Source: (Ducharme Consulting, 2018)

The total government fleet and related transportation activities is more than what has been mentioned in table 1 and 3 because the South African Police Services operate a fleet of over 55000 vehicles and National Department of Health also has a substantial amount of vehicle and they are not included in the total fleet vehicle mentioned in table 1 and 3 (Ducharme Consulting, 2018).

TABLE 4: TOTAL KILOMETRES TRAVELLED 2016 / 2017

Vehicle	Total
Sedan	347532415
LDV	274826471
Mini-bus/ Panel van	99616638
SUV	18702767
Sedan - High spec	18867155
Total	759545446

Source: (Ducharme Consulting, 2018)

The above information provides a better picture on the utilisation of motor vehicles and travel behaviour in government department when rendering services to the public. With reference to Table 4, the total travelled kilometres recorded was 758 653 092 for the period 2016/17 only, and these kilometres comprises of motor vehicles powered by petrol or diesel engines only. The environmental impact will be affected by these kilometres travelled. When taking into account motor vehicles operated for private use or for any use outside government, the environmental impact due to motor vehicles will be far worse than what is known. Hence this study wants to establish how far the government is ready to transition into sustainable and green travel. The current figures do not reflect sustainable travel nor a green transport environment.

3.4 National Transport Policy

The South African government has policy specific to the transport sector on the reduction of greenhouse gases (GHG). This section will indicate the two national policies aimed at addressing GHG production which are the National Transport Policy white paper and Green Transport Strategy. The National department of Transport published both these two policies.

The mission of the DoT (2018) Green Transport Strategy (GTS) (2018-2050) is to "support the contribution of the transport sector to the social and economic development of the country, while incrementally initiating innovative green alternative transformations in the sector to assist with the reduction of harmful emissions and negative environmental impacts associated with transport systems". The Environmental Consideration mission is to "To promote awareness and understanding of transport-related environmental issues, increase participation in environmental management, address environmental problems at all levels of transport, and ensure compliance with standards, monitoring and reporting that demonstrate a tangible improvement in the sustainable use of natural resources".

Both the Green Transport Strategy and National Transport Policy white paper, clearly emphasises and highlights the impact of transport on our environment and the need to take action to reduce GHG emissions.

The policy instruments that provide guidelines, procedures and regulations on the management of transport and travel within the government fleet are:

- Government Motor Transport Handbook version 01 of 2019, DoT (2019) – is a transport policy that obligates and guides all government officials on how to plan, manage and facilitate all transport and fleet related activities.
- National treasury, National travel policy framework (2017) – is a cost containment document with the purpose to create minimum norms and standards for commuters travelling on official business both domestically and internationally
- Subsidized Motor Transport Handbook Version 1 of 2017

This above policy instruments will be reviewed with the intention to be compared with National Transport Policy white paper and Green Transport Strategy to identify common elements and difference.

3.5 Funding and expenditure on transport

Since the case study is focused on the government departments, it is important to look at government funding, expenditure on travel related operations and sustainability. Government departments receives funds from the National Treasury. The National Treasury collects revenue through various government programmes or channels. In terms of economic policy, government funding is derived from fiscal policy.

Therefore, the National Treasury will distribute these funds to various government departments in accordance to its financial commitments and budget allocation for a particular financial year.

The National Treasury's total expenditure report on fleet operations across all provinces was R2.8 billion during the 2016/17 financial year which indicates a six percent average increase per annum, as the analysis shows:

TABLE 5: TOTAL FLEET OPERATIONS EXPENDITURE

Financial Year	2014/15	2015/16	2016/17
Total Fleet Operations Expenditure	R2.505 b	R2.657 b	R2.807 b
% Change		6% increase from 2014/15	5.6% increase from 2015/16

Source: (Ducharme Consulting, 2018)

Furthermore, over R1.2 billion was spent on fuel for the 2016/17 financial year. This figure is included in R2.8 billion total fleet expenditure, therefore over 45% of the total cost is spent on fuel.

In summary, the total fleet of government department is approximately 39 886 with 758 653 092 kilometres travelled and spent R2.8 billion on transportation and fleet activities during the financial period.

Auditor General reported the following findings during this period: Auditor General (2017)

- Fruitless and wasteful expenditure had increased by 17% since 2013-14 but decreased by 6% since the previous year. The number of government

department that incurred this type of expenditure had slightly decreased from 2015-16.

- Irregular expenditure had increased by 55% (R16 183 million) from the previous year and by 53% (R15 739 million) from 2013-14.

- Recommendations – Reducing the cost of services provided is part of the solution for improved financial health. We believe that more could be done with less if, among other - saving initiatives, a concerted effort is made to curtail the extent and costs of using external providers.

It is worrying to observe large sum of money spend on transport operation for service delivery related matters and on the other hand review an audit report which is not clean. Furthermore, with a budget deficit amounting to R156 billion for 2016/17 financial year (Statsa, 2017), the financial position of South Africa is at risk if public spending and mismanagement of funds continues. South Africa is regarded as the most unequal societies in the world. Therefore, government should look into alternatives ways to stabilise this situation. Better management of transport resources could offer an opportunity to reduce government expenditure on travel and related activities. Some of the travel activities includes sleepover accommodation at hotels or lodges which will be added to the government's expenditure.

Transitioning into green transport and sustainable travel behaviour offers not only potential savings but also the reduction of greenhouse gas emissions and traffic congestion.

3.6 Government Fleet Policy

As mentioned in the above section, transport and fleet management services within government are regulated by the Government Motor Handbook version 01 of 2019. The main purpose of the Government Motor Handbook is to provide guidelines based on best practice and legislative prescripts to provide guidance and direction in the management of government motor transportation.

3.6.1 Transport Officers

The Transport Officers also referred to as the Departmental Fleet Manager / Transport Control Officer / Departmental Transport Officer/ District Transport Officer / Transport Controller and local Transport Officer. Transport Officers are government officials who are appointed in terms of the Public Service act Government Gazette (2016) to manage and facilitate the administration of transportation and fleet in line with the Government Motor Handbook (2019). The Department of Transport (2017) subsidised motor vehicle handbook also gives power to Transport Officers to manage the administration of Subsidised motor vehicles.

3.6.2 Transport forum

The Government Motor Handbook gives power to government departments to establish transport forums where Transport Officers from various national departments participate to address all operational matters and to promote cost effective fleet management within the departments.

The transport forum is established as part of governance structures to promote compliance, participation and ensure that transport within departments in managed in accordance with applicable regulations.

Furthermore, the transport forum serves as a platform to engage, discuss and share information relating to but not limited to:

- Transport Policy formulation
- Transport Policy interpretation
- Fleet Management activities
- Maintenance Contracts
- Standard Operating procedure

3.3 Summary and conclusion

This chapter provided a “better picture” on the role of motor vehicles in government departments, the total vehicle fleet, applicable policies, funding and transportation expenditure, the Auditor General viewpoint and lastly the transport forum. The chapter provided a brief explanation on government service delivery and how motor vehicles are utilised in support of service delivery.

The total number of vehicles reported by the National Treasury with the assistance from Ducharme consulting for the period 2015-2017 indicate an increase in the number of motor vehicles. During 2016/17 financial year, Ducharme consulting (2018) reported R2.8 billion expenditures on fleet operations which indicated 5.6% increase from the previous financial increase. R1.2 billion was spend on fuel during the same financial year.

This chapter also explained where government obtains the revenue to fund fleet operations and related activities, and how the Auditor General plays the oversight role in monitoring the general government expenditure.

Key applicable policies were introduced to provide an understanding on how government manages and control its own fleet activities and how these policies are aligned with the National Department of Transport’s white paper and green transport strategy.

The national transport forum was also introduced as members of the forum plays a very important role in managing the day-to-day transportation activities within government departments.

In conclusion, the increase in number of motor vehicles and expenditure is concerning because of the rise in the number of vehicles will consequently increase the generation of emissions. It was also noted that 1.2 billion rand was spend on fuel which means thousands of litre of fuels was burned into the atmosphere. Furthermore, this amounts are quite significant and unsustainable especially in a country like South African where income and equality are skewed, high unemployment rate, poverty, high crime and poor housing for members of the with no income.

During the 2016/17 financial year audit period, the Auditor General of South African recommended that in order to create sustainable public finances, the reduction in the cost of rendering public services is necessary as it has been noted that public services can still be rendered without increasing recourses. This recommendation by the Auditor General of South Africa holds an important aspect particularly with the use of motor vehicles because reduction on the use of motor vehicle not only reduce emissions but also the reduces the cost of rendering services.

Lastly, the role of Transport Officers within the government departments were identified as a crucial factor government employers because of their role as managers of transport activities and subsequently the Transport Officers involvement in the reduction of emissions and mapping the way to sustainable transportation is crucial.

CHAPTER 4

METHODOLOGY

4.1 Introduction

The previous chapters indicated the importance of green transport and sustainable travel behaviour and the reason why countries should introduce strategies and implement them. This research study attempts to reveal the extent to which the government departments are transitioning into green transport and sustainable travel behaviour with the expectation to create awareness and promote on green and sustainable transport within national government departments.

The literature review chapter provided what constitute the elements and the components of green and sustainable transport. Possible benefits were identified and may be used as a foundation and the platform to create innovative and sustainable solutions.

Chapter three introduced the role of government, the status of government department fleet and expenditure, and the study focus. With the methodology chapter, the aim is to explain the methods used to collect data for analysis and interpretation.

4.2 Members of the national transport forum

As indicated in chapter 3, the Government Motor Handbook obligates National departments to establish a Transport Forum where Transport Officers from various government department may participate. This forum is chaired by the Fleet Manager from the National Department of Transport. These members of the forum can provide crucial information about travel and fleet operations from their experience and organisational history. As managers of transport, Transport Officers will serve as the first point of contact for data collection.

To fully understand the extent to which government travel is sustainable and transitioning into green transport, Transport Officers will be approached to assist with the collection of data through an open-ended questionnaires.

4.3. Data collection instruments

4.3.1 Open ended questionnaires

As mentioned above, the first point of contact in data collection was to request Transport Officers from various national government department to participate. Initially collection of data was going to be through conducting of in-depth interviews. During the application of the ethical clearance, proposed interview questions was submitted together with other supporting documents in the application of the ethical clearance. Ethics Committee approved ethical clearance on 15 September 2020 and valid till 14 September 2023. One of the requirements or approval conditions was that no contact survey will be allowed due to Covid 19 lockdown restrictions.

4.3.1.1 Description of the method

The main purpose to use questionnaires to collect data from the Transport Officers who are members of the national transport forum is because of their operational insight they possess. The questionnaires were designed to obtain direct and relevant data. An effort was made to ensure that the questions were clear, straightforward and unambiguous. Government terms (language) was used to ensure that participants understand the questions asked. The thesis is about understanding the extent to which government department's fleet and related travel activities transforms into green and sustainable travel with the aim to identify gaps that hinders transformation. The key questions were centred around the below themes and questions:

- To understand the motor vehicle procurement plan (What informs procurement of vehicles)

  The principle is to get in the minds of Transport Officers to understand the reason behind the purchasing of the motor vehicle with the intention to observe if the

environmental friendly motor vehicles were considered. Secondly, it is about observing if a technical motor vehicle selection process to identify the right motor vehicle was followed.

- Analysis on the total number of vehicles in service

  This will pave a way to the question on the number of vehicles, how many kilometres travelled and litres of fuel consumed. Number of vehicles will determine the total kilometres travelled and litres of fuel consumed during a particular period. The analysed information will provide motor vehicle utilisation and the impact on the environment. It will also reveal number of electric vehicles that a department owns.

- Determine the use of alternatives that will minimise travel, e.g. Teleconferencing / skype call?

  The objective is to establish the frequency on the use of online communication and what challenges are experienced when using the online communication. The intention is to encourage the use of online communication and discourage unnecessary travel as the main objective.

- Formulation of internal transport policies to address environmental impact?

  The objective is to determine the policy gap. Internal policy must be formulated in such that they can be used as a tool to address environmental issues. Departmental policies are very important because they serve as strategical and operational documents to drive the organisation towards a positive path. They are guide to assist in the provision and management of effective transport services in the government departments.

4.3.1.2 The objective of the method

As mentioned above, the main objective is obtaining relevant information from the various Transport Officers in order to understand the position of the governments in relations to green and sustainable travel with government department. It will be interesting and worthwhile to use the transport forum platform to obtain important

elements about travel and fleet operation in their own departments. The questionnaires will identify the gaps and what is missing from the government fleet as far as the green and sustainable travel is concerned.

4.3.1.3 Sample size design

The list of the Transport Forum members with their contact details was obtained from the chairperson of the forum. The researcher communicated with the members via email. The content of the email introduced the researcher, the purpose of collecting data, appointment requesting to conduct the interview, the importance of participation as members and the emphasis on voluntarily of the study, privacy protection and no remuneration was also highlighted. Attached documents were ethical clearance, interview questions and participants consent form.

At the time of the participation request, the transport forum had sixteen (16) members from various national departments and eleven (11) managed to participate as indicated below:

i. Department of Rural Development and Land Reform
ii. Human Settlements
iii. Tourism
iv. The Independent Police Investigative Directorate (IPID)
v. Water Affairs
vi. Statistics South Africa
vii. Labour and Employment
viii. Government Pensions Administration Agency (GPAA)
ix. Agriculture
x. Transport
xi. Environmental Affairs

4.3.1.4 Limitation to the method

Weeks and months went by without any response from members despite attempts made to remind them to participate. The researcher contacted the members telephonically when it became clear that most members were working remotely, some on routine schedule due to lockdown regulations. Covid 19 affected data collection especially on securing an appointment for a telephone interview/discussion.

As Covid 19 restriction were slowly started to be lifted according to levels, more people started to go to work and then communication channels between the researcher and participants improved. Participants started to ask for clarity about the study and willingness to participate. Most participants requested to answer the questions during free time as it was difficult to secure telephone interviews. The researcher allowed the participants to answer the questionnaires during free time and the process proved to be effective as response rates improved.

4.3.2 Service provider data

The case study chapter introduced ways in which government officials travels when providing government services to the citizen, one of the methods is through the subsidised motor vehicle scheme. Government officials who utilises the subsidy scheme are expected to utilise these vehicles in accordance with the rules of the scheme. In terms of the rules stipulated in transport circular 5 of 2003, officials are expected to travel a minimum of 70 % for business or approved trips and allowed 30% private trips.

The National Treasury of South Africa appointment two service providers to manage and administrate the subsidised motor scheme. The first service provider is called Mmela Financial services which is responsible to facilitate the financing of the motor vehicles for government officials and the second service provider is called Fleet Africa which is responsible for the administration, maintenance, repairs and fuel claims. The below section addresses how the data was collected and how it will be used. Service providers costing is not part of the R2.8 billion.

4.3.2.1 Subsidised motor vehicle financing data

As indicated above, Mmela Financial services is responsible for financing a subsidised motor vehicle for a government officials in terms of the National Treasury RT 68 transversal contract. Mmela Financial services is also responsible to provide insurance cover to all subsidised vehicles at the state cost.

4.3.2.1.1 Description of the method

Mmela Financial services has a dataset of active government officials who participate on the scheme. The researcher approached Mmela Financial services and requested the dataset via email. The study background was provided to Mmela Financial services with ethical clearance attached. Mmela responded with the information as requested by sending a Microsoft excel file of all active subsidies motor vehicles. The Microsoft excel file contained information of the officials and from both national and provincial departments who are currently on the government subsidised motor scheme, the cost of the motor vehicle, motor vehicle description which includes the model, engine capacity and gear transmission.

4.3.2.1.2 The objective of the method

The objective was to obtain total number of active motor vehicles, engine capacity size and fit for purpose. The method used will also assist to determine number of electric vehicles (EV) available on the subsidised scheme.

With the number of motor vehicles, the researcher will be able to see how many motor vehicles are involved, the size of engine capacity will provide insight about emission contributors because the bigger the engine, the higher production of CO_2 emissions and lastly, EV are considered to be environmentally friendly, therefore the research will be able to see how many EV's are involved.

4.3.2.1.3 Sample size

All active National Treasury RT68 subsidised motor vehicles were included in the study.

4.3.2.1.4 Limitation of the method

To obtain the data from Mmela Financial services was not a straight forward process. In the beginning of the data request, Mmela Financial services officials were reluctant to provide the data because some of the information was personal and confidential.

4.3.2.2 Maintenance and fuel claim data

On the other hand, Fleet Africa is responsible for the maintenance, repairs and fuel claims in terms of National treasury RT 62 transversal contract. Similar to Mmela Financial services, Fleet Africa also has a dataset of active government officials who participate on the subsidised motor scheme.

4.3.2.2.1 The description of the method

In a similar way as Mmela Financial services, the researcher approached Fleet Africa and requested the dataset via email. The study background was provided to Fleet Africa with ethical clearance attached. Fleet Africa responded with the information as requested by sending a Microsoft excel file of all active subsidised motor vehicles. The Microsoft excel file contained all the records of the total kilometres travelled and the cost of fuel claims as prescribed by the fuel tariff rate published by the National Department of Transport.

4.3.2.2.2 The objective of the method

The objective was to obtain total kilometres travelled of the active subsidised motor vehicle fleet. With travelled kilometres, the researcher will be able to analyse utilisation

in relations to sustainable travel goals and the fuel claim will provide a picture on the fuel cost impact to the government.

4.3.2.2.3 The sample size

All active National Treasury RT62 subsidised motor vehicles was included in the study.

4.3.2.2.4 Limitations to this method

Since the data was obtained from Fleet Africa's dataset, the person responsible for the dataset was not always available due to covid-19 rotational work. The chairperson of the National Transport Forum assisted in finding the responsible person to assist with the data.

4.4 Conclusion

The methodology chapter emphasised on how the data was collected and which data collection instruments used. Two data collection instruments were used namely questionnaires and secondary data which was the dataset obtained from service providers who administers government subsidised motor scheme. Questionnaires were used to collected data from the national government department Transport Officers who are members of the National Transport Forum on government fleet. The dataset from Mmela Financial Services and Fleet Africa was obtained to collect secondary data that was focused on the subsidised government motor scheme for both national and provincial government departments.

At the time of data collection, the transport forum comprised of 16 Transport Officers, of which 11 responded to the questionnaire and 5 did respond. The number of active subsidised motor vehicles was 4175 and consist of different make and engine size.

CHAPTER 5

RESEARCH FINDINGS

5.1 Introduction

The past chapters provided the key information to expand and streamline the research thesis. In chapter 2, the literature review emphasised the elements and components of green and sustainable transport and were highlighted for benchmarking. The case study chapter provided the key information about the current government fleet and related activities. The research methodology chapter explained the data collection process used to achieve the main objective.

The purpose of this chapter is to present the main research findings obtained from questionnaires used as a survey instrument and existing data. As indicated in chapter 4, the questionnaires were emailed to the Transport Officers who participate on the National Transport Forum chaired by the National Department of Transport, Government Fleet. Secondly, existing data was obtained from the service providers who administers subsidised government motor vehicles.

This chapter begins by presenting key findings from the questionnaires that were send to Transport Officers to understand the sustainability of government travel and whether the transition to green transport operations is evolving. This chapter will also explore the usage of subsidised vehicles in terms of its relations to green and sustainable travel.

5.2 Data from questionnaires

The main research findings will be discussed and categorised as follows, vehicle procurement and vehicle selection, fleet activities, policies interventions, online communication, outsourced or the use of external transport services and CO_2 Implications.

5.2.1. Vehicle procurement and selection of the vehicle

Vehicle procurement method are presented in Table 6 which reveals how various department responded on the question "Vehicle procurement plan - Which process do you follow when acquiring new vehicles? (Planning/Consideration)"

TABLE 6: RESPONSE ON MOTOR VEHICLES PROCUREMENT METHOD

The process followed by National government department to procure motor vehicles (Planning/Consideration)
National Department One
• Government Garage (G-Fleet) - a government owned entity that leases motor vehicles to various state organs. • Transversal contract (RT 57) Procurement contract • Subsidised motor vehicle scheme
National Department Two
• Vehicle purchase requests must take into consideration the most economical, most fuel efficient, and lowest emissions vehicles available in a particular model year that meet the operational needs and policy requirements of the Institution. • Conduct the feasibility study and check what is the size, type of vehicles your department needs and type of the road as per your projects or programme. It is what we called needs analysis. • Check the budget allocation for that financial year.
National Department Three
We do the following: Step 1- Need analysis (number of vehicles required, type of vehicles, how frequent these vehicles will be utilized) Step 2-Planning (Financial resources) Step 3-Procurement (we lease(G-fleet) our vehicles through the Transversal contracts, Long term and Short term)Long term- 5yrsShort term- 1month to 2yrs
National Department Four
• Needs Analysis • Current Fleet Utilization Analysis • Vehicle Specification Analysis • Quoting VIA G-Fleet.
National Department Five
• Transversal contract (RT 57) Procurement contract • Users requirement, comfort and safety • G-fleet • Budget Provisions
National Department Six
The (RT 57) contract is followed through National Treasury for the purchase of motor vehicle, which are supplied by various manufactures.

National Department Seven
• Consider various requirement, plan procurement based on allocated budget. • We make use of RT 57
National Department Eight
The department currently rely on 80% car rentals as most officials fly to different provinces around south Africa and the rest will be vehicles leased from government garage (G-fleet)
National Department Nine
We have a fleet tender in place for a period of 3 years and the procurement of vehicles are done through this tender.
National Department Ten
• Research Car Option. (Sedan Fleet, Hatchback or bakkies) • Find Financing… (Bank Financing) • Negotiate Price if you can get discount when buying in bulk • Determine Your Payment Amount • Consider Your Other Costs e.g. Maintenance Plan and Warranty
National Department Eleven
A needs analysis is conducted on a regular basis and the following instances are provided for in the Departmental Fleet Management Policy. • At 160 000 kilometre reading or after 4 (four) years • At 200 000 kilometre reading 5 (five) years • Replaced if a vehicle has been involved in an accident and is a write off, of • A vehicle has become uneconomical (maintenance costs exceed the original purchase price)

Participants indicated that the basis of procuring vehicles is centered around the following main elements which include RT 57 transversal contract, budget provisions, replacement of old vehicles and request from end-user business units.

The RT 57 contract is a National Treasury contract established with the main aim of procuring vehicles from the manufacturer on a discounted price. All national government department has the option to procure motor vehicles on RT 57 Contract. The RT 57 contract makes vehicles cheaper for the government because vehicle are procured directly with the manufacturer and not at a normal motor vehicle dealership. Therefore, the RT 57 Contract indirectly or directly promotes the use of motor vehicles by making them easily available to end-user department at a lesser price than the price offered to the general public.

Every financial year, each national department makes budget provision to procure vehicles. It is a standard practice for financial year budgeting and it is done in

accordance to the Public Finance Management Act (PFMA). Once the budget is approved, vehicles will be procured.

Asset management determines the life cycle of all assets in the organization including motor vehicles. Once the disposal date for vehicle is reached, then the vehicle must be sold and replaced with new vehicles. Therefore, replacement of vehicles follows the disposal of old vehicles.

The individual business units have their operational travel needs, for which they will request procurement of vehicles based on those operational requirements.

5.2.2 Fleet activities

The questionnaires responses revealed fleet operational activities of 11 national government department(s). As indicated, the information was obtained from Transport Officers which include the size of the fleet, kilometres travelled, litres of fuel used and the type of engine that powered the vehicle. E.g., fuel or electric.

TABLE 7: FLEET ACTIVITIES

Total fleet	3806
Engine Type	
Fuel	3795 (99.71%)
electric	11(0,29%)
"Litres/annual"	15807486,22
"Travelled km/annual"	46 967 556
"Monetary value"	R228 260 101
No account for litres	45,45% (1701 vehicles)

Table 7 reveals that the total fleet is 3806 with 46 967 556 kilometres travelled for the period 2019/20 financial year. The litres of fuel consumed was 15 807 486.22 with monetary value of R228 260 101. The monetary value was calculated based on the 12 months' average cost of unleaded petrol of R14.44 per litre in 2019. Table 8 provides basic fuel price for twelve months in 2019 (Department of Energy, 2019).

TABLE 8: BASIC FUEL PRICE

	2019 c/LITRE FUEL					
	Petrol 93 Unleaded	Petrol 93 Unleaded	Diesel 0.05% Sulphur Diesel	Diesel 0.005% Sulphur Diesel	Maximum Refinery gate price	Exchange Rate Rand/US$
Jan	524.470	536.470	635.630	639.030	731.963	14.1778
Feb	531.470	543.470	636.630	641.030	723.937	13.9476
Mar	605.470	617.470	727.630	734.030	800.053	13.8038
Apr	714.170	723.170	783.630	791.030	929.507	14.3871
May	768.170	777.170	784.630	791.030	993.108	14.1401
Jun	755.010	764.010	794.630	801.030	897.149	14.4127
Jul	667.790	677.790	728.630	734.030	886.744	14.6227
Aug	683.170	693.170	719.630	724.030	910.597	14.0709
Sep	694.170	704.170	745.630	750.030	898.455	15.1729
Oct	690.170	722.170	770.630	775.030	911.075	14.8432
Nov	677.170	709.170	754.630	761.030	888.591	14.9293
Dec	687.570	719.570	733.630	739.030	912.800	14.8037

Source:(Department of Energy, 2019)

99.71% indicate that 3795 motor vehicles were powered by fuel engine and on 0.29% is electrified.

The data also showed that 45.45% of participants do not account or keep record of fuel litres used. The 45.45% amounts to 1701 vehicles which fuel for vehicles are not accounted for or records kept.

5.2.3 Policies interventions

All government department have policies that provide high level guide, procedures and regulations to ensure service delivery is rendered efficiently and cost effectively in support of the overall government strategy and vision. At the departmental level, policies are formulated and implemented to empower government officials in the provision of good service whilst adhering to good practices and to comply with applicable rules and regulations.

Policies can be used to address a particular problem. From operational point of view, as far as greenhouse emission are concerned, policies can be used to discourage government from buying motor vehicles with fuel engines or restrict the buying of a

vehicle with a bigger engine motor vehicle. Policies can use used to discourage travel and promote sustainable travel.

91% of departmental policies do not have any special requirement to reduce greenhouse gases, whilst less than half of the Transport Officers are aware or familiar with The Green Transport Strategy (2019).

5.2.4 Online communication

Online communication was never an option to replace travelling. Government officials prefers travelling for face to face engagements, 45% do not use online communication often, 55% often used online communication and both is because of Covid 19 regulations. The impression created by questionnaires responses, once everything goes to normal were all Covid 19 restrictions are lifted, travelling will increase again. The online communication was enhanced by the Covid 19 pandemic.

5.2.5 Outsourced or the use of external transport services

Over and above the existing fleet, Table 9 presents 82% of the national department indicated that they make use of external transport services e.g. shuttles or rent a vehicle. These services occur when there is a shortage of vehicles or when they travel to the airport to fly out of the province.

TABLE 9: OUTSOURCED OR THE USE OF EXTERNAL TRANSPORT SERVICES RESPONSES

	Outsourced/External use of transport	
	yes	no
Respondents	9	2
Respondents %	82%	18%

5.2.6 General understanding on the effects of greenhouse gases

All Transport Officers are aware of the impact of greenhouse gases. Although some have demonstrated little knowledge but the common understand has been noted. About 18% indicated that they don't believe that anything can be done with the reduction of motorised travel and the reason was due to lack of Electric Vehicle (EV)

and travelling should happen because it is part of the work, whist 81% believe something should be done, the emphasis was on the Electric Vehicle (EV) but other forms of discouraging travel was not mentioned.

5.3 Service provider data

As mentioned above, the collection of data from service providers who administer subsidised government vehicles will be conducted for data presentation and interpretation. The first data to be presented will be the RT 68 Active data set from Mmela Financing. The data will constitute of vehicle category, type and engine capacity, top 7 most used engine size, top 7 least used, the most favourite make and model, gear transmission and lastly the finance instalments that the government has to pay monthly. Data obtained from Fleet Africa, will constitute of total kilometres travelled and total fuel cost as presented by fuel claims from government officials.

5.3.1 Vehicle Category, type and engine size

Government officials who are required to travel to perform official duties are given the opportunity to purchase vehicles based on the engine size capacity as listed in table 10. There are six (6) categories of vehicle types that varies from 0 to 3500 Cubic capacity (cc)

TABLE 10: MOTOR VEHICLE CATEGORY AND ENGINE SIZE

	Vehicle Category and Make	Engine Size A	Engine Size B	Engine Size C	Engine Size D	Engine Size E	Engine Size F	Engine Size G
1	Category A - sedan	(0 TO 1250)	(1251 - 1550)	(1551 - 1750)	(1751 - 1950)	(1951 - 2150)	-	-
2	Category B - light delivery vehicle - 4x2 double cab	-	-	-		(1951 - 2150)	(2151 - 2500)	(2501 - 3500)
3	Category B - light delivery vehicle - 4x2 single cab	-	(1251 - 1550)	(1551 - 1750)	(1751 - 1950)	(1951 - 2150)	(2151 - 2500)	(2501 - 3500)
4	Category C - light delivery vehicle - 4x4 double cab	-	-	-	-	1951 - 2150)	(2151 - 2500)	(2501 - 3500)
5	Category C - light delivery vehicle - 4x4 single cab	-	-	-	-	(1951 - 2150)	(2151 - 2500)	(2501 - 3500)
6	Category D - multi purpose vehicle	(0 to 1250)	(1251 - 1550)	(1551 - 1950)		(1951 - 2150)	(2151 - 2500)	(2501 - 3500)

"Table 11" present the total active fleet by category and engine cubic capacity (CC) for the financial period 2020/21. Base on this table, there are 4174 active subsidised motor vehicles, whilst "Figure 12" shows the graphical representation of active total fleet.

TABLE 11: TOTAL ACTIVE FLEET BY CATEGORY AND ENGINE CUBIC CAPACITY (CC) (2020/21)

Vehicle Category and Make	Engine Size A (0 to 1250)	Engine Size B (1251 - 1550)	Engine Size C (1551 - 1750)	Engine Size D (1751 - 1950)	Engine Size E (1951 - 2150)	Engine Size F (2151 - 2500)	Engine Size A (2501 - 3500)	Total
Category A - sedan	8	88	571	125	105			897
Category B - light delivery vehicle – 4x2 double cab					110	1236	75	1421
Category B - light delivery vehicle 4x2 single cab		3	11		759	339	57	1169
Category C - light delivery vehicle 4x4 double cab						142	62	204
Category C - light delivery vehicle 4x4 single cab					1	19	3	23
Category D - multi purpose vehicle	6	52	82		217	76	27	460
								4174

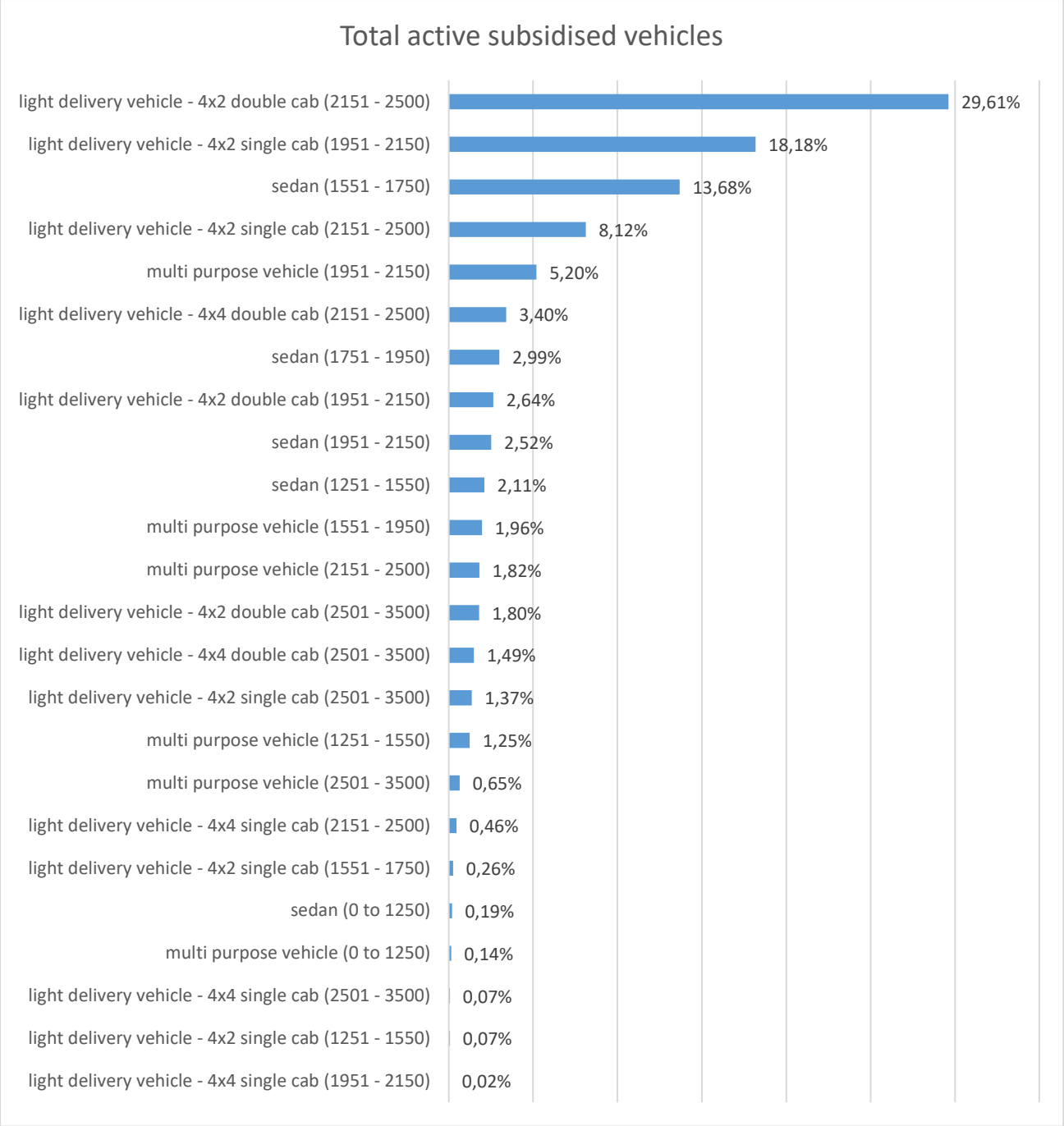

FIGURE 12: TOTAL ACTIVE FLEET GRAPHICAL PRESENTATION BY CATEGORY AND ENGINE CUBIC CAPACITY (CC)

5.3.2 Top seven (7) seven most used engine size (CC)

Table 12 represents the top seven (7) most favourite category. The most favourite category is category B, light delivery vehicle - 4x2 double cab (2151 - 2500) which represent 36% of the top seven most favourite amounting to 1236 motor vehicles and 30% of the total active fleet.

TABLE 12: MOST USED ENGINE SIZE (CC)

Vehicle Category By Make & Engine Capacity	Number#
Category A - sedan (1751 - 1950)	125
Category C - light delivery vehicle - 4x4 double cab (2151 - 2500)	142
Category D - multi purpose vehicle (1951 - 2150)	217
Category B - light delivery vehicle - 4x2 single cab (2151 - 2500)	339
Category A - sedan (1551 - 1750)	571
Category B - light delivery vehicle - 4x2 single cab (1951 - 2150)	759
Category B - light delivery vehicle - 4x2 double cab (2151 - 2500)	1236 (36%)
Grand Total	**3389**

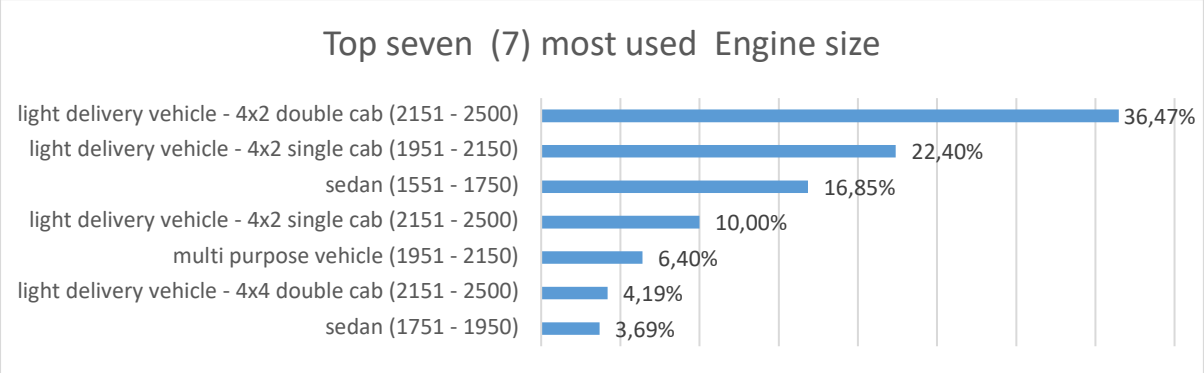

FIGURE 13: TOP 7 MOST USED ENGINE SIZE (CC) GRAPHICAL PRESENTATION

Table 13 presents the most use and favourite brand is Ford Ranger Bakkie which amounts to 806 vehicles, followed by Toyota Hilux (192), Isuzu KB (181) last Nissan NP 300 (19).

TABLE 13: MOST USED MOTOR VEHICLE MAKE AND BRAND

Vehicle Model	Number#
Nissan NP300	19
Isuzu D-Max & KB	181
Toyota Hilux	192
Ford Ranger	806

5.3.3 Top Seven (7) least used Engine size (CC)

Table 14 represents the least used vehicle as indicated by the engine cubic capacity (cc). Category C - light delivery vehicle - 4x4 single Cab (1951 - 2150) is the least used vehicle. Category A - sedan (0 TO 1250) is ranked at number four (4) of the least used vehicles representing 37 % of the seven (7) least used engine size (CC) and 0.19% of the total active fleet. Category A - sedan (0 TO 1250) is economical vehicle in terms

of the engine cubic capacity which is associated with less fuel consumption compared to the bigger engine (cc)

TABLE 14: TOP SEVEN (7) LEAST USED ENGINE SIZE (CC)

Vehicle Category By Make & Engine Capacity	Number#
Category C - light delivery vehicle - 4x4 single cab (1951 - 2150)	1
Category B - light delivery vehicle - 4x2 single cab (1251 - 1550)	3
Category C - light delivery vehicle - 4x4 single cab (2501 - 3500)	3
Category D - multi purpose vehicle (0 to 1250)	6
Category A - sedan (0 to 1250)	8
Category B - light delivery vehicle - 4x2 single cab (1551 - 1750)	11
Category C - light delivery vehicle - 4x4 single cab (2151 - 2500)	19
Grand Total	51

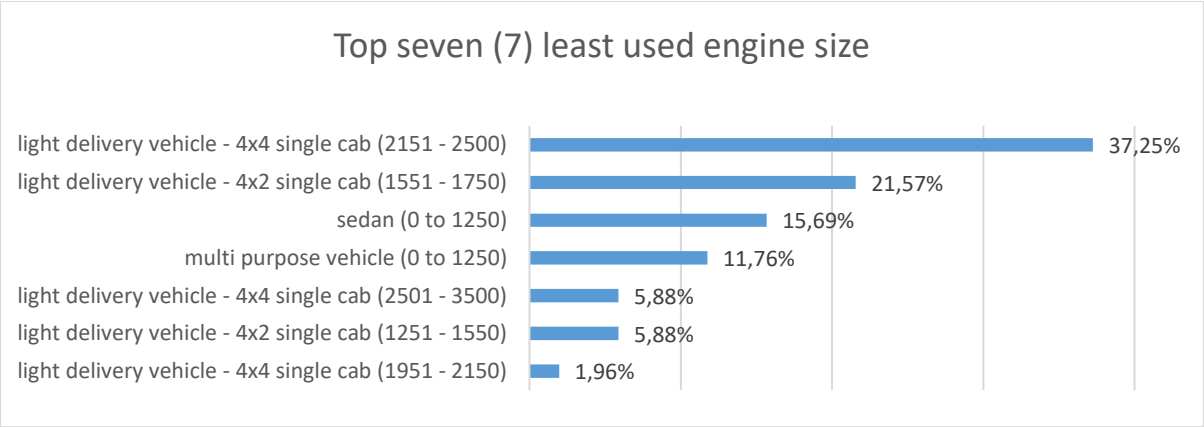

FIGURE 14: TOP SEVEN (7) LEAST USED ENGINE SIZE (CC)

5.3.4 Gear Transmission

Gear Transmission simply implies to motor vehicle gears system that integrates the engine and the gearbox to increases or decreases the speed of the vehicle. In most cases, there are two types of gear transmission, manual or automatic transmission. Table 15 presents the gear transmission.

TABLE 15: GEAR TRANSMISSION

Transmission	Number#	%
Automatic	1116	26,74%
Manual	3058	73,26%
Grand Total	4174	100,00%

5.3.5 Instalment contribution by government

The contributions by the government towards the monthly instalments of active subsidised vehicles was R20 736 069.88 for 4174 motor vehicles.

5.3.6 Kilometres travelled

One of the factors that the government considers when providing a subsidised motor vehicle scheme to a government employee is the expected minimum kilometres required to be travelled by an employee. In terms of the subsidised motor vehicle policy of the National Department of Transport (2003),the provision of a subsidised motor vehicle is deemed as a work tool to enable government employees to travel for work purposes. The subsidy scheme dictates that employees should travel 70% of the kilometres for work purpose and 30% should be private trips within the contracted period. Figure 15 reflects the structure of the government subsidised motor scheme. The government contributes 70% toward the financing cost of the vehicle with the expectation that 70% of the contracted kilometres will be travelled for work purposes whilst the 30% will be for private use at the employee's cost.

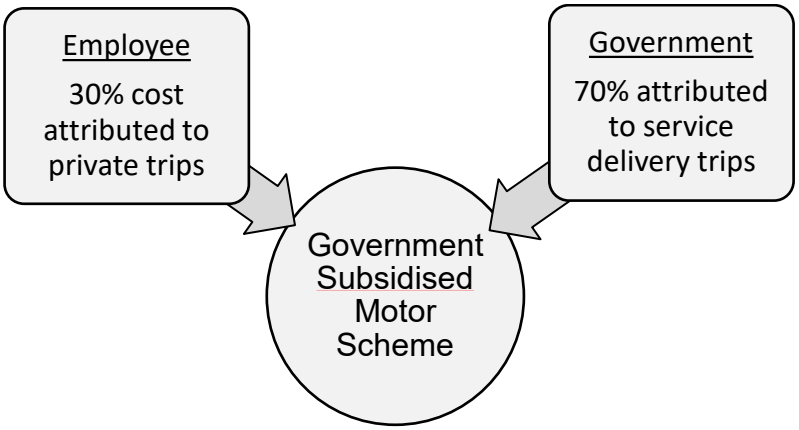

FIGURE 15: GOVERNMENT SUBSIDISED MOTOR SCHEME STRUCTURE

Table 16 shows the data collected from Fleet Africa which is a service provider appointed by the National Treasury to administer the maintenance and fuel claims on subsidised motor vehicles. The table revealed a total of 55 689 184 kilometres travelled for service delivery purposes and 19 791 166 kilometres travelled for private

use. Figure 16 provides a graphical presentation of total the travelled kilometres on government subsidised motor vehicles.

TABLE 16: KILOMETRES TRAVELLED

Month	Year	Actual Business Kilometres	Actual Private Kilometres	Total Kilometres Travelled	Business Kilometres %	Private Kilometres %
April	2021	4663423	1441388	6104811	76,39 %	23,61 %
March	2021	6028905	1776754	7805659	77,24 %	22,76 %
February	2021	5603150	1630587	7233737	77,46 %	22,54 %
January	2021	3885305	1861020	5746325	67,61 %	32,39 %
December	2020	4851437	2291615	7143034	67,92 %	32,08 %
November	2020	6095803	1872943	7968746	76,50 %	23,50 %
October	2020	5792843	1886295	7679138	75,44 %	24,56 %
September	2020	5170331	2137496	7307827	70,75 %	29,25 %
August	2020	4327179	1558754	5885933	73,52 %	26,48 %
July	2020	3734633	931123	4665756	80,04 %	19,96 %
June	2020	3265626	1293809	4559435	71,62 %	28,38 %
May	2020	2270549	1109382	3379931	67,18 %	32,82 %
		55689184	**19791166**	**75480332**	**73,78 %**	**26,22 %**

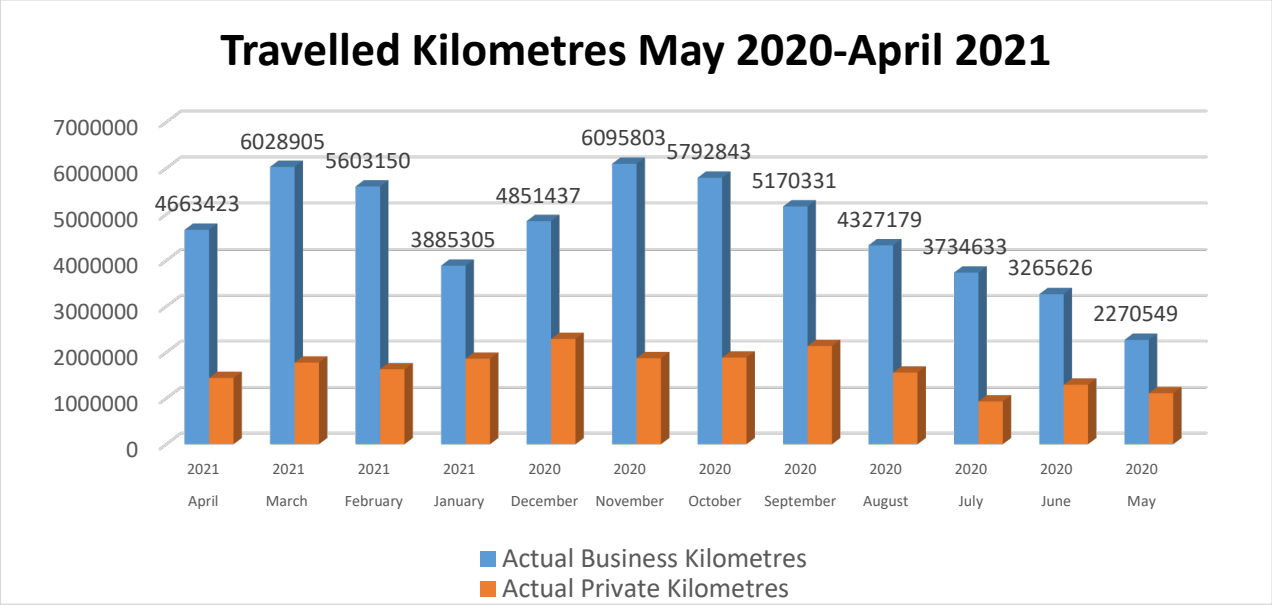

FIGURE 16: SUBSIDISED MOTOR VEHICLE TRAVELLED KILOMETRES

5.3.7 Fuel claim

As indicated above, fleet Africa is also responsible for the administration of fuel claims on subsidised motor vehicles. Table 17 shows the total cost to the government for fuel claimed on the use of subsidised motor vehicles for the period of twelve months which is R 72 356 365, 95.

TABLE 17: TOTAL FUEL CLAIMED SUBSIDISED MOTOR VEHICLE

Month	Year	Actual Business Kilometres	Business Kilometres %	Claim Value
April	2021	4663423	76,39 %	R 6 662 097,96
March	2021	6028905	77,24 %	R 8 522 242,27
February	2021	5603150	77,46 %	R 7 639 265,38
January	2021	3885305	67,61 %	R 5 086 977,58
December	2020	4851437	67,92 %	R 6 034 661,99
November	2020	6095803	76,50 %	R 7 474 564,80
October	2020	5792843	75,44 %	R 7 187 897,47
September	2020	5170331	70,75 %	R 6 858 267,67
August	2020	4327179	73,52 %	R 5 776 084,05
July	2020	3734633	80,04 %	R 4 875 337,47
June	2020	3265626	71,62 %	R 3 719 903,55
May	2020	2270549	67,18 %	R 2 519 065,77
		55689184	73,78 %	R 72 356 365,95

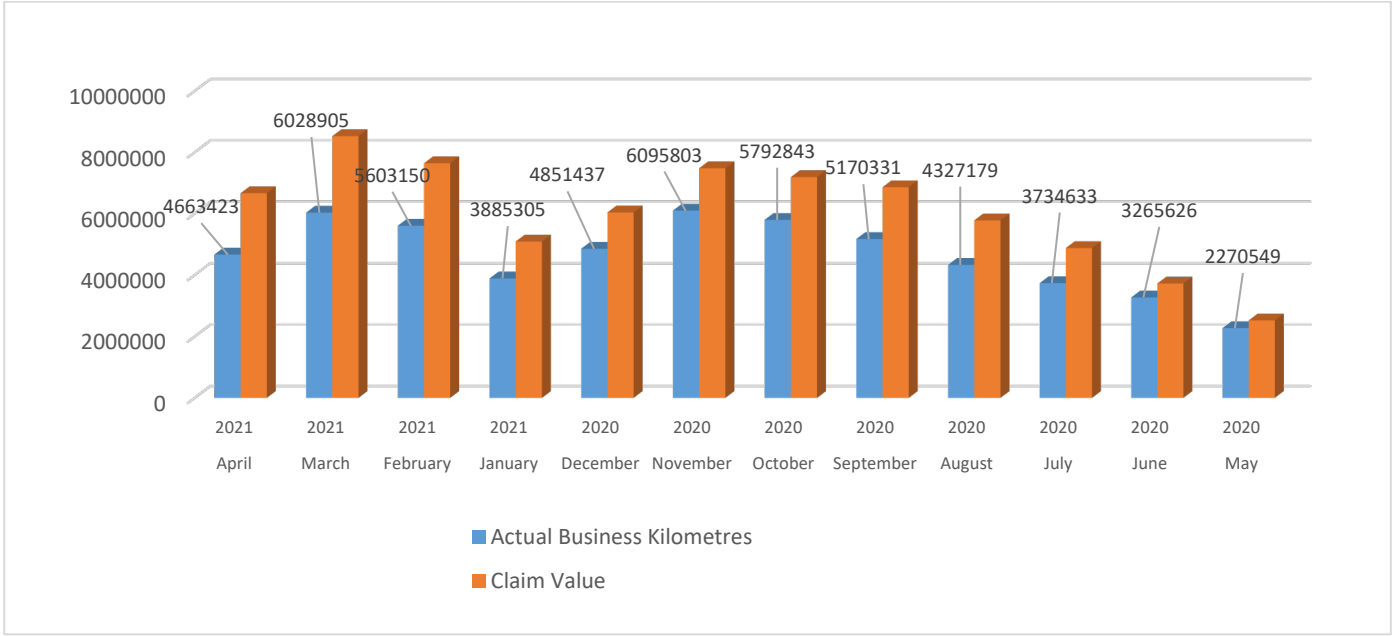

FIGURE 17: SUBSIDISED MOTOR VEHICLE TRAVELLED BUSINESS TRIPS AND FUEL CLAIMS

Data obtained from Fleet Africa represents the total travelled kilometres and the fuel cost for subsidies government Motor scheme incurred while rendering services. Figure 17, graphical presentation of business trips and fuel claimed.

5.4 Summary and Conclusion

This chapter presented the findings from data collected using the questionnaires and the National Treasury RT68 & RT62 service providers. The main findings from the questionnaires include motor vehicle procurement plan, fleet activities, policy intervention, use of online communication, external transport services, and greenhouse gas effects. The main findings from the National treasury RT68 & RT62 service providers include motor vehicle category, type, engine size and travelled kilometres.

The National Treasury RT57 procurement contract was the preferred method of purchasing motor vehicles, followed by g-Fleet management which is a government leasing entity. It was also identified that before procuring a motor vehicle, a simple-needs analysis that is purely influenced by the demand to travel is followed and not a thorough and technical fit for purpose analysis approach is followed.

Fleet activities revealed the total number of vehicles which equals to 3806 of which 3795 are powered by fuel engine; and only 11 electrified which are represented on 0.29% of the total fleet. The total travelled kilometres was also revealed and equals to 46 967 556. The total litres of fuel used is 15 807 486.22, this amount excludes the litres of fuel used by about 1701 motor vehicles because they do not record the amount of litres used.

Policies interventions revealed that about 91% of the National government department's internal policies do not provide directives that might influence the behaviour to consider the environment in order to reduce GHG emissions. Less than half of the Transport Officers are aware of the National Department of Transport's Green Transport Strategy (2018-2050).

Over and above the 3806 vehicles of the total fleet, 82% of the departments make use of external transport provisions e.g., Avis and other shuttle services.

There are 45% of the Transport Officers responded that it is unlikely to make use of online communication systems like Zoom, Skype and MS Teams. Further expression was made by Transport Officers that the use of online communication system was made popular by the travel restrictions due to Covid -19 national disaster lockdown; when lockdown is over travel will go back to how it was before Covid-19.

Most of the Transport Officers are aware of the effect of emissions to the environment and believe that intervention may be made to emit emissions. Only 18 % of the Transport Officers do not believe that emissions can be reduced by changing the way we travel purely due to lack of electric vehicles, electrifying charging station and that travel is work for them, if they do not travel, service delivery will suffer.

The finding from the National Treasury RT68 & RT62 service providers presents various types of vehicles categories with the engine capacity ranging from 0 up to 3500 cc. It was also revealed that 4174 motor vehicles are on government subsidy scheme and the government is contributing R20 736 069.88 towards their monthly instalments.

It was identified that the most used category is category B, light delivery vehicle - 4x2 double Cab (2151 - 2500) amounting to 1236 motor vehicles and 30% of the subsidised total active fleet. Ford Ranger is the most favourite model or brand under the most used category amounting to 806 vehicles.

It was also discovered that 3058 of the active subsidised motor vehicles use manual gear transmission.

The total kilometres travelled using 4174 subsidised motor vehicles for the period May 2020 to April 2021 equals to 75 480 332 and fuel claims for the same period was R72 356 365.95

CHAPTER 6

DISCUSSION AND IMPLICATIONS OF RESEARCH FINDINGS

6.1 Introduction

The previous chapters of this dissertation have reviewed the components of green and sustainable transport with the aim of understanding how green and sustainable the government fleet and its travel activities are. The research method chapter described how data was collected from government Transport Officers and service providers appointed by National Treasury to manage and administer government subsidised motor vehicles. In Chapter 5, the main research findings were presented, constituting to how motor vehicles are procured, intervention of the Transport Policy that manages the administration of fleet operations, government fleet activities, the online communication and lastly the utilisation of government subsidised motor vehicles.

The purpose of Chapter 6 is to discuss the research findings as set out in Chapter 5 with the intention to comment on the implications of the impact of travel dominated by motor vehicles powered by petrol or diesel engines and why government should transform its fleet and change travel behaviour.

This chapter starts by discussing findings from the questionnaires forwarded to government Transport Officers to analyse motor vehicle planning acquisition, fleet and travel activities. The chapter will proceed by discussing findings from the utilisation of government subsidised motor vehicles.

6.2 Questionnaires findings

As indicated in previous chapters, questionnaires were forwarded to Transport Officers of National Government department for data collection.

6.2.1 Vehicle Procurement and section of the vehicle

As presented in Chapter 5's research findings, government motor vehicle procurement plans and acquisition is centered on four key components that influence the decision making. This includes the RT 57 transversal contract, budget commitments, need analysis and lastly G-Fleet (Government Garage).

6.2.1.1 RT 57 Traversal Contract.

RT 57 is a National Treasury motor vehicle tender contract where the manufacturers supply vehicles to the government at the negotiated discounted price. The implication of RT 57 is the promotion of motor vehicle acquisition. The advantage of the RT 57 is that it creates a platform where government departments can procure vehicles cheaper and faster without following rigorous and stringent government Supply Chain processes as prices have already been negotiated at National Treasury rather than individual government department.

The National Treasury (NT) will conclude the motor vehicle prices with participating motor vehicle manufacturers and handover the RT 57 contract to DoT to manage and distribute the motor vehicle pricelist to various government departments with the purpose of buying motor vehicles.

Since vehicles are cheaper to be procured in this method, consideration of the size of the engine becomes less prioritised or important because the idea is to buy cars as long as there is a budget provision.

6.2.1.2 Budget Commitments

The second element is the financial year budget. The motor vehicle budgeting process starts with the anticipated disposal of old motor vehicles. Asset Management office provides asset value and depreciation, fleet management office will plan motor vehicle disposal and replacement process. Therefore, fleet management office will request funds to procure replacement vehicles after disposal. Motor vehicle procurement plan must be aligned with the motor vehicle disposal plan. For example, if ten motor

vehicles are due for disposal in the next financial year, budget provisions should accommodate the replacement of ten motor vehicles in a particular financial year.

Majority of national government departments indicated that they procure vehicles due to financial commitment during a specific financial year. In government, there is a general feeling that all funds committed during a particular financial year should be spent, thus under expenditure will be seen as under performance.

6.2.1.3 Need analysis

Respondents indicated that they use need analysis as one of the methods influencing the decision to buy motor vehicles. As mentioned by some of the departments, need analysis is a process of identifying number of motor vehicles required, expected kilometers and the type of vehicle. This process is purely based on operational requirements.

6.2.1.4 G-Fleet (Government Garage)

G-Fleet Management is a government institution trading under Gauteng Department of Roads and Transport. G-Fleet Management supplies government departments with motor vehicles on full maintenance lease as regulated in terms of Service Level Agreement (SLA) entered between the two parties. The advantage of leasing motor vehicles from G-fleet is that it has some strategic relevance in the promotion of government to government business as per Intergovernmental Relations Framework Act (No. 13 of 2005). The process of leasing from G-Fleet is also easier than the open tender where the process is time consuming and intense.

As part of government, G-Fleet management motor vehicle procurement is limited to the RT 57 pricelist, therefore clients or end-user departments are limited to what is on the RT57 pricelist as far as leasing of motor vehicles. The disadvantage is that when a particular vehicle is not on the RT 57 pricelist, you cannot lease the motor vehicle from the G-fleet.

6.2.2 Fleet activities

As presented in Table 6, out of 3806 motor vehicles of the participating national government departments, only 11 (0,29%) motor vehicles are electrified and 99.71% are fuel powered engines. Liters of fuel consumed by the respondents' motor vehicles equal to 15 807 486, 22 with an estimated monetary value of R228 260 101 based on the petrol price of R14.44 per litre. It was also noted by the researcher that about 45, 45% of the respondents indicated they have no verification or records of litres of fuel used. These unaccounted litres of fuel involve 1701 motor vehicles.
As indicated above, the estimated monetary value of R221 304 807, 08, if consideration is made to include the purchase cost of a motor vehicle itself, the total cost of transport will be more. For instance, using entry level vehicle e.g. VW Polo at RT57 price of R250 000.00 per vehicle, then the total purchase cost for 3806 vehicles will be R951 500 000.00 accumulative.

6.2.3 Policies interventions

As revealed in Chapter 5, Policy interventions, 91% of government departments do not have internal policies that are aimed at addressing environmental problems with the intention to reduce greenhouse gases. The 91% revelation indicate lack on internal policy interventions especially in a government environment where operational and strategical functions are policy driven and regulated in accordance to prescripts and legislature. The need for policy intervention is crucial in this regard because firstly it will provide a clear guide on what pertains environmental problems, secondly it will provide awareness within government structures to transition from traditional ways of operations into new environmental friendly operations.

The previous chapters mentioned the Government Motor Handbook version 01 of 2019 as a regulatory handbook that provides guidelines on how to control, utilise and manage motor vehicles in government. The Handbook was formulated in conjunction with various stakeholders including government departments. The Handbook replaces the old Transport Circular 4 of 2000 because of new developments in road transport as the old policy did not cover the current affairs. Therefore, Government Motor Handbook version 01 of 2019 was developed and introduced with the intention to

address new issues in government fleet, but for some reason the environmental consideration and CO_2 migrations are not mentioned in the handbook.

As mentioned in chapter 1, one of the interventions by NDoT to reduce CO_2 is through the publication of the Green Transport Strategy. The aim of the Green Transport Strategy is to reduce greenhouse gases by transforming the transport sector into a green transport sector. GTS is a high-level document which takes a consultative process before publication. The first draft was published in 2016, the second draft in 2017 and the final document in 2018. One of the questions which was asked to the Transport Officers was if they are familiar with the contents of the GTS, less than 46% confirmed which means less Transport Officers are aware of the GTS and about 55% are not aware of the GTS. The 55% value represents Transport Officers who are responsible in management of about 3026 motor vehicles collectively which accounts to 79.51% of the total fleet indicated in table 6. This calls for consultation and awareness to familiarise Transport Officers on better management of their fleet with green solutions in mind.

6.2.4 Online communication

The use of online communication increased purely due to Covid-19 lockdown regulations. Prior to the regulations, online communication was not an option. Although the use of online communication has increased, the feeling is that things will go back to normal after the pandemic to resuscitate the economy and that government officials prefer travelling, therefore will abandon online communication.

It is important to encourage officials to continue using online communication to change travel behaviour. After the pandemic, it would be wise to discourage travel as lockdown provided evidence that officials can still work without travelling.

6.2.5 Outsourced or the use of external transport services

Table 6 revealed that the total vehicle fleet is 3806, table 7 indicates that government officials still travel outside the total fleet of 3806 by making use of shuttle services and motor vehicles from rented companies like Avis Rental. Although data in terms of the

number of motor vehicles, kilometres travelled and litres of fuel used were not collected from these establishments, 82% of Transport Officers indicate that they make use of outsourced services to travel. This means increased use of motor vehicles will also add on the CO_2 emissions.

6.2.6 General Understanding on the impact of CO_2 emissions

The general impact of CO_2 emission on the environment is understood by all the Transport Officers and the expressed EV could help in the fight against increased CO_2 emissions. As mentioned in Chapter 5, 18 % of the respondents believe in the status quo, reason being that there is no practical substitute for motor vehicles powered by petrol engines. Managers of vehicle fleets, should be educated so they can contribute in the reduction of CO_2 as they are part of an important group, and therefore, their mind-sets should change.

The 81% of Transport Officers who believe things should be changed indicated that responsible government departments should empower these transport officials to expand knowledge beyond EV. More innovative ways to discourage travel, improved fleet management and NMT solutions should be explored.

6.3 Service provider data

As indicated in previous chapters, the implications of data obtained from Mmela revealing the active subsidised government motor vehicle and Fleet Africa data revealing total kilometres travelled and fuel claims, will be discussed.

6.3.1 Vehicle Category, type and Engine Size

Table 8 presented six (6) categories of vehicle types that vary from 0 to 3500 Cubic capacity (cc) that government officials can choose from when buying motor vehicles. In the fight to reduce CO_2 emissions, category A sedan 0-1550cc would be ideal because of producing less CO_2 emissions. Engine size from 1951-3500 cc should be

excluded from the list as they have the potential to contribute more on emissions. The bigger the engine cc, the higher the CO_2 emission.

(Patil, Varade and Wadkar, 2017) state four benefits of smaller or downsized engines as follows:

a) Reduction in CO_2 and NO2 emissions: Engine downsizing has proved a great dip in emission due to lesser fuel consumption and other important factors explained below.
b) Fuel consumption reduction: Optimization of the intake and exhaust valve timing at low engine speed with scavenging leads to a reduced residual gas content in the cylinder.
c) Decrease in the weight of engine block: Generally downsizing an engine is done by reducing the number of cylinders. This helps in the reduction of weight of the engine and thus the load on the engine decreases.
d) Lesser swept volume by piston: Due to decrease in the displacement of the piston, there is a decrease in friction between the piston and the engine bore. Hence the losses due to friction are reduced. This adds to the benefit of engine downsizing.

Hybrid motor engine and EV's are missing from the list. These two types of engines have the potential to reduce the CO_2 emissions.

6.3.2 Top Seven (7) Most Used Engine size (CC)

As revealed on Table 12, the most favoured motor vehicle is a Light Delivery Vehicle - 4x2 Double Cab (2151 - 2500) which represents 36% of total active subsidised vehicles amounting to 1236 motor vehicles. This type of vehicle is commonly known as a "bakkie" which originate from the Afrikaans language in South Africa. The main purpose of a bakkie is to carry small to medium loads of not more than 1.5 tonner, in most cases. However, it has gained popularity in South Africa for its dual purpose of being able to carry loads that would not normally fit in a sedan, Kombi or SUV and also being able to be a family motor vehicle. Businesses also use bakkies for deliveries and other work-related functions.

This category (Light Delivery Vehicle - 4x2 Double Cab (2151 - 2500)) is also not a cheaper choice as compared to category A sedan 0-1550cc with average price of R220 000.00 whilst the average price of Light Delivery Vehicle - 4x2 Double Cab (2151 - 2500) is R344 000.00. The engine capacity of Light Delivery Vehicle - 4x2 Double Cab (2151 - 2500) is also bigger which is less fuel efficient as compared to sedan 0-1550cc. As indicated in 6.3.1, the larger the engine, the higher the emissions.

As indicated above, bakkies are designed to carry loads, the option to select category A sedan 0-1550cc will be more economical, fuel efficient and practical since government department officials do not carry loads. In most cases they travel for meetings and site visits. For example, Stats SA travels to conduct census and surveys, the GPAA officials mostly travel to other governmental departments to educate employees about pension benefits and the Department of Labour travels mostly to conduct inspections. Therefore, the role of bakkies is minimal and unjustifiable. All that is needed is a smaller and efficient vehicle to travel to point A and B.

6.3.3 Top Seven (7) least Used Engine size (CC)

It has been noted on Table 13 that the vehicle on CATEGORY A - SEDAN (0 TO 1250) is amongst the top least used category. This category is regarded as an economic and efficient class based on the size of the engine. In an attempt to reduce CO_2 emissions, this vehicle should be the most used. The fuel consumption of this category is efficient and it can provide the opportunity to create sustainability with travel.

6.3.4 Gear Transmission

Table 14 revealed that 73.25% of the total fleet of motor vehicles consists of manual gear transmission, and according to Jürgens (2006), automatic gear transmission provide not only comfort and relaxed driving but also assist motor vehicles to produce less CO_2 by managing the overall fuel consumptions. Bagameri et al., (2018) also noted the advantage of automatic gear transmission by stating that automatic transmission should be considered in order to achieve lower fuel consumption and emissions. Looking at the benefits of automatic transmission, it will be important for government to consider promoting automatic transmission motor vehicles and

encourage users of subsidised vehicles to purchase automatic motor vehicles. The 26, 75% of automatic transmission motor vehicles in the subsidised fleet is too low if we want to mitigate the increasing greenhouse gases.

6.3.5 Instalments contribution by government

It was noted in Chapter 5 that the government pays instalments to the value of R20 736 069.88 per month for 4174 subsidised motor vehicles. The cost for twelve months will amount to R248 832 838, 60. The 3806 is the number of departmental vehicles that are utilised by everyone and the 4174 are subsidised motors that are attached to a particular person. The expenditure excludes fuel, maintenance, motor vehicle licencing (although renewal of motor vehicle license discs is done by officials), insurance and salaries.

Taking into account all these financial obligations, government pays lots of money to travel and the researcher believes it is not sustainable, reason being, firstly government departments do not generate revenue. It is funded by tax payers and therefore scarce resources should be optimally used, better transport planning and discouraging travelling with the aim to reduce number of motor vehicles will help to optimise resources. Secondly, the vehicles chosen are expensive and do not really fit the purpose. As indicated above, the majority of motor vehicles within the subsidised scheme are bakkies with over 2 litres of engine capacity. What is needed is an economical and fuel efficient vehicle to move from point A to B. Lastly, South Africa is dealing with a huge problem of socio economic issues and inequalities, thus attention, priority and funds should be channelled in programs and project to address these issues.

The researcher also believes that government departments can do away with many motor vehicles especially since Covid 19, many institutions found ways of working remotely without travelling. Of course, there are those who have no choice but to travel, e.g. Police investigators, health inspectors and Ambulances. This will represent only few, and reduction of travel activities will be achieved and funds will be saved.

6.3.6 Travelled kilometres

Motor vehicles burn fuel when driven and produce carbon dioxide in a form of CO_2 emission that increases greenhouse gases. Table 15 reveal kilometres travelled from May 2020 to April 2021. The total travelled kilometres are 75 480 332 of which 55 689 184 is for business related travel and 19 791 166 is for private trip. Contribution to greenhouse gases can be affected by both business and private trips. 73.78% contributed to business trips were government has the control of usage. It is therefore crucial for government to reduce total kilometres travelled by again practicing better transport planning, discourage travel, promote the use of online communication and introduce NMT where possible.

6.3.7 Fuel claims

Section 6.3.5 indicated that the government's cost for twelve months on subsidised motor vehicle instalments was R248 832 838,60, this section provides the cost for fuel claimed for business trips. The state costs for twelve months for fuel claims amount to R 72 356 365, 95. Fuel has two implications; the first implication is on impact of the public purse. With the same argument on sustainably and scarce public funds, R 72 356 365,95 is enormous figure to be spent on travelling bearing in mind that change in travel behaviour and small efficient motor vehicles engines can reduce the fuel claims.

The second implication of fuel is on emissions. As mentioned above, motor vehicles burn fuel when driven and burned fuel contributes to greenhouse gases. Once again, better transport planning, discourage travel, promote the use of online communication, NMT introduction (given the average daily kilometres travel, NMT might not be practical in the South African context) and most importantly, EV which are good replacements of fuel motorised vehicles.

1.4 Economic Costing and Analysis

Economic costing and analysis will be discussed as follows, firstly from a narrow scale making use of the data collected using questionnaires that were responded by the members of the national department transport forum, secondly, the government subsidised motor vehicle which constitutes of data obtained from Mmela and Fleet Africa, this data represents the entire population of government subsidised fleet and lastly, on a broader scale which focuses on number of vehicles, vehicle type, activities and travelled kilometres as indicated in the case study chapter 3 of this dissertation.

6.4.1 Analysis on departmental vehicles

The findings chapter provided some extensive insight on government fleet and travel. As per the findings, Table 18 reflects the total number of motor vehicles operated by government departments is 3795(99.71%) for fuel powered engine, 11(0.29%) for electric power engine. The fuel powered vehicles accumulated 46 967 556 kilometres over 12 months' period. These vehicles used an estimated litres of fuel amounting to 15 807 486 and costing R228 260 101.

TABLE 18: TOTAL MOTOR VEHICLE COST, KILOMETRE AND FUEL(TRANSPORT FORUM)

Government Fleet	Number of vehicles	%	Kilometres travelled	Litres	Value
Departmental vehicles (Fuel)	3795	99,71%	46 967 556	15 807 486	R228 260 101
Departmental vehicles(EV)	11	0,29%	-	-	-
Total Number	**3806**	**100%**			

The "narrow scale" classification is due to the fact that data collection was only limited to the members of the national department transport forum, but with that been said, the emissions and economical costs were significant and noted. If these motor vehicles were electric vehicles, the government could have saved R228 260 101.

6.4.2 Government subsidised vehicles

As indicated in the previous chapters, the provisions of a government motor vehicle subsidy to a government employee is deemed to be a work tool. Table 19 indicates the total number of subsidised government vehicles which is 4174 ,travelled 75 480 332 kilometres , consumed 4 990 094.20 litres of fuel that amounted to R72 356 365.95. The are no EV's within the government subsidised fleet. On the assumption that all these vehicles are replaced with EV's , then the government could have saved R72 356 365.95 and contributed to the reduction of emissions.

TABLE 19: TOTAL MOTOR VEHICLE COST, KILOMETRES AND FUEL (GOVERNMENT MOTOR SUBSIDY)

Government Fleet	Number of vehicles	Kilometres travelled	Litres	Value
Subsidised vehicles (Fuel)	4174	75 480 332	4 990 094,20	R72 356 365,95

Table 20, reveals the total CO_2 cost (external cost) of about R 1 599 677, therefore, government could have saved R 1599 677 on CO_2 emission costs if EV were utilised. The biggest contributor to CO_2 cost LDV bakkies followed by motorcars as indicate in Table 20.

TABLE 20 :TOTAL CO_2 COST (EXTERNAL COST) – GOVERNMENT SUBSIDISED FLEET

Vehicle type	Number of vehicles	Distance travelled in 2020/21	Kg Co2e/vkm	Kg Co2e	Ton Co2e	Co2e cost
Motorcars	897	11 967 704	0,2086	2 496 463	2 496	299 575,57
LDV's - Bakkies	2817	37 584 195	0,2478	9 313 364	9 313	1 117 603,62
SUV/High spec Sedan/Commercial vehicle	460	6 137 284	0,2478	1 520 819	1 521	182 498,28
TOTAL	**4 174**	**55 689 183**		**13 330 646**	**13 331**	**1 599 677**

6.4.3 Case study fleet

The case study chapter provided a broader understanding of government fleet and the operational cost. It has highlighted the key elements that formed the basis of this dissertation. Table 2 revealed the total number of vehicles which is 39886 and Table 4 provided total travelled kilometres of 759 545 446 for the period 2016/17. Analysing

economic and environmental cost associated with this fleet will provide a good understanding of the impact of the motor vehicle on the environment and how investment decisions can be made to address greenhouse gases.

Based on Table 21, the total CO_2 emission costs amounts to R20 476 507.42, and this amount is for all vehicles listed under vehicle type column. On the assumption that all these vehicles are replaced with EV's, the government could have saved R1.2 billion on fuel costs and R20 476 507.42 on CO_2 emission costs.

On the supply side, EV market is new across the globe, but there are on-going developments and innovation around the production of EV's. South Africa currently do not have EV minibuses and bakkies, on the assumption that only motorcars and SUV / High spec Sedan / Commercial vehicles (16885+6693) are replace with EV, the government could have saved R 9 793 086 on CO_2 emission costs and R607 224 501,90 (384319305 travelled km *R1.58 fuel cost per kilometre of travel) on fuel costs.

TABLE 21: TOTAL CO_2 COST (EXTERNAL COST)- CASE STUDY FLEET

Vehicle type	Number of vehicles	Distance travelled in 2016/17	Kg Co2e/vkm	Kg Co2e	Ton Co2e	Co2e cost
Motorcars	16 885	347 583 480	0,2086	72 505 913,93	72 505,91	8 700 709,67
Minibuses	3 501	99 770 106	0,2104	20 991 630,3	20 991,63	2 518 995,64
LDV's - Bakkies	12 807	274 563 681	0,2478	68 036 880,15	68 036,88	8 164 425,62
SUV/High spec Sedan/Commercial vehicle	6 693	36 735 825	0,2478	9 103 137,435	9 103,14	1 092 376,49
TOTAL	**39 886**	**758 653 092**		**170 637 561,8**	**170 637,57**	**20 476 507,42**

As indicated above, the market for EV,s is new and supply is limited to manufacturer's production capabilities . The EV's are also expensive with the lowest selling price of R709 400 as mentioned by News 24 (2022) article. On the assumptions that only motorcars and SUV / High spec Sedan / Commercial vehicles (16885+6693) are replaced with EV's at the cost of R709 400 each, it would have cost South Africa R16.7 billion. In comparison with the average purchase price of R400 000 on motorcars and R750 000 on SUV / High spec Sedan / Commercial vehicles (16885+6693), the government would save R4 952 483 200.

Table 22, cost comparison between the motor vehicles and electric vehicles revealed that EV are more expensive to procure but cheaper on the usage of electricity and motor vehicles procurement is cheaper but the fuel cost are higher then the use of electricity on EV's. The net saving of R4 473 258 698.10 will be achieved on the use of motor vehicles over EV.

TABLE 22:MOTOR VEHICLE(FUEL) AND ELECTRIC(EV) COST COMPARISON

	Standard Motor Vehicle	Electric Vehicle	Variance
Average purchasing price	R11 773 750 000,00	R16 726 233 200,00	R4 952 483 200,00
Fuel /Electric cost	R607 224 501,90	R128 000 000,00	-R479 224 501,90
Total cost	R12 380 974 501,90	R16 854 233 200,00	R4 473 258 698,10

Although financially motor vehicles are better than EV, the greenhouse gases will continue to create problems if the use of motor vehicle continues, e.g., in the literature review chapter, it has been noted that the greenhouse gas affects the environment, economy and the society in so many ways. On the environment, global warming is affected, on the economy, agricultural sector is affected and lastly on the society, sickness and diseases increases due to greenhouse gases.

As mentioned in the previous paragraphs, EV market is new, production and supply is low as compared to the current internal combustion engines. The production of EV is expected to rise as many motor vehicle manufacturers are starting to accept EV as the vehicle of the future and to address the problem of greenhouse CO_2 emissions. Therefore, the selling prices of EV's are expected to drop in the future as technology and innovation improves.

6.5 Summary and conclusion

The main findings showed that government departments do not consider the environmental impact when purchasing motor vehicles and the culture of traveling using motor vehicles powered by fuel is unsustainable. The inconsideration and unsustainability are demonstrated by three key findings. The first one is in relation to the type of fleet which reflects on the types of motor vehicles in the department's establishment. The type of fleet is influenced by a procurement plan and other acquisition prescripts which are in place. From the questionnaires, it was discovered

that the procurement of vehicles does not follow an analytical and technical process to select the most cost-effective vehicles to do the job.

The RT 57 should restrict the type of motor vehicles to be purchased from the onset. National Treasury, when negotiating motor vehicles prices with participating motor vehicles manufacturers, should prioritise the sale of motor vehicles which are fuel efficient and cost effective. National Treasury should promote the production of motor vehicles by ordering more EV. Budgetary obligations should purely be based on factual requirements. Before motor vehicles procurement budget gets approved, there should be an analytical and technical report providing evidence that would support the purchasing of motor vehicles.

The second key finding from the questionnaires that demonstrates the inconsideration and unsustainability is the fleet structure and travel activities which are presented by the number of motor vehicles, total travelled kilometres, litres of fuel used and lastly estimated cost of fuel used. The environmental inconsideration come from the fact that only 11 motor vehicles out of 3806 are powered by electricity which used 15 807 486,22 litres of fuel. The burned fuel polluted the environment. The unsustainability element is reflected by both kilometres travelled and the estimated monetary value amounting to R228 260 101.

Lastly, the key finding from the questionnaires that demonstrate the inconsideration is influenced by policy interventions. The GTS is a strategic document that intends to guide and provide direction in the reduction of GHG and yet is not known by most Transport Officers. Internal departmental policies also do not address the issue with on-going GHG problems.

CHAPTER 7

CONCLUSION

The dissertation investigated the use of motor vehicles within government departments with the main aim to explore the elements of a green and sustainable transportation system. The objective was to identify gaps and raise awareness that will promote greener travel within government departments that would contribute to the reduction of greenhouse gasses. The goal is to see the government taking the lead by transforming its own fleet into a green and sustainable transportation system.

It has been noted from various authors in the literature review chapter that green and sustainable transportation is a system that is clean and environmentally friendly which should not negatively affect the needs of future generations. With this background, it was noted that the government introduced the Green Transport Strategy to pave the way for green transport systems across all modes of transport. In so doing, the government should also look at its own fleet and other transport related activities.

Road transport has been identified as the highest emission contributor in South Africa and it is responsible for 91.2% of the total transport emissions. It was noted that the high level of emission in South Africa is due to the reliance of motor vehicles on fossil oil and continues to increase due to the rise in the sales of motor vehicles. Some of the main findings revealed that the government departments operate with a total fleet of 7980 and only 11 (0.14%) are electric. The amount constitutes only the data collected from Transport Officers who responded to the questionnaires. Therefore, the amount could even be higher.

The data collected from Transport Officers provided an important insight to transport operation within individual departments and has created some limited awareness because during the data collection process, some of the individual Transport Officers wanted to understand more about green transport technologies. For instance, some of their comments centred on electric vehicles and how they work. These officers

asked for the Green Transport Strategy to be shared with them as they want to study the document. Lastly, some also asked for the findings of this research to be shared with them.

Organisational policies assist in influencing a particular behaviour or culture within an organisation. One of the main findings was that more than 90% of the National government departments do not have any internal policies that address the environmental impact. The GTS and White Paper on Transport policy elaborate on policies to include green and sustainable initiatives. This reality implies that initiatives should be brought in to incorporate elements of green solutions into existing internal policies in order to get the transition towards greener transport going in all institutions whose operations pollute the environment.

It has been found that the decision to purchase a motor vehicle is purely based on demand to travel (users requirements), when a vehicle has reached a replacement time and ultimately budget provisions. This process does not follow an intensive analysis that follows a technical and cost-effective approach. Fuel efficiency and 'fit-for-purpose' is not considered. The National Treasury RT57 motor vehicle procurement contract makes motor vehicles easily available and cheaper for government thus increases the number of motor vehicles within the government institutions.

The National Treasury through SARS implemented a carbon and emission tax, although these taxes generate revenue to the state, it is for the purpose of reducing CO_2 emissions. It is recommended that the National Treasury should make provision and allow only efficient and less polluting motor vehicles on the RT57 Price list. The National Treasury should encourage motor vehicle manufacturers to produce more electric vehicles to be utilised by the government.

The research data collection was conducted on government departments. The research did not cover other state organs like municipalities and State-owned entities. The future studies should be conducted to cover these government organs to assess fleet and travel in relation to a green and sustainable transportation system.

The cost of rendering public service comes with a high price that is pre-dominantly funded by tax payers. As indicated in the research finding chapter, the cost of fuel for twelve (12) months for both data collected from Transport Officers (R 221 304 807.08) and service providers (R 72 356 365.95) is equal to R293 661 173.02. A particular attention has to be made on the estimated value of R951 500 000.00 for the cost of the motor vehicle purchase price accumulated during a specified period of motor vehicle productive time which is usually before it could be prepared for disposal. It was further revealed that government contributed R 248 832 838.60 for the instalment of subsidised motor vehicles for the period of twelve months.

Adding up all the 12 months incurred costs excluding the R951 661 173.02 purchase price cost of motor vehicles because the cost was incurred accumulatively during different times that exceed a twelve months' period which included R293 661 173.02. + R 248 832 838.60 = R 542 494 011.62. This amount is too big for a country like South Africa which is overwhelmed by socio-economic problems e.g. high unemployment and low incomes, a high crime rate, poor standards of education, unsustainable business practises.

Added to socio-economic problems, is the problem of service delivery and other public services. It is clear from the research findings that the government pays huge sum of money for the government fleet and associated travel activities but there are serious problems in our society. Green and sustainable travel will not only reduce greenhouse gas emissions but also transportation cost. Savings from transport activities might be redirected to government programmes where resources are required the most hence government should take the lead in transitioning from traditional transportation system to green and sustainable transportation.

One of the alternative ways to accelerate the process to achieve sustainable transportation is by using the Avoid-Shift-Improve (A-S-I) approach. According to Valiantis (2014), "successful climate change strategy in transport requires the adoption of a comprehensive and coherent approach centred on humans instead of cars". The A-S-I approach is an appropriate tool to successful enhance the climate change strategy.

Bassi et al.(2022) provides a brief explanation on each of the A-S-I starting with A-Avoid which focuses on the need to reduce or prevent unnecessary travelling, secondly, S-Shift represent the shifting of transport modes polluting and high fuel consumption more to clean and greener modes of transport and lastly I-Improve which focuses on the enhancement of the environment, safety and efficiency of transport performance via the use of technology, policies and regulations.

The government will benefit a lot by using this alternative A-S-I approach on its own fleet and public service delivery travel as a whole.

CHAPTER 8

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ANNEXURES

A1: TRANSPORT MANAGER/OFFICER QUEESTIONNAIRES

Interview Questions/Questionnaires:

1) What is the main role of your organization?

2) What is the role of vehicles in your organization?

3) Vehicle procurement plan - Which process do you follow when acquiring new vehicles?(Planning/Consideration)

4) How many vehicles do you manage and control including subsidized vehicles and full maintenance plan vehicles?

5) Over and above the existing current fleet, how often do you make use the private shuttle service from the travel agents?

6) What is your total fleet travelled kilometers per annual? (2019/20) before Covid 19 National lockdown.

7) How much liters of fuel do you consume per annual (Total fleet)? before Covid 19 National lockdown.

8) Do you Have EVs in your fleet? (@ which percentage towards the total fleet)

9) What is your understanding on the impact of global warming and greenhouse gases in the environment?

10) Are you familiar with DOT Green Transport Strategy (2019-2050)?

11) What can you do within your transport operations to mitigate against greenhouse gases?

12) Is your departmental Transport Policy addresses directly or indirectly some of the greenhouse gases problems?

13) How often do your travelers make use of skype or any online communication systems?

A2 - NATIONAL TREASURY RT57 – MOTOR VEHICLE PROCUREMENT

national treasury
Department:
National Treasury
REPUBLIC OF SOUTH AFRICA

Private Bag X115, Pretoria, 0001,
Enquiries: Mothushi Moifo, Tel: (012) 395 6521, Email: Transversal.Contracting5@treasury.gov.za

CONTRACT RT57-2019: SUPPLY AND DELIVERY OF SEDAN, LIGHT AND HEAVY COMMERCIAL VEHICLES, BUSSES, MOTORCYCLES, AGRICULTURAL TRACTORS, CONSTRUCTION PLANT AND EQUIPMENT TO THE STATE FOR THE PERIOD 1 JULY 2019 TO 30 JUNE 2022

1. This contract will be subject to the General Conditions of Contract issued in accordance with Chapter 16A of the Treasury Regulations published in terms of the Public Finance Management Act, 1999 (Act 1of 1999). The Special Conditions of Contract are supplementary to that of the General Conditions of Contract. Where, however, the Special Conditions of Contract are in conflict with the General Conditions of Contract, the Special Conditions of Contract will prevail.

2. The contract circular for the aforementioned contract distributed to user departments by the National Treasury, constitutes the official pricing and binding supply agreement between the contractor and the State. End-user institutions are, therefore prohibited from making any amendments of any nature to the aforementioned contract.

3. The National Treasury will communicate all amendments, if any, to the user institutions. It would only be at the receipt of such notification from the National Treasury that user institutions can affect any changes to this contract.

4. Please find attached the following documents for your information:

4.1. General Conditions of Contract

4.2. Special Conditions of Contract

4.3. Covering Letter

4.4. Contract Circular

A3 - NATIONAL TREASURY RT 68 – SUBSIDISED MOTOR VEHICLE FINANCE

national treasury
Department:
National Treasury
REPUBLIC OF SOUTH AFRICA

Private Bag X115, Pretoria, 0001,
Enquiries: Mothushi Moifo, Tel: (012) 395 6521, **Fax:** 012 315 5400, Email: mothushi.moifo@treasury.gov.za

RT68-2021_RA: APPOINTMENT OF CONTRACTOR FOR THE PROVISION OF FINANCE AND ADMINISTRATION OF SUBSIDISED VEHICLES TO THE STATE FOR A PERIOD OF FIVE (5) YEARS- 1 OCTOBER 2021 TO 30 SEPTEMBER 2026

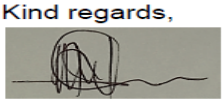
1. This contract will be subject to the General Conditions of Contract issued in accordance with Chapter 16A of the Treasury Regulations published in terms of the Public Finance Management Act, 1999 (Act 1of 1999).
2. The Special Conditions of Contract are supplementary to the General Conditions of Contract. Where, however, the Special Conditions of Contract are in conflict with the General Conditions of Contract, the Special Conditions of Contract will prevail.
3. The contract circular for the aforementioned contract distributed to end-user institutions by the National Treasury, constitutes the official pricing and binding supply agreement between the contractor and the state. End-user institutions are, therefore prohibited from making any amendments of any nature to the contract.
4. The National Treasury will communicate all amendments, if any, to end-user institutions. It would only be at receipt of such notification from the National Treasury that end-user institutions can affect any changes to the application of this contract this contract.
5. Please find attached the following documents as contract circular for your information:

5.1. General Conditions of Contract
5.2. Special Conditions of Contract
5.3. Contract Circular pricing

6. All National and Provincial Departments participating in the Subsidized Motor Transport Scheme making use of the government's Persal and Persol payroll systems will participate in this contract.
7. Name and Address of the contractor and other relevant information:

NO	CONTRACTORS NAME	ADDRESS	TEL NUMBER & CONTACT PERSON	E-MAIL ADDRESS
1	Mmela Financial Services (Pty) Ltd	P O Box 2140 **SAXONWORLD** 2132	Mr Mohobi Ramatsetse Tel : 011 387 3335 Cell: 083 707 6310	tenders@mmela.net

Kind regards,



MOTHUSHI MOIFO
FOR CHIEF DIRECTOR: TRANSVERSAL CONTRACTING
DATE: 25 AUGUST 2021

A4 - NATIONAL TREASURY RT 62 – SUBSIDISED MOTOR VEHICLE MAINTENANCE

national treasury
Department:
National Treasury
REPUBLIC OF SOUTH AFRICA

Private Bag X115, Pretoria, 0001,
Enquiries: Mothushi Moifo, Tel: (012) 395 6521, Fax: 012 315 5400, Email: mothushi.moifo@treasury.gov.za

RT62-2021: APPOINTMENT OF CONTRACTOR FOR THE PROVISION OF MAINTENANCE AND ADMINISTRATION OF SUBSIDISED VEHICLES TO THE STATE FOR A PERIOD OF FIVE (5) YEARS- 1 APRIL 2021 TO 31 MARCH 2026

1. This contract will be subject to the General Conditions of Contract issued in accordance with Chapter 16A of the Treasury Regulations published in terms of the Public Finance Management Act, 1999 (Act 1of 1999).
2. The Special Conditions of Contract are supplementary to the General Conditions of Contract. Where, however, the Special Conditions of Contract are in conflict with the General Conditions of Contract, the Special Conditions of Contract will prevail.
3. The contract circular for the aforementioned contract distributed to end-user institutions by the National Treasury, constitutes the official pricing and binding supply agreement between the contractor and the state. End-user institutions are, therefore prohibited from making any amendments of any nature to the contract.
4. The National Treasury will communicate all amendments, if any, to end-user institutions. It would only be at receipt of such notification from the National Treasury that end-user institutions can affect any changes to the application of this contract this contract.
5. Please find attached the following documents as contract circular for your information:
   - 5.1. General Conditions of Contract
   - 5.2. Special Conditions of Contract
   - 5.3. Contract Circular pricing
6. All National and Provincial Departments participating in the Subsidized Motor Transport Scheme making use of the government's Persal and Persol payroll systems will participate in this contract.
7. Name and Address of the contractor and other relevant information:

NO	CONTRACTORS NAME	ADDRESS	TEL NUMBER & CONTACT PERSON	E-MAIL ADDRESS
1	Fleet Africa a division of Super Group Africa (Pty) Ltd	Private Bag X 9972 SANDTON 2146	Mr Bonisile Makubalo Tel : 011 387 3335 Cell: 083 707 6310	info@fleetafrica.com

Kind regards,

MOTHUSHI MOIFO
FOR CHIEF DIRECTOR: TRANSVERSAL CONTRACTING
DATE: 12 MARCH 2021

A5 – ETHICAL CLEARANCE

UNIVERSITEIT
STELLENBOSCH
UNIVERSITY

NOTICE OF APPROVAL

REC: Social, Behavioural and Education Research (SBER) - Initial Application Form

15 September 2020

Project number: 16984

Project Title: Towards greener transport and sustainable travel behaviour: The case of the South African government vehicle fleet.

Dear Mr Khutjo Sehlodimela

Your REC: Social, Behavioural and Education Research (SBER) - Initial Application Form submitted on 3 August 2020 was reviewed and approved by the REC: Social, Behavioural and Education Research (REC: SBE).

Please note below expiration date of this approved submission:

Ethics approval period:

Protocol approval date (Humanities)	Protocol expiration date (Humanities)
15 September 2020	14 September 2023

SUSPENSION OF PHYSICAL CONTACT RESEARCH DURING THE COVID-19 PANDEMIC

Due to the Covid-19 pandemic and resulting lockdown measures, all research activities requiring physical contact or being in undue physical proximity to human participants has been suspended by Stellenbosch University. Please refer to a formal statement issued by the REC: SBE on 20 March for more information on this.

This suspension will remain in force until such time as the social distancing requirements are relaxed by the national authorities to such an extent that in-person data collection from participants will be allowed. This will be confirmed by a new statement from the REC: SBE on the university's dedicated Covid-19 webpage.

Until such time online or virtual data collection activities, individual or group interviews conducted via online meeting or web conferencing tools, such as Skype or Microsoft Teams are strongly encouraged in all SU research environments.

If you are required to amend your research methods due to this suspension, please submit an amendment to the REC: SBE as soon as possible. The instructions on how to submit an amendment to the REC can be found on this webpage: [instructions], or you can contact the REC Helpdesk for instructions on how to submit an amendment: applyethics@sun.ac.za.

GENERAL REC COMMENTS PERTAINING TO THIS PROJECT:

INVESTIGATOR RESPONSIBILITIES

Please take note of the General Investigator Responsibilities attached to this letter. You may commence with your research after complying fully with these guidelines.

If the researcher deviates in any way from the proposal approved by the REC: SBE, the researcher must notify the REC of these changes.

Please use your SU project number (16984) on any documents or correspondence with the REC concerning your project.

Please note that the REC has the prerogative and authority to ask further questions, seek additional information, require further modifications, or monitor the conduct of your research and the consent process.

CONTINUATION OF PROJECTS AFTER REC APPROVAL PERIOD

You are required to submit a progress report to the REC: SBE before the approval period has expired if a continuation of ethics approval is required. The Committee will then consider the continuation of the project for a further year (if necessary).

Once you have completed your research, you are required to submit a final report to the REC: SBE for review.

Included Documents:

Document Type	File Name	Date	Version
Research Protocol/Proposal	Sehlodimela KL - Research Proposal	02/07/2020	Third Version
Budget	Budget	02/07/2020	First Version
Default	Van Rensburg_Research	06/07/2020	One
Data collection tool	Proposed Interview Questions - Transport Manager or Officer	17/07/2020	v1
Data collection tool	Proposed Questionnaires - Travel pattern	17/07/2020	v1
Informed Consent Form	SU HUMANITIES CONSENT FORM TEMPLATE	20/07/2020	01
Informed Consent Form	SU HUMANITIES Consent template_electronic	20/07/2020	01
Request for permission	Permission Letter	22/07/2020	01

If you have any questions or need further help, please contact the REC office at cgraham@sun.ac.za.

Sincerely,

Clarissa Graham

REC Coordinator: Research Ethics Committee: Social, Behavioral and Education Research

National Health Research Ethics Committee (NHREC) registration number: REC-050411-032.
The Research Ethics Committee: Social, Behavioural and Education Research complies with the SA National Health Act No.61 2003 as it pertains to health research. In addition, this committee abides by the ethical norms and principles for research established by the Declaration of Helsinki (2013) and the Department of Health Guidelines for Ethical Research: Principles Structures and Processes (2nd Ed.) 2015. Annually a number of projects may be selected randomly for an external audit.

APPENDIX A – TOTAL NUMBER OF VEHICLES.

The total number of vehicles involved or surveyed in this dissertation is 7980 as listed in the below table.

Government Fleet	Number of vehicles
Departmental vehicles (Fuel)	3795
Departmental vehicles (EV)	11
Subsidised vehicles (Fuel)	4174
Total Number	**7980**

Departmental vehicles (Fuel) + (EV) = 3795 + 11 = 3806 were obtained from the questionnaire's responses from the Transport Officers who are the members of the national department transport forum.

The total number of the subsidised vehicles is 4174 and it was obtained from Mmela which is a private company appointed by The National Treasury to manage the administration of government vehicle subsidy scheme on behalf of the of Department of Transport. This number is for both national and provincial government subsidised motor vehicles.

The total number of vehicles in Chapter 3, the case study chapter, indicated 39886 total number of vehicles. This number of vehicles was obtained from a report compiled by Ducharme consulting on behalf of the National Treasury. This number is for both national and provincial government departments. In general, government fleet is even larger than 39886 as recorded because the report excluded SAPS (estimated fleet 55000), National Department of Health, and other institutions like Eskom with estimated mixed fleet of about 12 000 (article by Clean Technica 2022) and Telkom mixed fleet with about a total travelled kilometres of 133 149 253 (CA-Governance Report 2014).

The true size of government fleet in enormous and measuring can be complex to some extent, therefore, more studies are necessary to deal with case by case.

National Government Department
Fleet Size
Data collected from 11 X Transport Officers who are members of the National Department Transport Forum

Labour and Employment	1363
Rural & Development	1000
Independent Police Investigative Directorate (IPID)	166
Tourism	72
Water and Sanitation	44
Government Pensions Administration Agency(GPAA)	89
Agriculture, Forestry and Fisheries	431
Environmental affairs	104
Human Settlement	22
Statistics South Africa(STATSA)	500
Transport(DoT)	15
Total Surveyed Fleet	3806

11xNational Department

Total Fleet

Subsidised Government Vehicle

Provincial/National Office	Government Department	Fleet Size	Total Fleet
Defence	SANDF	51	51
EASTERN CAPE	Agriculture and Rural Development	244	556
	Economic Affairs and Tourism	1	
	Education	82	
	Health	38	
	Human Settlements	1	
	Roads and Public Works	61	
	Social Development	78	
	Sport Recreation Arts and Culture	15	
	Transport	36	
FREE STATE	Agriculture	59	144
	Cooperative Governance and Trad Affairs	3	
	Economic Development Tourism and Env. Affairs	30	
	Health	2	
	Police Roads and Transport	16	
	Public Works Roads and Rural Development	19	
	Rural Development	9	
	Social Development	6	
GAUTENG	Agriculture Conservation Environment	45	260
	Community Safety	9	
	Education	154	
	Finance	1	
	GG Transport Trading Account	1	
	Health and Social Development	2	
	Infrastructure Development	5	
	Local Government and Housing	6	
	Public Transport Roads And Works	1	
	Social Development	29	
	Sports Arts Culture and Recreation	7	

KWAZULU-NATAL	Agriculture Environment AFF Rural Dev.	252	572
	Arts and Culture	19	
	Community Safety & Liaison	7	
	Cooperative Governance Traditional Affairs	25	
	Economic Development and Tourism	3	
	Finance	2	
	Human Settlements	18	
	Public Works	43	
	SANDF	1	
	Social Development	16	
	Sport and Recreation	25	
	Transport	161	

LIMPOPO	Agriculture	116	638
	Economic Develop Environment Tourism	55	
	Education	62	
	Health	17	
	Local Government and Housing	12	
	Public Works	81	
	Roads and Transport	134	
	Safety, Security and Liaison	1	
	Social Development	155	
	Welfare	5	

MPUMALANGA	Agriculture Rural Dev and Land Administration	81	973
	Cooperative Governance and Traditional Affairs	32	
	Culture Sport and Recreation	27	
	Economic Dev Env and Tourism	18	
	Education	176	
	Finance	6	
	Health	71	
	Human Settlements	26	
	Office of the Premier	2	
	Public Works Roads and Transport	200	
	Safety, Security and Liaison	108	
	Social Development	226	

National	Agriculture	1	445
	Agriculture Forestry and Fisheries	47	
	Correctional Services	13	
	Energy	4	
	Environmental Affairs	23	
	Government Communications and Info System	11	
	Health	5	
	Higher Education and Training	16	
	Independent Complaints Directorate	21	
	International Relations and Cooperation	1	
	Labour	33	
	Mineral Resources	61	
	Public Works	33	
	Rural Development and Land Reform	58	
	Statistics South Africa	5	
	Transport	13	
	Treasury-Pensions -Administration	2	
	Water Affairs	60	
	Water Affairs: Water Trading Account	38	

NORTHERN CAPE	Agriculture, Land Reform and Rural Development	40	148
	Education	71	
	Environment and Nature Conservation	17	
	Roads and Public Works	3	
	Transport Safety and Liaison	17	

NORTH-WEST	Agriculture, Conservation, Env. & Rural Dev.	65	285
	Economic Development and Tourism	11	
	Education	10	
	Health	26	
	Human Settlements	12	
	Local Government & Traditional Affairs	2	
	Office of the Premier	1	
	Public Safety	2	
	Public Works, Roads and Transport	32	
	Social Development	104	
	Sports, Arts & Culture	20	

WESTERN CAPE	Agriculture	44	102
	Community Safety	1	
	Cultural Affairs And Sport	1	
	Health	12	
	Human Settlements	6	
	Local Government	2	
	Social Development	2	
	Transport and Public Works	34	

4174