THE IMPACTS OF ROADS INFRASTRUCTURE DEVELOPMENT IN MARGINALISED COMMUNITIES OF SOUTH AFRICA

By

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Supervisor: Prof. Mammo Muchie

2016
DECLARATION

I declare that:

The impacts of roads infrastructure development in marginalised communities of South Africa dissertation, submitted for the Magister Technologiae: Comparative Local Development, at Tshwane University of Technology, is my work and has not previously been submitted to any another university. I further declare that all sources cited or quoted are indicated and acknowledged by means of a comprehensive list of references.

Signed: ________________________________

Mr. Sehwane Kanuel Fourie, SELOANE
DEDICATION

This study is dedicated to my parents Mr Legasa (Ngwato) and Mrs Maefo (Mogošhadi) Seloane and my Siblings.

To my uncle Mr. Matsošhe (Phogole) Seloane and my aunts Mrs. Mooketši (Hunadi) Mašhilo and Miss Mogale (Boledi) Seloane.

And my grandparents; Mr Sepeke (Nape) and his wife Mrs Tšhumudi (Ngwatladi), Mr Seretle (Modipi) and his wife Mrs Mankate (Mologadi) and grand-grandparents; Mr Tabudi and his wife Mrs Tšiane, and lastly Mr Sobane and his wife Mrs Mapitsi.
ACKNOWLEDGEMENTS

Primarily, my special thank you goes to Almighty Lord, who has given me courage, guidance, perseverance and hope throughout the study. His presence has inspired my ambitions to become a successful always.

Secondly, my thanks giving to the National Research Foundation (NRF) for the financial support throughout my studies.

Thirdly, my special thank you goes to my supervisor, Professor. Mammo Muchie. As the supervisor, Prof. Mammo Muchie has been an outstanding source of inspiration: thorough, critical, enthusiastic, challenging, thoughtful, and knowledgeable. He expected a great deal and also gave a great deal in return.

Fourthly, my special thank you goes to my brother Mr. Pugišhi Seloane and my uncle Mr. Matsošhe Seloane for supporting me physically, emotionally and financially from my undergraduate studies to this level.

I am also grateful to everyone who directly and indirectly contributed to the completion of this study, to all lecturers who taught me at Tshwane University of Technology and University of Trento (Italy), IERI stuff and my fellow M-Tech students (Lina, Violet, Makale and Thabo), thanks for all great moments we shared.

And, lastly to my friend Mr. Matlou Ernest (Touch) Mabitsela, thanks for his unreserved and unwavering friendship.
Infrastructure plays a critical role in development. Good infrastructure such as roads enables people to access public services, such as healthcare and education, to access employment opportunities, and enable the movement of goods within the economy. However, it is worth noting that the benefits of road infrastructure have not been equally distributed throughout the space economy. While some regions have benefited from road infrastructure developments, others have often been marginalised, which tends to exacerbate social exclusion, poverty and inequality. The general focus of the study will be at the macroeconomic level. That is to say, the study will explore the importance of road infrastructure for the whole economy rather than its impact on specific sectors of the economy. As a literature-based study, this research will be undertaken through a critical analysis of available secondary sources in both local and international contexts. In addition an adapted case study about Mohlake rural village is used to give a clear practical example describing the impact of road infrastructure that are benefiting and disadvantaging the marginalised communities to achieve social and economic objectives. Furthermore, theories of transport are discussed to locate the study into the real phenomenon of development to cover social and economic factors that can let the community to be less or sustainable. Likewise, the adoption of political economy as a tool of analysis in this study will enhance our understanding of the interplay between road infrastructure and social factors that produce and reproduce inequalities as well as the interplay between ideology and development.
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<td>ADBI</td>
<td>Asian Development Bank Institute</td>
</tr>
<tr>
<td>AICD</td>
<td>Africa Infrastructure Country Diagnostic</td>
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<tr>
<td>AIDS</td>
<td>Acquired Immune Deficiency Syndrome</td>
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<tr>
<td>AU</td>
<td>African Union</td>
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<tr>
<td>AUC</td>
<td>African Union Commission</td>
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<tr>
<td>BIS</td>
<td>Business Innovation &amp; Skills</td>
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<tr>
<td>BRICS</td>
<td>Brazil, Russia, India, China and South Africa</td>
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<tr>
<td>BRT</td>
<td>Bus Rapid Transit</td>
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<tr>
<td>CBD</td>
<td>Central Business District</td>
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<tr>
<td>COMCEC</td>
<td>Committee for Economic and Commercial Cooperation</td>
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<td>COTO</td>
<td>Committee of Transport Officials</td>
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<td>CSIR</td>
<td>Council for Scientific and Industrial Research</td>
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<td>DEA</td>
<td>Development Education association</td>
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<td>DEDT</td>
<td>Department of Economic Development and Tourism</td>
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<tr>
<td>DFID</td>
<td>Department for International Development</td>
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<tr>
<td>DOL</td>
<td>Department of labour</td>
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<td>DORA</td>
<td>Division of Revenue Act</td>
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<td>DOT</td>
<td>Department of transport</td>
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<td>DPME</td>
<td>Department of Performance Monitoring and Evaluation.</td>
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<tr>
<td>DTI</td>
<td>Department of Trade and Industry</td>
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<tr>
<td>ESCAP</td>
<td>Economic and Social Commission for Asia and the Pacific</td>
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<td>EU</td>
<td>European Union</td>
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<tr>
<td>FDI</td>
<td>Foreign Direct Investment</td>
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<td>FHWA</td>
<td>Federal Highway Administration</td>
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<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
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<td>GNP</td>
<td>Gross National Product</td>
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<td>GP</td>
<td>Gauteng province</td>
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<td>HSRC</td>
<td>Human Sciences Research Council</td>
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<td>ICT</td>
<td>Information and Communications Technology</td>
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<td>Acronym</td>
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<tr>
<td>ILO</td>
<td>International Labour Organisation</td>
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<td>IPCC</td>
<td>Intergovernmental Panel on Climate Change</td>
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<td>IRF</td>
<td>International Road Federation</td>
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<td>IS</td>
<td>Innovation System</td>
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<td>ITF</td>
<td>International Transport Forum</td>
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<td>ITMP</td>
<td>Integrated Transport Master Plan</td>
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<td>ITP</td>
<td>International Transport Policy</td>
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<td>MDGs</td>
<td>Millennium Development Goals</td>
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<td>MGI</td>
<td>McKinsey Global Institute</td>
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<td>MIG</td>
<td>Municipal Infrastructure</td>
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<td>MRCSA</td>
<td>Medical Research Council of South Africa</td>
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<td>MSA</td>
<td>Moving South Africa Strategy</td>
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<td>NCP</td>
<td>National Council of Provinces</td>
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<td>NFMF</td>
<td>National Freight Monitoring Framework</td>
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<td>NIS</td>
<td>National Innovation Systems</td>
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<td>NLTSF</td>
<td>National Land Transport Strategic Framework</td>
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<td>NMT</td>
<td>Non-Motorised Transport</td>
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<td>NPCA</td>
<td>New Partnership for Africa’s Development Planning and Coordination Agency</td>
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<tr>
<td>NTIA</td>
<td>National Telecommunications and Information Administration</td>
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<td>NY</td>
<td>New York</td>
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<tr>
<td>OECD</td>
<td>Organisation for Economic Corporation and Development</td>
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<td>PAST</td>
<td>Transport Sector Programme Support</td>
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<td>PhD</td>
<td>Doctor of Philosophy</td>
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<td>PIDA</td>
<td>Programme for Infrastructure Development in Africa</td>
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<td>PPPs</td>
<td>Public-Private Partnerships</td>
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<td>PRASA</td>
<td>Passenger Rail Agency of South Africa</td>
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<td>public transport operations grant</td>
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<td>PUTCO</td>
<td>Public Utility Transport Corporation</td>
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<td>QES</td>
<td>Quarterly Employment Statistics</td>
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<td>R&amp;D</td>
<td>Research and Development</td>
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</table>
RRA  Rail-Road Association of South Africa
RSI  Regional System of Innovation
RTMC  Road Traffic Management Corporation
RTQS  Road Traffic Quality System
SABITA  Southern African Bitumen Association
SABOA  Southern African Bus Operators’ Association
SACTRA  Standing Advisory Committee on Trunk Road Assessment
SADC  Southern African Development Communities
SADD  South Africans Against Drunk Driving
SAICE  South African Institution of Civil Engineering
SALGA  South African Local Government Association
SANHTS  South African National Household Travel Survey
SANRAL  South African National Roads Agency SOC Limited
SANTACO  South African National Taxi Council
SATC  Southern African Transport Conference
SEU  Social Exclusion Unit
SOVs  single-occupant-vehicles
SSWA  South and South-West Asia Office
ST  Socio-Technical
Stats SA  Statistics South Africa
STR  Space Time Research
TB  Tuberculosis
TDM  Travel Demand Management
TETA  Transport Education Training Authority
TFC  Total Final Consumption
TRP  Taxi Recapitalisation Programme
UK  United Kingdom
UN  United Nations
UNEP  United Nations Environment Programme
UNH  United Nations Habitat
UNIDO  United Nations Industrial Development Organisation
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<td>WCTR</td>
<td>World Conference on Transportation Research</td>
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<td>WESS</td>
<td>World Economic and Social Survey</td>
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<td>WHO</td>
<td>World Health Organisation</td>
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<td>WPNTP</td>
<td>White Paper on National Transport Policy</td>
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<td>WTO</td>
<td>World Trade Organisation</td>
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CHAPTER 1: INTRODUCTION

1.1. Introduction

The obligation that democratic South Africa inherited in 1994 was to correct the imbalances in the infrastructure sector. It had to embark on reconstruction and development. A review of the excessive investments in infrastructure mainly devoted to the white communities was among the key tasks; this had to be done in order to ensure equality and to reduce social exclusion. DPME (2014:104-105) notes that ‘during the post-1994 period up to the early 2000s, government focused on increasing access to social and household infrastructure through the provision of housing, schooling and healthcare, and connecting households to electricity grids and water networks.’ Accordingly, DPME adds, there was increased focus on the budget for infrastructure projects and programmes by national government, and large new infrastructure grants to the provincial and local spheres of government were introduced. Many initiatives were introduced to assist provinces and municipalities to improve their infrastructure planning and delivery.

Infrastructure refers to all basic inputs into, and requirements for, the proper functioning of the economy. Estache and Garsous (2012:1) stress that infrastructure is defined as electricity, gas, telecoms, transport and water supply, sanitation and sewerage. Sheppard (2003:5-6) states that infrastructure projects are generally regarded as including capital-intensive facilities in the following sectors: Electric power (generation and distribution); Energy (refineries, pipelines, processing facilities; Telecommunications; Water / Sewer; and Transportation (toll roads, bridges, ports, railways, etc.) Estache and Garsous further enlighten that infrastructure matters to development. However, there is much less convergence on which infrastructure subsector matters the most under which circumstance. This can be seen in the differences in estimates of investment needs across regions and within regions.

Public-Private Partnerships Authority (2011:1) asserts that extensive and efficient infrastructure is critical for ensuring the effective functioning of the economy, as it is an
important factor determining the location of economic activity and the kinds of activities or sectors that can develop in a particular economy. Public-Private Partnerships Authority adds that a well-developed infrastructure reduces the effect of distance between regions, integrating the national market and connecting it at low cost to markets in other countries and regions. In addition, the quality and extensiveness of infrastructure networks significantly impact economic growth and affect income inequalities and poverty in a variety of ways. Pouliquen (2000:1) adds that infrastructure often acts as a catalyst to development and enhances the impact of interventions to improve the poor’s access to other assets, e.g. human, social, financial, and natural assets. Its impact is felt both in the economic and social sectors.

The availability of infrastructure is of great importance in the realisation of sustainable development, desperately needed in South Africa. The development of infrastructure in South Africa would ensure societal well-being by enabling human and social development in society, which is important for development in a country. Infrastructure plays a decisive role in determining the overall productivity and development of a country’s economy, as well as the quality of life of its citizens. Infrastructure development and management has become even more essential for South Africa’s economic development and integration; that is, for trade among African countries to run smoothly, viable infrastructure should be in place - such as transportation system and means of communication. It is through the development and management of infrastructure that efforts towards the eradication of the scourge of marginalised communities in South Africa could be advanced.

Estache and Garsous (2011) state that one way of organising the assessment of the drivers of infrastructure priorities could depend on the development stage of the country, the time period over which the impact is assessed, and the type of infrastructure. In general, however, all infrastructure subsectors can be good examples of sectors in which such network externalities can matter. Their social return will, however, evolve with time - with the demand of the population size and with market size. The section below discusses the three subsectors of infrastructure. The rest of the study discusses road infrastructure as a
specific key subsector in addressing the imbalances of marginalised communities of South Africa.

1.2. The three subsectors of infrastructure

1.2.1. Energy

Economies depend on electricity supplies that are free of interruptions and shortages so that businesses and factories can work unimpeded (Public-Private Partnerships Authority, 2011:1). Estache and Garsous (2012:4) state that: ‘The importance of access to electricity to human development has been documented in a large number of case studies and cross-country econometric studies across regions. It is a recurring item in all studies on the impediments to the business environment.’ In fact, Garsous (2012) finds that focusing on the energy sector is more likely to find a robust positive impact than any other infrastructure sector. In other words, investing in the energy sector may be the safest bet to achieve a high social rate of return. This should not be a surprise, energy is indeed an input into any of the other infrastructure subsectors; for instance, water is often pumped through electric pumps and traffic lights also use energy to work efficiently and effectively.

DPME (2014:106)) says that ‘the democratic government inherited a modern electricity generation fleet that was largely fuelled by coal and able to deliver electricity at low prices by international standards. Consequently, between 1994 and 2002, comparatively little investment was made in electricity generation, given the low economic growth rates of the past. However, the demand rapidly exceeded supply (compounded by pre-1994 decisions to mothball power stations), resulting in a supply crisis in early 2008. Pouliquen (2000:2) has emphasised that without electricity, the industrialisation process, which provides the poor an important source of employment is unlikely to take off.’

1.2.2. Telecommunications
A solid and extensive communications network allows for a rapid and free flow of information, which increases overall economic efficiency by helping to ensure that businesses can communicate and decisions are made by economic actors taking into account all Public-Private available relevant information (Public-Private Partnerships Authority, 2011:1).

The impact of telecommunications for growth may be the best documented impact. As with other infrastructure, there is a debate on the precise magnitude of its contribution. But this is quite normal, the inter-dependency between fixed and mobile telephones for instance still requires a significant amount of regulation of access. Its effectiveness strongly drives the social return for the sector. Estache and Garsous (2012:5) state that this is quite obvious on the importance of access to internet to increase competition in the sector, and from there increase the social return to expansions in the sector.

However, the order of magnitude of the gains vary across regions and across countries; but the average payoffs are quite impressive and are usually among the highest when the payoffs to infrastructure are unbundled into its components. For South Africa, for instance, this is one of the reasons why supranational investments on the backbones are so important.

1.2.3. Transport

Public-Private Partnerships Authority (2011:1) states that effective modes of transport, including quality roads, railroads, ports and air transport enable entrepreneurs to get their goods and services to market in a secure and timely manner and facilitate the movement of workers to the most suitable jobs. Before 1994, transport was not managed in a holistic way. Racially segregated town planning, which saw black people being allocated land far away from business centres, coupled with poor transport infrastructure, meant that most South Africans did not have easy access to economic opportunities or social spaces and services (DPME, 2014:108). Today pass laws have been abolished, new settlements have been built closer to cities, and freedom of movement prevails.
In fact, transport policy has become more integrated since 1994. Emphasis has been placed on supporting regional and international trade. Various managing entities have been formed, most notably the South African National Roads Agency Limited (SANRAL) and the Passenger Rail Agency of South Africa (PRASA). The National Freight Logistics Strategy, the National Ports Act and the National Land Transport Act were approved in the late 2000s (DPME, 2014:108).

For South Africa, as like many developing countries, the estimated growth effects of transport investments have not been very strong. Accordingly, the main impact at stages of development has to come from quality, from addressing bottlenecks or from capturing new network or supranational effects which have not been internalised in older designs of the transport networks. For instance, roads are needed for developing countries to catch up with the rest of the world (Buys, Deichmann & Wheeler, 2006). Roads are essential in reducing differences across regions within countries (Estache & Fay, 2010). Without roads, the poor are not able to sell their output on the market (Pouliquen, 2000:2).

According to DPME (2014:109) in 1998, the 7 200km of national roads was absorbed into the newly established South African National Roads Agency Limited. Since its inception, SANRAL has leveraged private investment in road infrastructure by concessioning and tolling specific road routes. DPME added that the Warmbaths toll road was developed in 1994. The largest toll road project, the reconstruction of the N4 corridor linking Johannesburg and Maputo in Mozambique (R1.4 billion), was launched in 1996. This was followed by the expansion and tolling of further sections of the N3. The N4 was further extended with the Platinum/Bakwena toll road in 2000. In addition, some toll roads are under long term concessions to private parties under public-private partnerships. These are the N4 and Platinum Highway N3 Toll Concession (Pty) Ltd (N3TC), the N1/N4 Bakwena Platinum Corridor Concessionaire (Pty) Ltd (Bakwena) and the N4 Trans African Concessions (Pty) Ltd (TRAC). By 2012, private consortia had financed some R5.8 billion in capital for these projects (DPME, 2014:110).
The DPME asserts that in comparison with the national roads, the standards of many provincial and local roads have not kept up with demand. Many were originally designed during the apartheid era for a smaller vehicle population, and have deteriorated with the increase in vehicles due to rising prosperity in the democratic era, and due to poor maintenance regimes and resource constraints (DPME, 2014:111). In addition, most of the local roads are leading to marginalised communities of South Africa. However, these types of roads do not effectively support the marginalised communities and do not fully address the imbalances created by the apartheid government because their economic and social impact is less recognised. Furthermore, the unequal distribution of public services throughout the country has benefited metropolitan and urban areas, while marginalised (rural and peri-urban) communities are confronted with lack of road infrastructure and poor road conditions - which tends to exacerbate social exclusion, poverty and inequality (SEU, 2003).

1.3. Rationale of the study

Following the success of democratic elections in 1994, all South African citizens have hopes that opportunities would be open at realising their full potentials in life. In economic infrastructure, roads development was one of the government’s priorities and marginalised communities believe that democracy can bring this to their communities. In fact, democracy was viewed as an objective aspect that could break the barriers in undeveloped and underdeveloped communities. The hope for every community was to participate in the mainstream economy, and roads development was viewed as one of the economic infrastructure that can play a significant role in socio-economic development. And it can be a key determinant in alleviating poverty and eliminating inequalities (The Tanzania Forum Group, 2003).

It is noteworthy that without road access, mobility for rural communities can be a great challenge as they try to obtain health, education and other social services (Donnges, Edmonds and Johannessen, 2010). In fact, poverty in marginalised communities can be aggravated by the fact that the communities are poorly served by road transport services.
due to poor road provisioning can also affect activities such as farming, travelling, trading and marketing of products produced (IRF, 2011). Typically, this can put pressures on the marginalised communities not to take full advantage of democratic developments that could lead them to participate in more social and economic activities (Dakyes & Ogbuli, 2012).

Roads development can be a key element in the provision of physical access at locations of residence and production. The primary benefits of roads development are increased accessibility and reduced transport costs (Khadaroo and Seetanah, 2007). In addition, roads development can be treated as the link between different transport networks that connect local/or national businesses and customers with different regions (Khadaroo and Seetanah, 2007). Further, roads form an important link providing access at metro, urban, rural and peri-urban areas, centres of trade and centres of industry to regional/national markets (Yong Kim, 2014). Roads development has an impact upon the socio-economic development of any area, be it urban or rural. For example, if a road is built/or improved some form of development is widely observed/or expected to follow, and if it is not built/or improved, then development takes place more slowly (Muradzikwa, 2004). Therefore, the absence of roads can be a negative factor for marginalised rural and peri-urban communities at accessing social facilities (like, education, health etc) and economic facilities like production sites (Litman and Laube, 2002).

It is argued that a good investment a country can make is in roads development and road infrastructure, especially for marginalised rural communities. According to the World Bank (2006) economic investment in roads can help to make road transport costs lower. Then, for marginalised communities relying on agricultural production roads can help to lessen delivery and distribution costs (Chikunga, 2013). The reduction in cost could make domestic, regional and national trade in goods and services between regions, countries and provinces easier (NPC, 2014:183; Martin, 2012). Indeed, trade could be cheaper when road transport costs are lower, thereby allowing regions, countries and provinces to obtain raw materials from far away suppliers (Arvis, 2005; Wilson, 2003).
The reduction in road transport costs can allow communities, regions and countries to trade their specialised products or services over great distances, thereby increasing their market position (Chikunga, 2013; Hoffmann et al., 2001). It is worth noting that the South African government in its National Development Plan aims to alleviate poverty and reduce inequality by 2030, in recognising the importance of giving roads and roads infrastructure the best possible start in life (NPC, 2014:186). The government identified roads and roads infrastructure development programmes for marginalised communities a priority measure for tackling poverty, both in the short term and as a long term strategy (NPC, 2014:186 and Vickerman, 2008).

1.4. Problem statement

Road infrastructure development is a problem in marginalised communities (like, poor rural and peri-urban communities) of South Africa and this plague needs to be addressed. The South African government in its National Development Plan 2030 highlights that despite the progress since 1994, South African society remains divided (NPC, 2014:258). The result is that the economic structures today still exclude the majority of marginalised South Africans. The government attests that the privilege attached to race, class, space, geographic location and gender in the provision of economic infrastructure (like road services) has not been fully reversed (NPC, 2014:258). This has long created imbalances and inequality amongst communities in the country. Road infrastructure development that has been designed to support the country’s medium and long term economic and social objectives has been determined by who you are and where you stay (NPC, 2014:160).

Despite rapid improvements in access to basic services, the quality of roads in marginalised communities continues to be inadequate, unmaintained and ineffective to support development (NPC, 2014:258). A poor provisioning of roads infrastructure has created deep inequalities and social exclusions that negatively impact on development of marginalised communities. The impact of this is the prevention of the transport of goods from points of production to where they could be consumed (NPC, 2014:183).
Accordingly, Walters (2012) adds that poor provision of road infrastructure can perpetuate social exclusion and undermine social cohesion in the country. It is further argued that social and economic exclusion caused by the apartheid system is still evident in many marginalised communities that cannot travel from where they live to where they work or want to work (NPC, 2014:184). As a result, great uncertainties in improving road infrastructure to support and give access to marginalised communities remain a policy implementation constrain for the government in ensuring that all citizens are benefiting from development.

The significance of road infrastructure development is still not well addressed and this has placed a huge mobility burden on marginalised communities when it comes to participating in the mainstream economy (NPC, 2014:184). Likewise, road infrastructure development remains a huge challenge and solutions should not be sought from one angle (Chikunga, 2013). The problem can only be resolved if road infrastructure challenges are identified and the prospects of designing a long term resolution is determined (NPC, 2014:187).

1.5. **Research questions**

The key questions examined in this study are:

a) What are the key challenges and backlogs of road infrastructure development facing marginalised communities in South Africa and what are the constraints that hinder their development?

b) What are the key interventions that can contribute to the improvement of road infrastructure in the marginalised communities of South Africa?

1.6. **Research objectives**

The overall goal of this study is to identify the importance of roads and road infrastructure development as the determinants of economic development in South Africa.

The following specific objectives are identified:
• To determine the importance, relevance and development of road infrastructure in the marginalised communities of South Africa in promoting

• To identify key development strategies relevant for improving road infrastructure for marginalised communities in South Africa to promote development.

1.7. The organisation of the study

Chapter 1: Introduction
Chapter 2: Research methodology, Methods and Theories
Chapter 3: Literature review
Chapter 4: Case Study of Mohlake Rural community
Chapter 5: Research findings and Analysis
Chapter 6: Conclusion, Recommendations, Evaluation and Contribution of the study
CHAPTER 2: RESEARCH METHODOLOGY, METHODS AND THEORIES

2.1. Introduction

This chapter is divided into two sections: Section A and B. Section A outlines the research methodology and Section B outlines the role of theory in the study.

2.2. Section A: Research methodology and Methods

2.2.1. Introduction

The term methodology in research defines the activity of what the research is, how to proceed, how to measure progress and what constitutes success. This subsection brought out the methodology employed in the procedure of data collection. It is organised under the following headings: (1) describing the research methodology of this study (2) describe the procedure used in research design (3) explain the sample selection (4) describe the sources of data collection (5) provide procedures used to analyse the data, and (6) explain the limitation experienced in sourcing the data.

2.2.2. Research methodology

The study will collect and analyse the data on the road infrastructure development of developing countries and South Africa. Primarily, the data collected are qualitative in nature. Qualitative data refers to all non-numeric data or data that have not been quantified and can be a product of all research strategies (Saunders, Lewis and Thornhill, 2009:480). The goal of qualitative analysis is to uncover emerging themes, patterns, concepts, insights, and understandings expressed through words and other symbols (Patton, 2002). ‘The qualitative method investigates the why and how of decision making, not just what, where, when. In the conventional view, qualitative methods produce information on the case studied and conclusions are only propositions (Shirish, 2013:24).
In fact, a descripto-explanatory research methodology will be used for this study. This means that the research project utilises description, and it is likely to be a precursor to explanation (Saunders, Lewis and Thornhill, 2009:140). In addition, a case study strategy has been adopted to a selected sample of Mohlake rural community. The term ‘case study’ is commonly applied to a research methodology designed to focus on understanding and highlighting the importance of context within single settings (Saunders, Lewis and Thornhill, 2009:146). It is noteworthy that in adopting a case study strategy, the research method will use a combination of specific methods, such as interview, observation, questionnaires, and documentary sources (Saunders, Lewis and Thornhill, 2009:149). Given this, it is argued that the case study adopted in this study involves direct observation (Saunders, Lewis and Thornhill, 2009:146-147).

The National Planning Commission (NPC) has highlighted that marginalised communities (like, rural and peri-urban areas) present developmental challenges. They generally do not have the economic base that urban areas have, while the low densities and remoteness of many marginalised communities mean that the capital investment and servicing cost per unit is high’ (NPC, 2014:283). Mohlake rural community serves as an example of a marginalised community facing developmental challenges in South Africa. Provision of basic services is very vague and government has done little to improve the development of road infrastructure in the community. Poor developed road infrastructure has negatively impacted on social issues such as poverty, inequalities, health, education, migration, social isolation and social exclusion in most marginalised communities (rural and peri-urban areas).

Before 2006, the only road leading to Mohlake came from Schoonoord. The road is pure gravel, poorly maintained and eroded by water; thus, driving on this road is very difficult. The rationale behind adopting the case study strategy in this section of research methodology is to show existing road infrastructure challenges faced by the Mohlake rural community. An advantage is that the researcher has lived in Mohlake; he understands the phenomenon of poor roads very well, and knows the social complexities and challenges of road infrastructure development that affect the community.
There are other distinct advantages in using the case study strategy in research methodology. The case study strategy appeals to the researcher’s tacit knowledge as a full-time member of the social context (Saunders, Lewis and Thornhill, 2009:146). For these reasons, the case study places emphasis on the full analysis of road infrastructure development and its impact on social and economic development. The sample of Mohlake rural community has been chosen as an example to elaborate more on the existing issues faced by the marginalised communities of South Africa.

2.2.3. Research design

Research design is needed because it facilitates the smooth sailing of the various research operations, thereby making research as efficient as possible yielding maximal information with minimal expenditure of effort, time and money (Kothari, 2004:32). A cross sectional design is adopted where data is collected from a direct observation developed from a case study. The direct observation seeks to describe the incidence of road infrastructure development or to explain how the development of road infrastructure is related to societal development, e.g. the relationship between road infrastructure development, and mobility and accessibility of Mohlake rural community (Saunders, Lewis and Thornhill, 2009:155). It also helps in saving time and cutting down costs, since it is cheaper.

The case study is originally undertaken to understand the links between road infrastructure development and its relevance as a mechanism for linking Mohlake rural community with, neighbourhoods, technology and markets. It was undertaken as an example to highlight practical issues related to road infrastructure challenges. It illustrates the experience of road infrastructure development in a marginalised community of South Africa and the country’s attempts to forge equality, social cohesion and social inclusion and to promote marginalised rural communities’ development.

2.2.4. Sample selection
For this study, a suitable sample for road infrastructure development of Mohlake rural community has been identified. This method implies the collection of information by way of the investigator’s own observation, without interviewing the respondents (Kothari, 2004:17). This form of sample is often used when working with very small samples such as in case study research, and when selecting cases that are particularly informative (Neuman as quoted by Saunders, Lewis and Thornhill, 2009:237). Equally, the purpose in using the case of Mohlake rural community is to define the actual issues around road infrastructure development that affect the marginalised communities.

In fact, the road infrastructure development of Mohlake rural community is used as a typical case sampling as part of this research project to provide an illustrative profile using a representative case. Below are maps showing road and footpaths leading to Mohlake rural community. This sample provides an illustration of what is ‘typical’ to those who will be reading this study and may be unfamiliar with the subject matter (Saunders, Lewis and Thornhill, 2009:240).

The motivation behind selecting the road infrastructure development of Mohlake rural community is because the community is relatively easy to reach and is the most familiar to the researcher. Further, the community is underdeveloped and needs proactive intervention from government.
Fig: 2.2.4.1) Map of old road leading from Schoonoord, new road leading from Ga-Mokadi and footpath leading from Ga-Maila Mapitsane to Mohlake rural community

Sourced: Google Maps (2014)
Fig: 2.2.4.2) Map of new road leading from Ga-Mokadi and footpath leading from Ga-Maila Mapitsane to Mohlake rural community

| Legends |
|-----------------|---------------------------------|
| Old road before 2006 leading from Schoonoord |
| New road developed in 2006 leading from Ga-Mokadi |
| Footpaths used for Non Motorised Transport |

Sourced: Google Maps (2014)
2.2.5. Source of data collection

2.2.5.1. Introduction

This study will be conducted using a desktop review, in which existing secondary data will be collected. It will also make use of direct observation in collecting primary data employing a case study strategy in Chapter 4.

2.2.5.2. The secondary data

The secondary data will be sourced from existing literature. Secondary data include both raw data and published summaries, and both quantitative and qualitative data (Saunders, Lewis and Thornhill, 2009:256-258). The raw data or compiled data are used most frequently as part of a case study strategy (Saunders, Lewis and Thornhill, 2009:258). The literature will be sourced from books, journal articles, conference proceedings, policy documents, newspaper reports, periodicals, internet, university/or public libraries, and magazines (Committee for Protection of Human Subjects, 2014; Saunders, Lewis and Thornhill, 2009:256).

The existing literature will provide the study with insights about what is already known. In particular, this study will be undertaken through a critical analysis of available secondary data. Conversely, the value add in this study will be in the way that the data will be interpreted using the theoretical framework for analysis. In addition, the historical and situational analysis will be used to further broaden our understanding of practical issues related to impact of road infrastructure development.

2.2.5.2.1. Advantages and disadvantages of secondary data

The benefit of secondary data is the enormous saving in resources, in particular time and money (Ghauri and Grønhaug as quoted by Saunders, Lewis and Thornhill, 2009:268). In general, it is less expensive to use secondary data than for one to collect the data
themselves. In addition, there is likely to be higher-quality data than could be obtained by collecting your own (Stewart and Kamins quoted by Saunders, Lewis and Thornhill, 2009:268). Often it can be useful to compare data that one has collected with secondary data.

Secondary data such as the census can be used to assess the generalisability of findings, in other words how representative these data are of the total population. Re-analysing secondary data can also lead to unforeseen or unexpected new discoveries (Saunders, Lewis and Thornhill, 2009:269). Secondary data generally provide a source of data that is both permanent and available in a form that may be checked relatively easily by others (Denscombe, 2007). This means that the data and research findings are more open to public scrutiny.

Although secondary data has some advantages, it also has some disadvantages. Secondary data may be collected for a purpose that does not match the specific purpose in mind: to answer one’s research question(s) and to meet one’s objectives (Saunders, Lewis and Thornhill, 2009:269). The fact that secondary data were collected for a particular purpose may result in other challenges, including ethical problems. When using data that are presented as part of a report you also need to be aware of the purpose of that report and the impact that this will have on the way the data are presented (Saunders, Lewis and Thornhill, 2009:272).

2.2.5.3. The use of primary data

The primary data collection technique employed includes direct observation. Saunders, Lewis and Thornhill (2009:146) urge that direct observation is adopted using a typical case sample of road infrastructure development in Mohlake rural community to ‘highlight the importance of context’ (Yin, 2003) and the processes being enacted (Morris and Wood 1991). The case of Mohlake rural community has been chosen because of the researcher’s in-depth contextual knowledge and rich knowledge of the community.
Direct observation enables the researcher to share his/her experiences by not merely observing what is happening but experiencing the road infrastructure development challenges of Mohlake rural community (Gill and Johnson quoted by Saunders, Lewis and Thornhill (2009:289). In the direct observation approach, experiential data can also be generated because of the perceptions and feelings the researcher experienced in the process of researching. It has been used extensively in these disciplines to attempt to get to the root of ‘what is going on’ (Saunders, Lewis and Thornhill, 2009:289). Further, a single case is used if it is typical, or because it provides an opportunity to observe and analyse the targeted phenomenon (Saunders, Lewis and Thornhill, 2009:146).

2.2.6. Method of analysis

The data analysis will examine the existing secondary sources and the adopted case of Mohlake rural community. The existing secondary data will be examined to provide a breadth of available and comparable data from various studies. A sample of road infrastructure development challenges of Mohlake rural village is provided to display results with respect to the research questions. The value add in this study will be in the way that the data will be interpreted using four theories of road transport, historical analysis and conditional analysis as the researcher’s framework. The theoretical framework will help in the analysis of the findings to enhance our understanding of the interplay between development and road infrastructure challenges that produce and reproduce inequalities, poverty and exclusions that are affecting marginalised communities in South Africa.

2.2.7. Limitations

Some limitations have been encountered while searching for literature and adopting the case study of Mohlake rural community for this study. The limitation is identified because the review of secondary data provides different researchers’ viewpoints which might not be accurate in answering the research question per se. Conversely, Mohlake residents were not consulted to participate in the construction of the case study to provide clear contextual
meaning of poor road infrastructure challenges that affect their socio-economic activities on a daily basis.

The adoption of the case study method is based on direct observation (e.g., human actions or a physical environment) (Yin, 2012:10-11). As an initial example, the conventional manner of collecting observational data has taken the form of using the researcher’ own five senses, taking field notes, and ultimately creating a narrative based on what researcher might have seen, heard, or otherwise sensed (Yin, 2012:11). However, it is not credible to use the case study method in generalising context in a big country like South Africa because each are context specific. Accordingly, the adopted case study method may be limited in drawing conclusions because other methods (such as interview, observation, questionnaires, and documentary sources) to uncover residents’ viewpoint were not used and applied.

2.3. Section B: Theories

2.3.1. Introduction

A theory informs the definition of research questions and objectives (Saunders, Lewis and Thornhill, 2009:36). Gill and Johnson as quoted by Saunders, Lewis and Thornhill (2009:67) define theory as ‘a formulation regarding the cause and effect relationships between two or more variables, which may or may not have been tested.’ Further, Sutton and Staw quoted by Saunders, Lewis and Thornhill (2009:36) contend that good theory includes a plausible, coherent explanation for why certain relationships should be expected in data.

The definition demonstrates that ‘theory’ has a specific meaning. In fact, theory can refer to situations where, if roads and good infrastructure are developed, then the mobility and accessibility of marginalised communities will be the consequence (Saunders, Lewis and Thornhill, 2009:37). This section will outline four theories (location theory, production theory, innovation theory and empowerment) for road infrastructure development to
provide guidelines of how the development of roads can empower marginalised communities.

2.3.2. Location theory

Location theory is concerned with the geographic location of economic activity; it has become an integral part of economic geography, regional science, and spatial economics. Location theory addresses questions of what economic activities are located where and why (Feinberg, N.d; Assink & Groenendijk, 2009). Location theory rests on the assumption that agents act in their own self-interest. Firms thus choose locations that maximise their profits and individuals choose locations that maximise their utility (Glatte, 2015).

Location theory offers an explanation for industrial attraction for a community or region to be competitive and sustainable when improved roads give marginalised communities access to road transport services (Burdina, 2004). Typically, the location of activities is the outcome of interactive market mechanisms involving road transport services supported by good road infrastructure for marginalised communities to reach basic services. Moreover, roads development or provision can be the mechanism for goods and people to move from or to different places in shorter space of time (Cooley, 1894: 73).

It is worth noting that every year governments, businesses, and individuals make huge investments and decisions about the development of roads infrastructure services. The main objective is to make sure that the country has an ability to move people, raw materials and finished goods over long distances to different locations (Yilmazkuday, 2010). Further, these investments inject into road infrastructure development to ensure that the country supports the process of production and factors of input in the production function which depend on roads to move from one location to another (Levinson, 2014). Furthermore, good roads supported by quality road infrastructure can allow an efficient distribution of labour across the locations of production and other service sectors (Yilmazkuday, 2010).
Use of road transport services underlines that the movement and trading of products and long-distance of commuting are the result of separated locations of consumption, residence and productions (Borck, Pflüger & Wrede, 2007:2). Thus, the distance from production of goods and raw materials to areas of consumption, price of available resources, land rents and transport costs are the determinants that affect road and road transport services usage in every country (Miller as quoted by Burdina, 2004). Substantially, good roads and quality infrastructure can permit a smooth flow of people and transfer of goods using innovations in commuting technologies to increase this mobility and accessibility of locations and production facilities (Borck, Pflüger and Wrede, 2007:2).

Jones and Kierzkowski (2005) argue that the costs of road transport service depend on the associated services linked to costs and distance of available locations, which tend to be country-specific. For example, in South Africa, some provinces and municipalities have poor road networks and facilities that could complicate community development and delay the delivery of goods and raw materials for production/ construction and consumption purposes (Kumar, 2014).

Kilkenny (1998) asserts that the best location of production can be based on minimisation of road transport costs of delivering goods/or raw materials and final products to the consumer. Likewise, African Monitor (2012) emphasises that the development of efficient road infrastructure not only reduces the cost of inputs and road transport services to markets, but it increases access for marginalised communities to larger markets and also facilitates the trading process. Input costs can include the use of road transport services from the points of extraction or harvest to the conversion facility (Yousif et al., 2011). Furthermore, road improvement can encourage investors to recruit new businesses closer to the location of large volume of customers with a view to lowering delivery costs of finished goods (Burdina, 2004:7). The figure (2.3.2.1) below illustrates the location theory model developed by Johann H. von Thunen.

**Fig: 2.3.2.1) Von Thunen Model**
Adapted from: Burdina (2004)

In his theory Thünen indicates that transport cost depends on the distance from the market, and different kind of products. Locational rent, a term used by Thünen in his argument, is to be understood as the equivalent to land value. It corresponds to the maximum amount a farmer could pay for using the land, without making losses. It can be defined as the equation below:

\[ L = Y (P - C) - YDF \]

- \( L \) = Locational rent (in ZAR /km\(^2\))
- \( Y \) = Yield per unit of land (in \( t/km^2 \))
- \( P \) = Market price per unit (in ZAR /\( t \))
- \( C \) = Production cost per unit (in ZAR /\( t \))
- \( D \) = Distance to/ or from the market (in km)
- \( F \) = Freight/ or Transport cost per unit and unit of distance (in ZAR /\( t/km \))
- ZAR=South African Rand
- KM = Kilometre
- t= tonne or a unit of mass equal to 1000 Kilograms (kg)
Take the locational rent of a product with a yield of 1000t/km², for example, with a fixed price of 100ZAR/t in the market. Production and transport costs are respectively, 50ZAR/t and 1ZAR/t/km. The locational rent is 50,000 ZAR/km² at the market, 40,000 ZAR/km² 10 km from the market and only 20,000 ZAR/km² 30 km from the market. Since locational rent falls with increasing distance from the market, the amount each farmer is willing to pay for agricultural land will shrink and the price of land will eventually decline.

Thünen concludes that the cultivation of a crop is only worthwhile within certain distances from the city: beyond that, the cost of the land becomes too high, with increasing distances transport costs also increase, or, if there is another product having greater yield or lower transport costs. After a certain distance from the market (the city) the production of a crop becomes unprofitable, either because its profits drop to zero or the profits earned by other crops are higher, as von Thünen calculated them for products having different intensities (cattle, wood, grain, eggs, milk, etc.).

If good road infrastructure is of major significance for a company, it can locate to where the cost of supplying raw materials and shipping cost of goods could be at minimal (Burdina, 2004:7). From the Von Thunen Model, Weber indicates that the industry which produces goods less heavy than the raw materials used in production, could settle near to the raw-material source if quality roads and infrastructure support the process to lessen costs of delivering the raw materials (Burdina, 2004:12). As a result, the difference in road freight cost for shipping different kinds of products may affect the location choice of a manufacturing or business activity (Burdina, 2004:7). Therefore, industries producing heavier goods would settle near their market to minimise the weight they have to transport the goods for consumption (Burdina, 2004:12).

Kimura and Kobayashi (2009) stated that a key for marginalised communities to gain advantage and attract investors and donors can be through government interventions at improving road infrastructure. In marginalised (rural and peri-urban areas) communities, efficient improved roads can link trading networks, accessing social service across the country and other regional communities (Burdina, 2004). It is worth noting that costs for
having uninterrupted road connectivity across the marginalised (rural and peri-urban) communities can offset gains from trade preference and promote social inclusion.

2.3.3. Production theory

The production theory can be defined as the study of production, or the economic process of converting inputs into outputs. Production uses resources to create goods or a service that is suitable for use in a whole economy, or exchange in a market economy (Fujita & Hamaguchi, 2001; Feinberg & Keane, 2001). This can include manufacturing, construction, storing, shipping, and packaging. Some economists define production broadly as all economic activity other than consumption (Feinberg & Keane, 2001).

According to Porter (2000) production theory provides that if a firm/ or community has a given technology (infrastructure) to transform its inputs (x) into output (y) in an economically efficient manner, the roads development can be the function (f) allowing road transport services to access locations of consumption. A production function ‘y=f(x)’ can be used to describe the relationship between outputs (movement of people and goods) and inputs (the utilisation of road transport services supported by good road and infrastructure). In fact, road transport services is an integral part of the process through which production inputs can be converted into goods and services that could be necessary to satisfy human needs and result in commercial transactions (Shumer as quoted by DoL, 2008).

According to Kveiborg (2005) road infrastructure development and road transport services can be a consequence of economic activities taking place at different production facilities and geographic locations. Cooley (1894:75-77) indicates that the existence of local facilities for production in marginalised communities can be stimulated by road transport services that are supported by good roads infrastructure development to provide mobility and access. Further, road transport services can be the instrument of all economic and social activities for a country/community or region (Cooley, 1894:76). In fact, road transport service can be an integral part of the production process of every production stage, so that a
change in transport costs may affect the effective productivity of each stage of production by delaying the process (Yilmazkuday, 2010).

The Department of Labour has ascertained that good road development can diminish the need for organisations to hold large stocks of goods in their warehousing and storage facilities (Department of Labour, 2008). In fact, the physical function of road transport services supported by quality roads can close the gap between the places of production and consumption, and thereby adding time value and place value to goods and services. The Department of Labour affirmed that the economic function of road transport services can be to cross the longer distance, delivering goods at the lowest possible cost. Moreover, improved or well developed roads may lower the labour costs by expanding the pool of available workers or by reducing the cost of housing workers near the work place (Hulten, 2005).

Improved roads infrastructure can reduce transport costs by allowing production or manufacturing or storage facilities to locate in areas where business opportunities are available. In addition, high quality road infrastructure can also link firms to local market centres that may be available for marginalised communities to take full advantage of (Lall and Chakravorty, 2005:49). It is worth noting that the availability of reliable road infrastructure can enhance market accessibility, regional amenities and economic diversity thereby influencing location and collection of business facilities/ or industries.

The division between production and costs implies that there could be a relationship between the costs of production and the price of road transport services to perform the task (DoT, 2006). In other words, each small movement along the production towards the distribution channel can increase the cost of transport determined by the distance that raw materials need to be shipped (Mtantato, 2012). In addition, the rising costs of road freight services for the distribution of finished products can create intense pressure at moving products from/ or to distribution channels and also, can affect the quality of roads developed if overloading occurs.
Mtantato (2012) adds that the cost of transport could rise when business activity occurs at a distance of 150-400 km from the manufacturing sites. Therefore, the effect of costs and distance can perpetuate exclusion and loss of productivity, as the cost of road transport services can constitute a form of regressive tax on delivery process (Mtantato, 2012). For the marginalised communities, it can become very difficult to afford road transport service to deliver goods to/or from the markets/ or their homes. Moreover, poor roads can affect efficiency in marketing, hence competitive market centres cannot be reached with ease due to mobility and accessibility restrictions (DoT, 2006:40).

In fact, the road transport service can be the cause of counter changes. Typically, evidence suggests that road development can be the mechanism through which road transport services may have an impact on production and community development. The link and impact of road networks development lies in the fact that improved road infrastructure can improve access to economic opportunities by reducing road transport costs (The Tanzania Forum Group, 2003). Likewise, improved road infrastructure may lower input prices and production costs (DoT, 2006:40). Moreover, improved road infrastructure may also ease accessibility to markets and social services by supporting road transport services, and link the marginalised communities to the rest of the economy (The Tanzania Forum Group, 2003).

2.3.4. Innovation theory

2.3.4.1. Introduction

The concept of Innovation Systems (IS) has increasingly been gaining intellectual and practical coherence over a number of decades, enjoying initial strong adoption by OECD and developed countries, and more recently is becoming the focus of increased attention as a means to address some of the more profound issues facing developing nations (OECD, 1999). Muchie argued that innovation system for integrated development could be viewed as an alternative to all existing development approaches to address persistent challenges of
underdevelopment in marginalised communities of South Africa (Muchie as quoted by Adesida, Karuru-Sebina and Resende-Santos, 2016:13).

Rose and Manley (2012:3) stated that delivering large infrastructure programmes (like, road systems) to address inequalities, exclusion, disempowerment and poverty eradication in marginalised communities of South Africa requires significant ingenuity on the part of the integrated innovation systems. Muchie added that in the marginalised communities’ context, the validation of innovation system should include a combination of social, economic, environmental and deeper integration, along service provision (like, development of road infrastructure) and knowledge creation (Muchie as quoted by Adesida, Karuru-Sebina and Resende-Santos, 2016:14).

In fact, a key to improve and develop marginalised communities of South Africa could be through the promoting regional innovation system and integrated road infrastructure. In addition, an improvement of innovation and technology uptake and innovation system as the learning process and knowledge base for development (Manley, 2008). In view of that, the development in the marginalised communities could be redefined to promote local economic integration and sustainable local development. This subsection gives detailed information about innovation system and its significance for development

2.3.4.2. Defining and understanding innovation

A system of innovation is defined as a set of distinct institutions which jointly and individually contribute to the development and diffusion of new technologies and which provides the framework within which governments form and implement policies to influence the innovation process (Lundvall, 2002).

Therefore, it is a system of interconnected institutions to create, store and transfer the knowledge, skills and artefacts which define new technologies (Metcalf, 1995; and Niosi, 2002).
In a narrow sense, systems of innovation include institutions that are directly involved in the production science and technology. In this context system of innovation is viewed in isolation of other influences.

By contrast, the broad definition of systems of innovation encompasses both informal and formal institutions in public and private sectors whose activities and interactions initiate, import and diffuse technologies (Freeman quoted by Adesida, Karuru-Sebina and Resende-Santos, 2016:20). The broad definition of system of innovation recognises inequality and provides a framework within which this development challenge can be analysed and addressed

2.3.4.3. Approach to innovation research

In the past decades an understanding of the nature of the innovation process has emerged. Major contributions in this respect have been made by an innovation systems approach. Traditional concepts like the linear model of innovation or the Schumpeterian view of firms innovating in isolation have been replaced by modern theoretical developments stressing the systemic character of innovation (Tödtling and Tripl, 2005:3).

According to Lundvall, the modern version of the innovation system concept appeared first in an unpublished contribution to the OECD by Freeman (1982) (Muchie as quoted Adesida, Karuru-Sebina and Resende-Santos, 2016:20). He further argued that some years later Lundvall (1985) used the concept in formulating the importance for innovation of the concept of producer user and feedback for learning. The innovation system is a concept utilised to describe relationship between internal processes in the firms and external processes in the wider environment, in the context of knowledge creation, diffusion and transfer (Muchie as quoted Adesida, Karuru-Sebina and Resende-Santos, 2016:21).

In the developed world’s economic development, innovation system framework is based on empirical evidence of technologies, knowledge, innovation and learning. However, in developing economies, there is a need to reframe an innovation system to make it relevant
to embrace the development economies interactions in a specific and empirically valid way among relevant stakeholders (Muchie as quoted Adesida, Karuru-Sebina and Resende-Santos, 2016:21). Muchie highlighted that development economies have to be reframed to be context sensitive, so too the innovation system concept needs to be reworked to be context sensitive. In a view of that the new synthesis that incorporates both can benefit, if all stakeholders explore how an innovation system has been conceptualised.

Conversely, to promote and developed marginalised communities (like, rural and peri-urban areas) of South Africa and their social and economic activities requires regional and local institutions’ cooperation and interactions and the effective governance of local government for services provision that best supports an integrated development (like, social, economic and environmental) to address challenges of underdevelopment.

2.3.4.4. Regional innovation systems

The innovation system (IS) literature has revealed huge differences between countries in such attributes as economic structure, Research and Development (R&D) base, institutional set-up and innovation performance (Edquist, 2001). More recently a growing interest in regional innovation systems has emerged (Acs, 2000; Bathelt and Depner, 2003; Cooke et al., 2000; and Mytelka, 2000). Whilst not denying innovation systems that of national and international, further, technological and sectoral factors are essential, and equally, the regional dimension is of key importance.

According to Cooke (2004:3) regional innovation system is defined as ‘interacting knowledge generation and exploitation sub-systems linked to global, national and other regional systems.’ The regional innovation system (RIS) approach provides a useful framework for such a differentiated approach. It draws attention to the national, clusters and institutions of an innovation system, to the interdependencies within the regional level and to spatial levels (Cooke et al., 2000 & 2004). In view of that, situations of that nature are characterised by low levels of clustering and a weak endowment with relevant institutions (‘organisational thinness’), a lack of interaction and of networks (‘fragmentation’), and situations of ‘lock in’. 
Reasons supporting a view of regional innovation system are that regions differ with respect to their industrial, knowledge and locational specialisation pattern and their innovation performance (Breschi, 2000; and Usai, 2000). The knowledge spill-overs, which play a key role in the innovation process are often spatially bounded (Bottazzi and Peri, 2003). Accordingly, the ongoing importance of tacit knowledge for successful innovation has to be mentioned (Gertler, 2003; and Howells, 2002). Finally, policy competences and institutions are partly bound to sub-national territories (Cooke et al., 2000).

The regional innovation system can be thought of as the institutional infrastructure supporting innovation within the production structure, learning process and knowledge creation of a region. In the regional innovation system, informal institutional context (like, norms, trust and routines) in which interactive learning takes place are emphasised. This dynamic and complex interaction constitutes what is commonly labelled innovation systems (Edquist, 1997), like, systems understood as interaction networks of public and private sectors (Kaufmann and Tödtling, 2001).

Based on the new insights on the nature and the functioning of innovation systems, a deeper understanding of regional innovation barriers can be gained. Several types of failure can arise blocking the system’s functioning (Edquist, 2002; Lundvall, 2002; and Smith, 2000). The regional innovation system failures may be due to an underdeveloped community’s organisational and institutional setup. Such problems range from limited innovation capabilities of the region to the cluster level. As stated, the region may suffer from the fact that few or no clusters exist (like, a lack of regional specialisation). Furthermore, the region’s innovation deficiencies may be caused by an over-specialisation in traditional industries and out-dated technologies.

Tödtling and Tripl (2005:5) stress that innovation problems may also result from missing or inappropriate local/ or regional organisations in the region sub-system of knowledge generation and diffusion. Again, both the lack of local/ or regional organisations (in the fields of research, education and technology transfer) as well as a too strong orientation of
existing institutions on traditional economic and technological structures may lead to serious innovation problems. The problems distinguished are that a poor innovative performance may result from a lack of communication and cooperation between the regional innovation system elements, leading to an insufficient flow of knowledge and technological development.

2.3.4.5. Technological Innovation System (TIS)

Successful technology development is important for a country or region survival (Zahra and Nielsen, 2002). According to Carlsson and Rikard Stankiewicz as quoted by Coenen and Díaz López (2009:11) defined technological innovation system (TIS) as “network(s) of agents interacting in a specific economic/industrial area under a particular institutional infrastructure or set of infrastructures and involved in the generation, diffusion, and utilisation of technology. Technological systems are defined in terms of knowledge or competence flows rather than flows of ordinary goods and services. They consist of dynamic knowledge and competence networks”. This definition acknowledges that a technological system can be national, regional and international, and, that a technology can cut across various industrial sectors (Coenen and Díaz López, 2009:11).

Given that technology is the common denominator in TIS, this allows for a framework geared to studying how the configuration of actors, networks and institutions change over time as the technology develops. Socio-Technical (ST) systems encompass production, diffusion and use of technology in relation to so-called societal functions (for example, transport, communication, nutrition). The elements of these systems, which in the above approaches are mainly constitutes of organisations, include for ST systems also artefacts, knowledge, capital, labour, cultural meaning, etc.

Caerteling, Halman and Dore´e (2008:2) stated that government is both a promoter of Research & Development for public goods and a buyer of new technology. Again, the government could support technology development and create new opportunities for all citizens. In order for government not fail to address the impact of road infrastructure
development in marginalised communities of South Africa. It is important on its role in
technology development to focuses on micro-level other than macro-level for development.
In the marginalised communities’ context, government may develop good road
infrastructure that will create new opportunities for new technologies, which will strongly
affects the viability of new businesses, large mobility and accessibility of road transport.

Conversely, government does not itself develop new technologies in road infrastructure.
Firms develop and commercialise new technologies, and government, as a customer,
depends on these firms. To avoid the emergence of monopolies and a dependence on a
single supplier, government may stimulate the development and commercialisation of
competing technologies (Caerteling, Halman and Dore´e, 2008:3).

A research on large technical infrastructures, such as road infrastructure and energy supply,
has shown that these infrastructures have specific characteristics that have to be taken into
account (Geyer and Davies, 2000). Road infrastructure as a large technical system consists of
physical components such as roads, bridges, and traffic monitoring equipment. These
components form a network that hierarchically links roads of various classes (Mom, 2005)
and that is controlled through signs, regulations, and dynamic route information to optimise
traffic flow. Important operational goals in road infrastructure are the improvement of the
capacity use, safety, and reducing the environmental side effects of car traffic. These goals
are the drivers of many improvements in road infrastructure, such as dynamic route
information systems and quiet pavements.

Partially public goods and services such as defence systems, road infrastructure, and health
care show similarities in their structure and innovation dynamics. These goods are
characterised by a capital-intensive infrastructure, a broad range of technical components,
and the involvement of a variety of actors and institutions (Markard and Truffer, 2006). The
research indicated that the concept of large technical systems has emerged to explain the
process of innovation in these types of goods and services (Davies as quoted by Caerteling,
Halman and Dore´e, 2008:3)
Caerteling, Halman and Dore´e (2008:4) stated that road infrastructure as a large technical system has four distinct characteristics that distinguish it from other large technical systems. Road infrastructure: is superimposed on an existing road network; traffic flows have a non-systemic character; has a huge physical impact on the landscape; and is controlled and owned by government. These characteristics have implications for understanding technology development in road infrastructure. Taken together, these characteristics induce incremental and path-dependent innovation.

Economic literature has provided explanations for path-dependent innovation (Davies, 1996; and Markard and Truffer, 2006). In the literature, technological regimes direct the variation in new technologies (Malerba and Orsenigo, 1997). Van den Ende and Kemp (1999:835) define a technological regime as “the complex of scientific knowledge, engineering practices, production process technologies, product characteristics, user practices, skills and procedures, and institutions and infrastructures that make up the totality of a technology.” The concept of technological regimes (Winter, 1984; Malerba and Orsenigo, 1993) points at the core differences between technologies, claiming that firms/ or government institutions operating within the same regime are likely to share some proximate organisational and behavioural features (Dosi and Malerba, 1996).

A technological regime reinforces the established consumption patterns and principles for the solution of techno-economic problems (Markard and Truffer, 2006). As such, a technological regime guides the direction of technological change and the adoption and diffusion of new technologies. A technological regime also affects the appropriability conditions (Shane, 2001). Appropriability conditions refer to the ability the government (national, provincial and local) have to exploit new technology, and become nonexclusive in services provision. The conditions that govern the government’s ability to effective governance and services provision from a technology are the nature of the technology and the efficacy of legal instruments (Teece as quoted by Caerteling, Halman and Dore´e 2008:4).
A technological regime to road infrastructure has both supply and demand policies that determine the rate and direction of innovation. The government championship as a supply-oriented policy provides technical assistance, political support, and human resources to firms engaged in technology development (Caerteling, Halman and Dore’e 2008:5). Its championship can create favourable demand conditions and help in obtaining planning approvals. In addition, the government’s championship is vital in projects that do not have an obvious initial beneficiary. In contrast, withdrawal of government championship can be a direct cause of failure in services provision (like, poor provision of road infrastructure in marginalised communities of South Africa).

Demand-oriented policies are carried out through the public procurement of new technologies (Moon and Bretschneider, 1997) and have a direct effect on their variation and selection. Improving public goods and services, cost reduction and the changing needs of society are a few of the factors that induce governments to adopt new technologies (Rothwell and Zegveld as quoted by Caerteling, Halman and Dore’e 2008:5). In mainly or exclusively public markets, such as defence and transport infrastructure, government procurement may dominate the adoption and diffusion of technology (Caerteling, Halman and Dore’e 2008:5).

In addition, innovation-oriented procurement policies can provide an opportunity for experimentation and demonstration of new technology (Rothwell and Zegveld, 1981; Seaden and Manseau, 2001). Providing this opportunity can include technical support for prototype development or technical assistance during the phase of final adjustments (Dalpe’, DeBresson, and Xiaoping, 1992). In this respect, procurement and championship are interrelated and can complement each other.

Governments can affect the efficacy of legal instruments in several ways. First, laws and regulation define what can be protected with Intellectual property rights (IPRs). The standard-setting behaviour of government can affect the appropriability conditions. Government regulation can impose a technology standard on an industry. That standard may self-evidently dominate other technology options in an industry (Schilling as quoted by
Caerteling, Halman and Dore´e 2008:5) and will limit the viability of other technologies. Further, government can indirectly promote new technologies by providing tax incentives. Besides these factors, the appropriability conditions are affected by the decisions about size and timing of demand.

As a major customer for a new technology, government has a vested interest in promoting the conditions for long-term implementation success (Morris and Hough as quoted by Caerteling, Halman and Dore´e 2008:5). Yet promoting these conditions is a great challenge for government. In fact, elections and political appointments may have disruptive influence on operations and governments’ roles are dispersed across different organisations and offices at national, regional, and local levels. Thus, developing and implementing new technology require coalition building among decision making, policymaking and executive agencies at different levels of government.

2.3.4.6. Competence building and policy learning

A neglected problem in designing best policy is the competence/ or incompetence of the policy makers. This may come as a surprise in a world where ‘government failure’ is frequently used as an argument for hands-off policies (Lundvall, 2007:38). Lundvall added that there are different models for what a competent policymaker is and how a design policy needs to take this into account.

There is the model of ‘the generalist policy-maker’ who can administer any system on the basis of some general analytical tools such as cost-benefit analysis, game theoretic models or quantitative benchmarking (Lundvall, 2007:38). A one advantage of the generalist is that he/she is easy to move around and easy to replace. The weakness is that the competence to intervene in as well as design and redesign complex system is weak. The opposite is ‘the life-long specialised policymaker’ who has a very detailed insight in the sector in which he/she is in charge. Here the analytical tools can be combined with experience-based tacit knowledge (Lundvall, 2007:38). The strength of the sector expert is that he/she can understand the
system that he/she intervenes with. However, the weakness may be myopia and tendency to reproduce old routines that may be obsolete.

According to Lundvall (2007:39) in the real world a mixture of the two types are found in the same organisation/ or government institutions and most individual policymakers combine some sector experience with being generalists. But nevertheless as the economic rationale for public policy has become more predominating there has been a tendency to move in the direction of the generalist models. Lundvall argued that this tendency of deskilling makes it more difficult to realise the most useful ideas in the innovation system concept. The complexity of the National Innovation System concept and its application in terms of institutional and policy design is difficult to combine with a staff of policymakers that know very little about the reality in which innovation processes actually take place.

Without competence-building among policy makers in charge of innovation policy it might be better to avoid using the innovation system concept and instead to use simple rules of thumb such as trying to keep public Research and Development (R&D) expenditure at a reasonable level,. This is why some effort and emphasise could be put on discussing how the National Innovation System concept can support policy learning. These reflections on innovation related policies point to a need for ongoing policy learning focusing on building competences and skills in all parts of society and on integrating narrow perspectives and strategies from different policy areas (Lundvall, 2007:39). Policy learning is together with technological, organisational and institutional learning an integrated part of the learning economy. Lundvall (2007:40) argued that policy learning can take different the following forms in relation to innovation policy.

- Forming visions about the learning economy as an environment for learning, innovation and sustainable growth and clarifying the value premises of innovation policy.
- Understanding the fundamental characteristics of the domestic national innovation system
• Institution building that supports the production and reproduction of human and social capital
• Stimulating regional and local experiments in policy areas in need of reform and developing new methods to evaluate the outcomes of such experiments that take into account learning effects.
• Developing new forms of democratic participation in the design and implementation of innovation strategies including forms of ongoing dialogues between employees, unions, researchers and governments

The best constellation within a policy agency is probably a mixture of experts and generalists. The way the competences of experts and generalists are developed is important. Narrowly focused experts need to require system-wide insight. Generalists need to get a chance to go deeper into specific fields. Moving experts from one field of expertise to another from time to time may be a way to diffuse ideas from one policy area to another. The strategies of policy learning the human dimension and the design of career paths are extremely important.

2.3.4.7. Innovation system as the learning process and knowledge base

In order to understand the concept of innovation system and why competence building needs to be integrated with innovation, it is necessary to understand the role of knowledge and learning in the economy. In Lundvall (1992:1) it was proposed that ‘the most fundamental resource in the modern economy is knowledge and, accordingly, the most important process is learning. Over the last decade the attempts to get a better understanding of the knowledge based economy and the learning economies have created a more satisfactory theoretical foundation for the understanding of innovation systems (Lundvall and Johnson, 1994; OECD 2002; Foray, 2004; and Amin and Cohendet, 2004)

It has been argued that what is new in the present phase of development is not the use of knowledge in production, but rather the speed of learning and forgetting (Muchie, Gammeltoft and Lundvall, 2003:6). The understanding has been further developed using the
basic distinctions between information and knowledge, between ‘knowing about the world’ and ‘knowing how to change the world’ and between knowledge that is explicit and codified versus knowledge that remains implicit and tacit (Lundvall, 2007:19). Likewise, Lundvall and Johnson (1994) introduced a distinction between Know What, Know Why, Know How and Know Who that has proved to be useful in understanding knowledge creation and learning in innovation systems. These distinctions are helpful when it comes to contrast the theoretical micro foundations of innovation systems with those of standard economics.

Lundvall (2007:20) suggested that if neo-classical models include learning it is understood either as getting access to more or more precise information about the world (know what) or it is a black-box phenomenon as in growth models assuming ‘learning by doing’. The very fundamental fact that agents, individuals as well as firms are more or less competent (in terms of know-how and know-why) and are more or less integrated in knowledge-based networks (know-who) is abstracted from in order to keep the analysis simple and based upon ‘representative firms’ and agents. This abstraction is most problematic in an economy where the distribution of competence becomes more and more uneven and the capability to learn tends to become the most important factor behind the economic success of people, organisations and regions (Lundvall and Johnson 1994).

Lundvall (2007:20) stated that this focus on learning is combined with the understanding of decision-making as ‘muddling through’ based upon use of rules of thumb and routines. This follows directly from the focus upon innovation. Lundvall (1992) defined innovation as an interactive learning process, which is socially and territorially embedded and culturally and institutionally contextualised to enhance regional empowerment. It emphasises a dynamic approach to innovation rather than the more static approach adopted in the knowledge-based economy that emphasises access to an amount of specialised knowledge (Lundvall and Archibugi, 2001).

In fact it is, thus, necessary to pay attention to knowledge creation as a process that is of equal importance to the processes of learning and competence building (Asheim and Coenen, 2005:3). It is also important to underline ‘the tremendous importance of
incremental innovation, learning by doing, by using and by interacting in the process of technical change and diffusion of innovations’ in both marginalised communities (rural and peri-urban areas) as well as urban and metropolitan areas (Freeman, 1993:9-10). It is worth noting the differences between the investigated types of regions with respect to their innovation activities and their pre-conditions for learning.

It is against this background that regional policy can clearly move away from a re-active notion of redistributing welfare to a pro-active position at the heart of economic development. The development of the endogenous capacity of regions to innovate in order to create competitive advantage is today often referred to as ‘regional constructed advantage’ in which the establishment and formation of regional innovation systems plays a strategic role (Cooke and Leydesdorff, in press). There is no single optimal strategy in this respect. However, the innovation system process implies that a region is particularly dependent on their specific knowledge base while integrating and incorporating knowledge from the international and national level, other than reliance on regional or local level alone (Asheim and Gertler, 2005).

2.3.5. Empowerment

2.3.5.1. Introduction

The origin of road infrastructure problems in South Africa, in particular marginalised communities, can be taken back to the pre-democratic elections era and the post-democratic elections period, when road infrastructure was not developed and managed in a holistic way. From this point the social needs of marginalised communities - social exclusion, poverty alleviation, inequalities and social delineations - increased. In essence, poor provision of roads and lack of good road infrastructure development to enhance marginalised communities’ involvement in the main stream economies have disempowered these communities.
Racially segregated town planning, which saw black people being allocated land far away from business centres, coupled with poor transport infrastructure, meant that most South Africans did not have easy access to economic opportunities or social spaces and services. According to the World Bank quoted by Adedeji, Olafiaji, Omole, Olanibi and Lukman (2014:1) ‘the marginalised communities engage in primary activities which form the foundation for any economic development. Despite this level of contribution to economic development, marginalised communities have been neglected in terms of development which has made it non-attractive to live in the marginalised communities. This is justified by the high correlation that exists between rural living and poverty.’

Therefore, much still needs to be done to improve road infrastructure development and systems of marginalised communities, as well as to improve their social spaces and amenities in existing regions. In addition, transport policy has been more integrated since 1994; however, the empowerment of marginalised communities in roads development has been the least addressed.

2.3.5.2. Defining and understanding empowerment

Empowerment refers to the ability of people to gain understanding and control over personal, social, economic and political forces in order to take action to improve their life situations (Israel, Checkoway, Schultz And Zimmerman, 1994). It is the process by which individuals and communities are enabled to take power and act effectively in gaining greater control, efficacy, and social justice in changing their lives and their environment (Minkler, 1992; Israel et al., 1994).

According to Rappaport, empowerment is a construct that links individual strengths and competencies, natural helping systems, and proactive behaviours to social policy and social change (Rappaport, 1984). Rappaport notes that it is easy to define empowerment by its absence but difficult to define it in action as it takes on different forms in different people and contexts.
Czuba (1999) suggests that three components of empowerment definition are basic to any understanding of the concept: empowerment is multi-dimensional, social, and a process. It is multi-dimensional in that it occurs within sociological, psychological, economic, and other dimensions. Empowerment also occurs at various levels, such as individual, group, and community. Empowerment is a social process, since it occurs in relationship to others, and it is a process along the continuum. Other aspects of empowerment may vary according to the specific context and people involved, but these three remain constant. How empowerment is understood also varies among perspectives and contexts.

2.3.5.3. Power

The essence of the concept of empowerment is the idea of power. According to Lukes (1994) power may occur at several levels and this clarifies the understanding of the term and also its relationship to community organisation. At the community level power involves the shared leadership and common decision making. The possibility of empowerment depends on two things: empowerment requires that power can change and expand (Czuba, 1999). Empowerment is a process that fosters power (that is, the capacity to implement) in people, for use in their own lives, their communities, and in their society, by acting on issues that they define as important (Czuba, 1999). Traditional Social Science emphasises power as influence and control, often treating it as a commodity or structure divorced from human action (Lips, 1991).

Grounded in an understanding that power will be seen and understood differently by people who inhabit various positions in power structures (Lukes, 1994), contemporary research on power has opened new perspectives that reflect aspects of power that are not zero-sum, but are shared. Researchers and practitioners call this aspect of power ‘relational power’ (Lappe & DuBois, 1994), ‘generative power’ (Korten, 1987), ‘integrative power’ and ‘power with’ (Kreisberg, 1992). This aspect means that gaining power actually strengthens the power of others rather than diminish it, such as with domination-power. Kreisberg has suggested that power, defined as ‘the capacity to implement’, (Kreisberg, 1992) is broad enough to allow power to mean domination, authority, influence, and shared power or
‘power with’. It is this definition of power, as a process that occurs in relationships, that gives us the possibility of empowerment. It is a process that fosters power (that is, the capacity to implement) in people, for use in their own lives, their communities, and in their society, by acting on issues that they define as important.

2.3.5.4. Levels of empowerment

In South Africa, the issue of empowerment has continued to be of national importance. For instance, most of the marginalised communities’ roads are in poor condition, and this has imposed significant costs on the national economy, especially to the agricultural activities, due to increased transport service operating costs and travel times (Akintola, 2007). The government of South Africa has embarked on various programmes at one time or the other to ensure the provision of adequate transport facilities to meet the needs of the marginalised communities’ population, but these programmes have not been able to address development challenges as planned. As an initial example, the development of road infrastructure in marginalised communities (like, peri-urban and rural) is very poor and slowly as compared to metros and township communities. In the later communities, roads are properly maintained, reconstructed and rehabilitated to ensure effective mobility and accessible road transports.

The importance of empowerment in marginalised communities of South Africa can be justified from both social and economic perspectives. Socially, a significant proportion of marginalised communities’ population lives in the rural and peri-urban areas and demands various forms of transport to facilitate socio-political interactions. In addition, the marginalised communities’ areas are indispensable in the supply of food, raw materials to urban centres and the country’s economic growth as a whole. In light of the above, it becomes useful to strengthen the empowerment of these communities by providing good and quality roads infrastructure that could resolve their socio-economic problems in the long run, so that the potential of these communities can be known, so as to achieve sustainable local development.
The provision of infrastructure as an approach to marginalised communities’ development is one of the methods that could be used by both spheres of government (National, provincial and local/ or municipal) for empowerment. The concept of empowerment has different meanings within the context of health promotion work (Robertson and Minkler, 1994; Labonte and Laverack, 2001) as empowerment may appear on different levels (Robinson and Elliott, 2000; Smith, Littlejohns and Thompson, 2001), but all these levels are closely connected: in empowered communities there are empowered organisations and the level of an organisation’s empowerment depends on the empowerment level of its members (Wallerstein and Bernstein, 1994). Although it has been suggested that the three levels are interdependent, the aims of each may differ (Robertson and Minkler, 1994) and this may impede practice (Laverack and Wallerstein, 2001).

In the current study, the community empowerment is elaborated and modified (Bush, Dover and Mutch, 2002). Domains consist of four components: firstly, activation of the community; secondly, competence of the community in solving its own problems; thirdly, programme management skills; and fourthly, ability of mobilizing resources (political, social, intellectual and financial) (Kasmel, n.d:6).

Empowerment at the community level of analysis - community empowerment - includes efforts to deter community threats, improve quality of life and facilitate citizen participation. The community empowerment model suggested by Wallerstein (1992) is multi-dimensional and includes the dimension of improved self-concept, critical analysis of the world, identification with the community members, and participation in organising community change. She defines empowerment as follows: it is a social-action process that promotes participation of people, organisations and communities towards the goals of increased individual and community control, political efficacy, improved quality of community life and social justice. The outcomes of community empowerment may emerge as actual socio-environmental and political changes in community. In practice, the conception of empowerment takes interdependence to be an essential aspect of empowerment.
CHAPTER 3: LITERATURE REVIEW

3.1. Introduction

It is worth noting that the preliminary search that helps a researcher to generate and refine research ideas that has already been discussed is the reviewing of existing literature (Sharp et al., as quoted by Saunders, Lewis and Thornhill, 2009:58). The literature review focuses on the impact of road infrastructure development on improving the marginalised communities in South Africa.

This chapter outlines the review of literature under to the following headings: first, the role of road infrastructure and development; second, the road infrastructure of developing countries; third, the overview of infrastructure development in South Africa.

3.2. The role of road infrastructure and development

Road transport infrastructure is a critical ingredient in economic development at all levels of income and it supports personal wellbeing and economic growth (OECD, 2013:1; Chapman et al., 2002; and Weisbrod, 1997) as well as social development (UNCDF, 2007). Road infrastructure plays a role as a capital input into production and wealth generation (OECD, 2013:1). Further, road infrastructure can contribute to growth by expanding the stock of capital available for use in producing goods and services. With more capital and more efficient production, both real income levels and standard of living can be expected to rise (OECD, 2002). Furthermore, road infrastructure can be a key determinant of transport costs and trade (Limao and Venables, 2001:1-2), and can contribute to the level and structure of economic activity and output (OECD, 2002:13).

Road infrastructure supports domestic and regional needs and is an effective catalyst for spatial development, and the development of businesses, transport systems and human settlements (SA National Treasury, 2011; Kockelman et al., 2013:49; DOT, 2006:38). Road transport can be considered as a key factor for national economic growth by facilitating
trade, creation of wealth and stimulation of development (DOT, 2006:38; COTO, 2012:1). Brit (2010) argues that road infrastructure can be an important input for the efficient functioning of the socio-economic activities of a nation, and is central to development. Road transport infrastructure could also be perceived as a public good fundamentally developed to support mobility (PATS as quoted by Brits, 2010).

The South African government recognises the importance of road infrastructure in its framework ‘Road Infrastructure Strategic Framework for South Africa’ (RISFSA 2006) intended to ensure that road constructions and maintenance are carried out (DoT, 2006). This recognition is evident from the government’s decision to make investment to the value of R202 billion over the 2010 to 2050 period towards road infrastructure development (DPME, 2012:56). Further, Ferreira and Khatami (1996) indicate that investment in road infrastructure could play an important role in increasing the productivity of labour and business. It is argued that the investments in road transport infrastructure will contribute extensively to promotion of development (World Bank, 2007a).

According to OECD (2002:31) the direct effect of road infrastructure investment is to improve travel conditions for its users. It is important to note that road infrastructure investment can contribute both to overall growth and to redistribution of benefits. The OECD added that the indirect contribution of road infrastructure to economic development may arise through a multitude of channels, including the enabling of productive private investment, the creation of new activities (supply chains), or the reshaping of economic geography.

It is worth noting that for the country to achieve a thriving national economy with all areas playing their part it needs quality road infrastructure to connect cities, regions and sub-regions (UKDfT, 2012:13; Mutambara, 2008:1-2). According to Kockelman, Chen, Larsen & Nichols (2013:37-38) a safe and efficient road network can be an essential enabler of socio-economic development in all areas of South Africa. Economic growth and development requires the support of an effective and efficient public, private and freight transport system that can be enabled by the road network (COTO, 2012:3).
The quality of the road network can play an important role, not only in the mobility of people and goods nationally, but also in the promotion of local trade and regional trade (OECD, 2002). COTO (2012:7) recognises that ‘the country’s road network can be an important factor in enhancing economic and social activities’. The road network can be considered as the heartbeat of development and could also perform the basic function of providing access and mobility for the country (COTO, 2012:1; UKDfT, 2012:4-6). Further, the road network can connect origins and destinations for all potential users and makes it possible for people and goods to go efficiently and safely from one place to another (COTO, 2012, 10).

A road network that provides access to transport is the heartbeat of the economy and a catalyst of economic development when supporting the demands of all sectors identified by government (DoT, 2006:38). Pinard and Greening (2004) indicate that road transport is the primary mode of transport for both freight and passengers, contributing to the economic growth of the country. Road transport accounts for over 90% of transportation of freight and passengers and is supporting regional economic and social development programmes (Kolluru and Ponnamb, 2009:1; SAinfo report, 20 November 2012). SABITA (2014:2) showed that the bulk of South Africa’s inland freight during 2013 was carried on the road network (87.9% in terms of tonnes; 69.5% in terms of tonne-km).

The road transport services are productive financial instruments that are key for national economic growth (DoT, 2006:38). The pricing of road transport services may be in the form of fees and financial incentives incurred by travellers, including (but not limited to) transit fares, cargo fees, fuel taxes, variable and flat rate tolls, parking fees, vehicle registration fees, and insurance payments (Kockelman et al., 2013:49). Accordingly, road transport supported by quality infrastructure can promote tourism which may generate inflow of money into public facilities coming from travellers visiting the country. Road transport can serve as an additional source for generating funds into the public purse coming from prices charged on tolled national and provincial roads. The pricing of road transport services can increase investment in assets like bridges, roads, ports or even telephone lines, which can
stimulate development by reducing transport and communication costs, thereby facilitating trade and creation of wealth.

Road transport can make the Southern African Development Community (SADC) countries and remote districts or locations accessible for new business development, thus serving as strategic links to these areas (DoT, 2006:40; Mutambara, 2008:1). In addition, Cooley (1894:91) argues that road transport can lead to the movement and transfer of goods to their storages while reducing transaction and trade costs. Mutambara (2008:1) argues that most of the SADC countries are landlocked, and so the road network is very important in linking the countries to principal ports in countries like South Africa, Mozambique, Angola and Namibia. Accordingly, road transport provides a vital transport link for the SADC countries’ diverse imports and exports and handles the bulk of these commodities. Moreover, road transport is the dominant mode of transport in the region, carrying over 80% of the region’s goods and services (Pinard and Greening, 2004:1).

3.3. The road infrastructure in developing countries

3.3.1. Introduction

Roads are archetypical of public economic infrastructure; telecommunications, power and railways are often privately financed (Collier, Kirchberger & Söderbom, 2013:2). The World Bank (2011:12) insisted that because of their high and diverse functionality and wide range of beneficiaries, roads have become an essential component of all national transport systems, usually consuming the greatest proportion of public and private investment resources in both infrastructure and services. However, poor road infrastructure is a key obstacle to development in developing countries because the practical scope for private financing of roads has proved to be extremely limited. Mbara, Nyarirangwe and Mukwashi (2010:151) highlight that road infrastructure shortcomings have manifested themselves in the form of high vehicle operating costs and rampant potholes, leading to a decline in road safety and a deterioration of service levels for those who use roads to deliver goods or connect to international markets.
The challenges facing developing countries’ road infrastructure in promoting development are a result of corruption and funding. Further, the benefits of investments in road infrastructure have not been fully realised due to lesser public–private partnership involvement, policy deficiencies and poor institutional arrangements in developing countries.

3.3.2. Corruption in road infrastructure

Collier, Kirchberger & Söderbom (2013:2) indicate that public work contracts, including roads, are subject to substantial levels of corruption. Kenny (2009:314) states that if 5% of investment and maintenance costs in infrastructure are lost to corruption, the financial burden alone may add up to about US$18 billion a year in developing countries. According to the World Bank quoted by Collier, Kirchberger & Söderbom (2013:6) ‘allegations of fraud, corruption or collusion were made in about one fourth of the 500 approved World Bank financed projects with a road component between 2000-2010.’ The estimates of costs of collusion and cartels in the road sector are large and range between 8% and 60% (World Bank, 2011). Considering that substantial resources are allocated to road construction and maintenance then US$56 billion between year 2000-2010 was spend, this represents a massive waste of funds. Further evidence from investigations discussed in World Bank report (2011) is striking: in Bangladesh, companies paid officials up to 15% of the contract value in exchange for award of the contract.

Corruption in the roads sector is a problem for both developed and developing countries, yet the economic and social loss is more profound for poor communities in developing countries. In an African country, fraudulent claims such as cement contents and thinner layers than specified accounted for 15-20% of the bid price; the use of substandard materials imposes costs exposed through higher maintenance costs and costs on vehicle drivers due to worse road conditions; this may eventually lead to even negative rates of return on a particular project (like, Mining or construction) (Kenny, 2009:315). The fraudulent claims against public funds have lessened investment in roads to support services
deliver, agricultural productivity and growth in marginalised communities and South Africa as a whole.

3.3.3. The institutional and policy gap

While increases in funding are clearly needed to help developing countries to close the infrastructure investment gap, such incremental funding is not, by itself, sufficient to sustain services and expand access. Fay and Yeppes (2003:4) say ‘more efficient and sustainable operation of existing road infrastructure and better allocation of capital for new investments are also required for spending to improve services.’ Obtaining greater productivity from present spending levels, coupled with policies and institutional arrangements that promote financial, economic and social sustainability are critical complements to scaled-up spending on road infrastructure.

Fay and Yeppes add that formulating, implementing and effectively coordinating policies that provide incentives to invest and operate efficiently and to extend services to the poor requires strong, capable institutions, particularly at the local level. Across the developing countries, decentralisation of service delivery responsibility has proceeded in tandem with growing political decentralisation. As a consequence, local authorities bear ultimate responsibility for planning, service delivery, oversight and financing of key infrastructure services such as solid waste disposal, energy, telecommunication and urban and rural transport.

3.3.4. The funding of road infrastructure

According to Gumbie & Kudenga quoted by Mbara, Nyarirangwe and Mukwashi (2010:153) ‘the average age of the regional trunk road network is over 40 years and many roads have out-lived their design life and are in need of rehabilitation. Mbara, Nyarirangwe and Mukwashi add that the overall quality of the developing countries road infrastructure continues to deteriorate over the years, as characterised by visible structural failures and associated fatalities along most of the trunk network. The gradual deterioration in road
quality has largely been attributed to insufficient funding for maintenance and rehabilitation. Mbara, Nyarirangwe and Mukwashi, (2010:153) have indicated that in 2009, the estimated funding requirement in Zimbabwe for road maintenance amounted to about US$225 million compared to a budget provision of US$13 million, which was less than 6% of the total required amount. The road rehabilitation requirements were estimated at about $1.3 billion, compared to a budget allocation of $8 million, a mere 0.6% of the total need. Figure 3.4.4.1 illustrates the extent of deterioration of the trunk road infrastructure.

**Fig: 3.3.4.1) Deterioration of the trunk road infrastructure**

![Image of deteriorated road]

Source: Gumbie & Kudenga (2009)

It is argued that funding of road infrastructure in developing countries has traditionally been the responsibility of the government. In fact, the capacity of most governments to adequately fund road infrastructure construction and maintenance is limited (Mbara, Nyarirangwe and Mukwashi, 2010:154). The challenge has been exacerbated by the fact that road infrastructure provisioning competes strongly for funding with other sector needs such as water, health, education, housing, etc. Therefore, a number of innovative fund-raising projects, as well as partnerships with, particularly, the private sector have continued to be researched and implemented.
Mbara, Nyarirangwe and Mukwashi highlight that the choice among different transport funding methods should be based on a number of parameters including equitability, efficiency, adequacy and ease of administration. This is fundamental, although it is rare to find any source of funding that fulfils all these criteria at the same time. Likewise, the main sources of road (construction and maintenance) funds that are common in many countries include fuel levy, motor vehicle licences and road tolling - among others. In other countries like South Africa, funds in the form of conditional and other grants are transferred from the National Treasury to the road agency. The Provincial Department of Transport also provides funding in the form of municipal infrastructure grants (DoT, 2009).

Despite various innovative efforts, private sector participation in transportation capital and operational investment remains limited. It is argued that while transitional countries are expected to spend at least 5% of GDP on road infrastructure, most developing countries are currently spending about 2% of GDP on road infrastructure (Kuang & Shladover, 2006; Queiroz, Rdzanowska, Garbarczyk & Audigeas quoted by Mbara, Nyarirangwe and Mukwashi, 2010:155). This situation indicates that road systems are generally under-funded. Given the limitations associated with the funding sources, most governments are pursuing the option of involving the private sector through different forms of public-private partnerships (PPPs).

3.3.5. The public-private partnership involvement

3.3.5.1. Introduction

According to the Partnerships British Columbia (2003:1) private-public partnership (PPP) is a legally-binding contract between government and business for the provision of assets and the delivery of services that allocates responsibilities and business risks among the various partners. These schemes are sometimes referred to as PPP. The private-public partnership (PPP) involves partnerships between the public sector and the private sector for the purposes of designing, planning, financing, constructing and/or operating projects which would be regarded traditionally as falling within the remit of the public sector.
Infrastructural projects such as roads and bridges are prime examples (Webb and Pulle, 2002:2). Furthermore, PPPs entail a sharing of responsibility between government and the private sector: For example, the private sector contributes design, construction, operation, maintenance, finance and risk management skills while the government is responsible for strategic planning and industry structure, obtaining permits, some customer interface issues, regulation, community service obligations and (sometimes) payment on behalf of the service users (United Nations Economic Commission for Europe, 2012:4; 2012 Webb and Pulle, 2002:2).

3.3.5.2. The role of public-private partnerships (PPPs) in road infrastructure

It is important to maintain macro stability and ensure that infrastructure investments are efficient and enhance productivity in developing countries. Public-private partnerships finance for infrastructure is fundamental for economic and social transformation at a fast pace, if budget balances and external debt accumulation are sustainable (China-DAC study group. 2010:10). Highways, telecommunications, power, railroads, hospitals, prisons and schools are common examples of utilities that are funded by the state needing maintenance. The problems of under investment and political interference in infrastructure cause low productivity, poor service delivery, long queues, lack of access to basic services, lack of transparency and low of operations of this infrastructure entity (UN-HABITAT, 2011:47).

Since investments in infrastructure attracted more political interferences and pressure from different constituents who want to receive their fair share, many investments come with strings attached in terms of budget allocation. This tends to significantly increase the general cost of public infrastructure investments, particularly if the intended purpose of the infrastructure is designed not to address the needs of the society at large. Tatari, Khorasani, Yadollahi & Rahimi (2013:3) state that ‘the private sector participation in infrastructure development, in particular the road sector, can be one of the initiatives to help the sector to transform the economy and society, hence most of the movement of goods and people is by road.’ The potential and the need for sharing private sector skills in public entities could
make a large contribution to resolving the developing countries state capacity problem. With greater transparency, this would also strengthen local ownership and accountability processes, a key to longer-term sustainability of any developing countries’ road development (China-DAC study group. 2010:11).

Mbara, Nyarirangwe and Mukwashi, (2010:155) indicate that the forces driving the different forms of partnerships may include the associated acceleration of infrastructure provision, faster implementation, reduced whole life cost, better risk allocation, better incentives to perform, improved quality of services, generation of additional revenues, and enhanced public management. UN-HABITAT (2011:48) asserts that the main distinction among the key PPP approaches is how responsibility is allocated for asset ownership, operations and maintenance, capital investments, and commercial risk. The partnerships include service contracts, management contracts, leases, BOT, concessions and divestiture (full-scale privatisation). Accordingly, Mbara, Nyarirangwe and Mukwashi add that these options exhibit different levels of public and private sector involvement and responsibilities. The greatest public and private sector involvement is found under service contracts and divestiture, respectively.

Tab: 3.3.5.2.1) Possibilities for Private Sector Participation in infrastructure

<table>
<thead>
<tr>
<th>Approach</th>
<th>Asset Ownership</th>
<th>Operation &amp; Maintenance</th>
<th>Capital Investment</th>
<th>Commercial Risk</th>
<th>Duration of contract</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Contract</td>
<td>Public</td>
<td>Public/ Private</td>
<td>Public</td>
<td>Public</td>
<td>1-2 years</td>
</tr>
<tr>
<td>Management Contract</td>
<td>Public</td>
<td>Private</td>
<td>Public</td>
<td>Public</td>
<td>3-5 years</td>
</tr>
<tr>
<td>Lease</td>
<td>Public</td>
<td>Private</td>
<td>Public</td>
<td>Shared</td>
<td>8-15 years</td>
</tr>
<tr>
<td>Concession</td>
<td>Public</td>
<td>Private</td>
<td>Private</td>
<td>Private</td>
<td>25-30 years</td>
</tr>
<tr>
<td>Build-Operate Transfer</td>
<td>Public and Private</td>
<td>Private</td>
<td>Private</td>
<td>Private</td>
<td>2-30 years</td>
</tr>
<tr>
<td>Divestiture</td>
<td>Private or public and private</td>
<td>Private</td>
<td>Private</td>
<td>Private</td>
<td>Indefinite or limited by license</td>
</tr>
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</tbody>
</table>

Source: Jerome adapted by UN-HABITAT (2011)

According to UN-HABITAT (2011:48) the on-going restructurings in infrastructure financing are being implemented to promote private investment, provide strong incentives for operating efficiency, restore the financial viability of virtually bankrupt state-owned network utilities, especially through the promotion of more rational pricing policies that would improve service quality and eliminate service backlogs, introduce greater transparency in the operations of these industries and also insulate the operating infrastructure entities from damaging political interference.

UN-HABITAT (2011:48) asserts that despite promising signs in the transition process, the track record of governments in establishing the conditions for attracting private investment in infrastructure has been inconsistent and uneven across most developing countries. In many developing countries, the cost of infrastructure services has not decreased, and increases in quality and access rates have not occurred as anticipated. Like many civil engineering sectors, the private sector is involved in transport project delivery, which can include design and construction, project management - such as maintenance and operations - and project financing, namely raising capital. However, existing transport infrastructure financing is facing challenges.

3.3.5.3. The challenges of public-private partnerships in road infrastructure

- Lack of funding: road infrastructure funding initiatives are generally not sufficient for maintaining and improving the performance of transport systems. This was a major driver behind privatisation and deregulation in the passenger and freight transport industries worldwide.
• Divergence of purpose: road infrastructure finance initiatives should be designed to promote productivity gains, such as increased accessibility, capacity and performance. Many investment projects are politically instead of commercially driven, which creates a divergence in the purpose of transportation.

• Uncertainty in outcome: road infrastructure finance initiatives differ in their probable impacts on transport system performance. This underlines the difficulty of assessing multiplying effects linked with specific road infrastructure investment projects.

• Time frame misalignment: There is often a misalignment between the time range of the road infrastructure project and the time range of the financing. This underlines the paradigm between the long term character of road infrastructure and the short term perspective prevailing in finance.

3.4. Overview of road Infrastructure development in South Africa

3.4.1. Introduction

Road infrastructure development is one of the central priorities for the South African government to address problems of inequality, poverty and unemployment (Presidential Infrastructure Coordination Commission (PICC), 2012:2). Road infrastructure consists of the fixed installations, including road networks, associated power and communications systems, networks and terminals (such as bus stations, taxi ranks and truck terminals), bicycle tracks and refuelling depots (like fuel stations). Roads receive the necessary attention to address the development issues of communities in all areas (PICC, 2012:3). The commitments are done by the government to ensure that road construction and maintenance programmes targeted at marginalised areas are delivered.

South Africa has a fairly well-established road network that allows good connectivity between the various regions of the country. The total road network is about 750 000km, the longest network of roads of any African country (DoT, 2012:50; DPME, 2012:47). Further, the entire road network comprises of streets and roads, including surfaced and un-surfaced
roads, as well as un-proclaimed roads, as illustrated in Figure 3.4.1.1 below. The South African national road networks offer an alternative to highway transport (such as air and rail transport), particularly for bulk commodities and other low unit-value products within the SADC region.

**Fig: 3.4.1.1) Map of South African Arterial Road System**

![Map of South African Arterial Road System](image)

Source: RRA (2012)

These roads are classified according to the functional purpose they serve in the country for social and economic development. Furthermore, the roads can be designed according to type - such as national, provincial and urban or rural depending on their geographical location.

3.4.2. The classification of South African road transport

The South African National Roads Agency Ltd (SANRAL) (2002) stated that classification is the tool by which a complex network of roads can be subdivided into groups having similar characteristics. There are various schemes for classifying roads and the class definitions will
generally vary depending on the purpose of the classification. Roads can be classified into different operational systems, functional classes, or geometric types. These classifications are vital for communication among authorities and the general public (Department of Performance Monitoring and Evaluation, 2012:47).

The primary purpose or function of a road and street network is to serve the needs of travellers for all modes of transport, including walking. The classified roads are intended to direct motorists towards the most suitable routes for reaching their destination, and do this by identifying roads that are best suited for traffic (United Kingdom Department for Transport, 2012:6). The basic functions of roads are the same irrespective of whether an area is rural or urban (Committee of transport officials, 2012:10; Smith & Visser, 2000:1). The principles also apply to rural areas, peri-urban, metropolitan and urban areas.

The Department of Transport in its RISFSA (DoT as quoted by COTO, 2012:1) highlights that ‘the classification and management of the road network is a fundamental component for the planning and development of road infrastructure in South Africa in order to optimise efficiency and effectiveness in the delivery of roads.’ DoT (2006:49) and COTO (2012:3) assert that the benefits of road classification can broaden the understanding of the value which the roads are contributing to government’s service delivery goals. Moreover, it is very critical to ensure that these roads are managed to perform their functions (COTO, 2012:2).

In fact, the basis of road classification is divided into different operational systems, functional classes and geometric types which are necessary for communication purposes for the general public (UKDfT, 2012:6; DoT, 2006:47; and Smith & Visser, 2000:3). Different classification schemes can apply different purposes in different areas (Smith & Visser, 2000:3). The classification of roads is based on the six functional classes of the Road Infrastructure Strategic Framework for South Africa (RISFSA) (DOT, 2006:50-52). This system is the most well-established, clearest, best understood, most widely used and the most logical system available in many countries (COTO, 2012:17). According to DoT (2006:50-52) the six functional classes are : (a) primary distributor (b) regional distributor (c) district distributor (d) district collector (e) Access road (f) non-motorised access ways.
DoT (2006:48) emphasises that the functions of classified roads are developed according to
the types, nature and purpose they could serve in the entire road system and the
contribution which the roads could make in the country.

3.4.3. Types of roads in South Africa

3.4.3.1. Introduction

The design of a road is that of a three-dimensional structure which should ideally be safe,
efficient, functional and economical for traffic operations, and which should also be
aesthetically pleasing in its finished form.

3.4.3.2. The national and provincial roads

In 1998, the government established the South African National Roads Agency Limited
(SANRAL) to manage the national road asset (DoT, 2006:13). SANRAL was established in
(SANRAL Act, 1988). Its establishment was aimed at managing and controlling South Africa’s
national roads system and at taking charge of the development, funding, maintenance and
rehabilitation of national roads within the framework of government policy (Martins, 2013).
The existing Act further provides for the establishment and operation of toll roads, including
provision for electronic toll plazas (SANRAL, 2014).

SANRAL (2014:19-25) highlights that over the last sixteen years the South African national
road network under SANRAL’s jurisdiction have grown from 7 200km to 19 704km, including
both toll and non-toll roads throughout South Africa. The road network is expected to grow
to 35 000km (SANRAL, 2013:24). The road network connects major cities, towns and rural
areas, supporting economic growth and social development and contributing to job creation
in the country. The road network currently stands at about 3 120km (16%) of the tolled
national road of which most are maintained by SANRAL. SANRAL manages 1 832km of these
toll roads and concessionaires are responsible for managing and funding the remaining 1 288km (SANRAL, 2014:25).

Non-toll roads which SANRAL is responsible for are about 16 584km (84%) of the national road network that are predominantly in the rural areas (SANRAL, 2014:19 & 33). In addition, there are about 185 000km of provincial roads, and the municipal network totals around 66 000km (SANRAL, 2014:33). Despite its importance to the national economy, the road network in South Africa is grossly inadequate in various respects. The majority of South Africa’s national road network is older than 25 years, which exceeds the design life of the roads, although well maintained (SA Institute of Civil Engineering, 2011; Wittmann, 2010).

The country’s national roads connect the neighbouring countries and provinces, while its provincial/local roads connect urban areas, peri-urban areas, townships and rural villages. The provincial and local/municipal roads are important in linking South Africa and the SADC region. They are part of the SADC Regional Trunk Road Network and the Trans-Africa Highway from Cape Town to Cairo (Highway No. 1) which links South Africa to other Southern and Central African countries (SAinfo report, 20 November 2012). Likewise, the 2 000km drive from Musina on South Africa's northern border to Cape Town is an example of a national road connecting provinces (Daynes and Abagun, n.d).

National and provincial roads are serving as a catalyst road network to link continental, regional, national, provincial and municipal trading businesses and communities (Walters, 2008). Furthermore, the national roads could be highly significant for the defence and security of the country. For example, roads could be essential for the movement of troops, tanks, armoured cars, and field guns etc. Great importance can be given to the construction of border roads to facilitate the movement of troops for the protection of the all borders against foreign invasion, for example.

The condition of South Africa’s roads has deteriorated due to over-utilisation and under-investment; however, there does appear to be a stabilisation of the condition of the primary systems as a result of higher investment over the past few years. It is, however, difficult to
provide a reliable assessment, as there is limited capacity to assess the condition of South Africa’s road network (DPME, 2012:49).

Since the democratic election of 1994, the eradication of poverty and redressing of inequalities in South African society was a central theme of the government (Kane, 2006). The provision of road services to the marginalised communities has been put in place as part of the government’s plans to eradicate poverty in all areas (DoT, 2003). Lucas (2011) adds that in rural areas, poverty has been aggravated by the fact that the rural sector is poorly served with roads and infrastructure facilities, which affects mobility, farming activities and marketing of local products.

3.4.3.3. Urban and rural roads in South Africa

3.4.3.3.1. Introduction

The South African population comprises of urban (32 559 331), tribal/traditional/rural areas (16 478 624) and farm areas (2 732 605) (Space Time Research, 2014). Compared to their urban counterparts, tribal/traditional/rural and farm people have inferior access to roads that can complement their basic social services that could lead them to participate in the economic mainstream.

3.4.3.3.2. Urban roads in South Africa

Nevhutanda (2007) indicates that for the past twenty years the proportion of people living in urban areas has been increasing rapidly in South Africa. This increase is marked by a concentration of the population in large cities. Even though, South Africa does not have many big city centres; those available are six metropolitan municipalities which are growing at a fast rate. The population movement in South Africa is seen as the main source of over-population problems in the cities, which is likely to compound the traffic congestions problem as well. The influx of migrants into South African cities, compounded by relaxed
legislations as part of a response to the ending of restrictive apartheid legislation has been regarded as the growth factor to the level of urbanisation (Gelderblom, 2003).

Today, 32 million of the South African population lives in towns and cities, which is an average level of urbanisation for a Third World country (Time space research, 2014). In fact, this rapid population growth increases the use of motorisation in the cities and townships because of higher volume of private car ownership and increased number of human settlements. Further, rapid urbanisation places huge demands on infrastructure like land use, water, electricity, housing, transport and employment (DoT, 2006). As a result, the influx has compounded social exclusion, inequality and poverty in most marginalised peri-urban communities.

Motorisation is haunting South Africa cities, which is adding a twist to the yet unresolved urban transport dilemma (Mitric, 2008). The problems arise when an increase in transport demands have not been matched by appropriate responses in the supply of infrastructure and services. According to Nevhutanda (2007:1) ‘the demand for transport is a derived demand. That is to say, it depends on where people live and work, and on the location of production, services and leisure activities. Any change in the structure of the society will change the demand for transport.’ Matric has argued that if this mismatch continues, high transport costs become a drag on city productivity and competitiveness, which could be a barrier to poverty alleviation, social cohesion and social inclusion.

The rise of motorisation and the spatial restructuring of cities add to the burden on the road infrastructure (Mitric, 2008). In fact, motorisation in urban areas continues to increase as a result of population influx. For that reason, the problem remains how to contain private cars ownership, high volume of taxis ownership and commuter buses in the cities while ensuring and maintaining good road infrastructure. Nevhutanda (2007:1) asserted that ‘because of the increase in motorised transport in South African cities, people walk and cycle less. This has resulted in reduced access to transport for the urban poor and other vulnerable groups.’ The cities face difficulties in meeting this increased demand, resulting in a decrease in the quality of public transport services provided.
Mitchell (2014) states that ‘the meaning of urban transport infrastructure is broadened to include vehicles used (taxis, buses and freight), as well as urban freeways which, although part of the national primary road network, play a major role in traffic distribution in urban areas.’ Mitchell adds that urban transport in South Africa is characterised by lost opportunities, mainly because of political indecisiveness, or lack of acceptance of proposals from the professionals and funding shortages.

The importance of urban transport infrastructure is emphasised by the fact that by far the greatest percentage of the South African population lives in cities. Unfortunately, the urban transport infrastructure milieu in South Africa is a story of lost opportunities caused by a failure to address the traffic problems in urban areas (Mitchell, 2014). One of the essential requirements of efficient urban transport is the balancing of journeys, primarily commuter journeys. Ideally, when the peak flow occurs the optimum mode of transport should be in place to handle peak demand volumes. However, the absence of appropriate institutional arrangements and coordination of modes, as well as grossly inadequate levels of funding, has seen urban transport in an uncertain state to address commuters’ demands.

Nevhutanda (2007:3) indicates that all these issues can be addressed positively if each city’s transport planning agenda is strongly committed to a public transport system taking an inclusive approach. Nevhutanda argues that South African cities need expanded investments in mass transit, roads and other transport-related infrastructure and services to address the issue of urban sprawling which causes traffic volumes in cities.

3.4.3.3.3. Rural roads in South Africa

It is against this backdrop that the government has intensified the implementation of the Rural Transport Development Programme (RTDP) to promote rural transport infrastructure and services (DRDLR, 2010). Mashir, Nhemachena and Chakwizira (2010) argue that the plan was to ensure rural road infrastructure and services become a key component of rural development and poverty reduction. The aim of the programme was to ensure that road
transport services support rural agriculture and serve as the base for distribution of food and fibre and provides access to domestic markets and customers (Olayiwola and Adeleye, 2005).

Efficient and effective rural roads can serve as one of the channels for the collection and exchange of goods and services, movement of people, dissemination of information and the promotion of the rural economy (COTO, 2012:23). Furthermore, accessible rural roads can provide access to individual properties, farms, settlements, mines, tourist areas, game and nature parks and heritage sites. In general, rural roads can connect to provincial roads leading to cities, towns, villages, rural settlements, border posts, mining areas, seaports, airports, large game and nature parks and other mobility roads which form the foundation for any economic development (COTO, 2012:23).

3.4.4. The challenges of road infrastructure development in South Africa

3.4.4.1. Introduction

There is concern about the ageing state of road transport infrastructure in South Africa. South African Institute of Civil Engineering (SAICE, 2011) indicates that more than 80% of the national road network has exceeded its structural design lifespan of 20 years and need to be upgraded. In fact, Metropolitan and urban roads are considered to be in a fairly satisfactory condition as compared to rural and peri-urban roads that are in a very poor condition (Litman, 2010). Further, provincial roads are deteriorating, with more than half of these roads having exceeded their design life. According to Alfreds, 40% of provincial roads are in a poor to very poor condition (News24 report, 2013 April 04). The condition of the provincial and municipal roads in South Africa is terrible, with potholes, broken bridges and slopes (Creamer Media’s Research channel, 2012).

3.4.4.2. Poor road conditions
Despite the potential that rural communities possess to contribute to economic development, the majority do not have access to good road infrastructure due to poor implementation of the existing policy on rural roads, lack of financial and human resources and poor governance (African Monitor, 2012). Moreover, poor roads and lack of connectivity of rural areas can constrain agricultural production and movement of incoming or outgoing goods (African Monitor, 2012). As a result, crops produced can take longer hours or days to be taken to the market (AFDB, 2010).

The absence of road infrastructure facilities and services can discourage investors and new companies from locating in rural areas. Further, some business owners may refuse to locate their businesses in the areas with poor roadways (Sengupta, Rout and Coondoo, 2007). The lack of good road infrastructure in many rural areas in South Africa may aggravate poverty and perpetuate exclusion. Critically, marginalised rural communities’ farming activities and marketing of agricultural products could be poorly served by road transport services (IRF, 2011). In fact, the poor communities could remain more impoverished and disadvantaged as a result of poor road transport services to connect to the mainstream economy (Porter 2013).

This has been shown by the DPME (2012:49) in Figure: 3.4.4.2.1; KwaZulu-Natal province performed the worst, with over 40% of roads in poor to very poor condition, followed by Mpumalanga (35%) and North West (30%). The best performing provinces are the Free State and Limpopo, with less than 10% of their roads in poor or very poor condition. Less than 10% of national roads are in a poor to very poor condition.

**Fig: 3.4.4.2.1) Road condition in South Africa – Paved provincial and SANRAL**
It is a cause for concern that in a context of substantial growth in allocations to provincial transport authorities, deterioration of the road networks is ongoing (DPME, 2012:50). South Africa is currently being hampered by three key elements of development: a lack of skilled work force, lack of funding for roads and lack of appropriate road infrastructure, specifically in rural areas (Bruggemans, 2005). This outcome of the road infrastructure shortage in South Africa is excluding the marginalised communities from connecting to the national roads. The South African Institute for Civil Engineers (SAICE) highlights that there is still a failure to invest in the maintenance and renewal of road infrastructure in marginalised communities (2006).

SANRAL (2013) adds that South Africa is also challenged to maintain, improve and expand national, provincial and local road networks because it is becoming more acute as construction costs soar and demands on the country’s tax base increase. Wittman (2010) adds that the majority of South Africa’s national road network is older than 25 years, which exceeds the design life of the roads. Some of these conditions are caused by the overloading of freight transport travelling to neighbouring countries, or local industries like manufacturing, mines and warehouses.
3.4.4.3. Transport costs

The road infrastructure contributions may not be experienced in full by all areas in the country if costs of fuel, travelling, delivery and many more are not monitored very well. The Department of Transport (2012) shows road transport is the largest end user of energy in the country, accounting for 87% of the total transport energy. The higher volume of fuel energy used in the road sector may impact on the cost of generating and distributing the fuel to different markets and locations in the country. Actually, high fuel costs can reduce attractiveness of marginalised communities like Mohlake because travelling on this mountainous route could increase vehicle maintenance costs and consume more fuel as compared to the urban townships of Soweto, Mamelodi, Tembisa and others. Furthermore, for the users or passengers, the high fuel prices may affect the cost of using or hiring transport to deliver goods, raw materials and passengers (DoT, 2005).

In fact, the cost of using road transport in marginalised communities can also consume household hard earn income and this can forced the communities to be reluctant to travel (COMCEC, 2013). These constraints are typically experienced by poor and pro-poor local communities under which their roadways are underdeveloped and undeveloped (African Monitor, 2012:8. In general, the communities will perceive travelling as too expensive or may decide to walk longer distances to locations where they can access public facilities (Kockelman et al., 2013:32-34). Further to this, it will take an unreasonable amount of time and energy for these communities to deliver goods to end users (Lucas, 2012). In addition, the South Africa Institute of Civil Engineering (2011) emphasises that South Africa’s road network is less than satisfactory, giving rise to increased road accidents per year.

3.4.4.4. Road safety

Road safety is a growing concern in the country. Chikunga (2013) states that the South African transport sector is facing a tough challenge to reduce road traffic fatalities as part of its commitment to the UN Decade of Action for Road Safety. South Africans against Drunk Driving (SADD) (2015) stated that South Africa has some of the worst road traffic injury
statistics in the world. Each year, thousands of people are killed or injured on our roads. These deaths touch hundreds of people and affect many lives, and also impact on the South African economy (Justice Project South Africa, 2015).

SADD (2015) indicates that on the 25th of March 2015, road crashes estimates were 229,037; with 3,761 fatalities, 34,277 injuries and 2,090 paralysed. These mysterious crashes are estimated to cost the nation a total of R70,038,010,793; see the road carnage counter below. Arrive Alive (2013) asserts that 65% of all fatal crashes are attributed to the abuse of alcohol by both drivers and pedestrians. Further, 90% of all crashes are preceded by one or more traffic violations (Arrive Alive, 2013).

**Fig: 3.4.4.4.1) South African Road Crush Carnage Counter**

![South African Road Crush Carnage Counter](image)

Source: Justice Project South Africa (2015)

Venter et al., (2013) assert that safety issues mainly revolve around poorly maintained vehicles are unsafe. Arrive Alive (2013) adds that most crashes are, therefore, caused by human error; meaning it is an attitude and behavioural problem. Venter et al., (2013) also confirm the Arrive Alive claim that safety on board taxis and buses has been jeopardised by reckless and unsafe driver behaviour. Furthermore, drivers’ lack of knowledge of road
safety, general attitude of the road users and the poor quality and inadequacy of the roads are the most important contributors to accidents.

Some of these issues have been visibly worse in poor rural areas and peri-urban areas, where existing roads have been predominantly narrow, unpaved and in bad condition due to lack of regular maintenance (John, 2015). Many of these roads are very slippery during the wet season and thus dangerous for driving, especially those without side protection and constructed on terrain with steep hills and deep valleys (DoT, 2005). In addition, some bridges are in a state of disrepair and dangerous to use.

The result of poor road provision is also increased traffic volumes on all routes and at traffic intersections. In cities, power failure at traffic lights may add a further burden to the roads as they struggle to cope with the large volumes of vehicles. Furthermore, urban growth and sprawl adds to the challenges of road congestion, hence people with high levels of affordability choose private vehicle ownership, rather than relying on public transport (DoT, 2006:43).

3.4.4.5. Road congestion

The existing national road networks are inadequate; they experience unprecedented high traffic density and are unable to handle high traffic volumes (Wittmann, 2010). The increasing motorisation on all roads can haunt South Africa and add yet another challenge to the unresolved high traffic congestion dilemma (Mitric, 2008). Ownership and use of motor vehicles can rise with the increase in urban populations; the problem is compounded when an increase in motorisation is not matched by roads development. Mitric (2008) asserts that if this mismatch continues, high costs can slow down the country’s productivity and competitiveness.

More than 600 000 private passenger vehicles registered in the metropolitan area (Electronic National Administration Traffic Information System, 2013). As a result, peak-hour traffic congestion can become more pronounced on some roads, as well as accident rates
Typically, car ownership in South Africa can reach levels as high as 165 vehicles per 1,000 people (Mitric, 2008). Accordingly, Tom Tom (2014) has suggested that an estimated eight million vehicles travel on the roads daily and this figure can grow by a staggering 20% every year. Congestion affects millions of people every day, and can have serious effects on drivers’ health and on businesses, society and the environment.

According to Tom Tom (2014) South Africa has an overall congestion level of 21%. Table 3.4.4.5.1 shows that Cape Town overtook Johannesburg; it topped the list in the 2013 report (Tom Tom, 2014).

**Tab: 3.4.4.5.1) Traffic congestion in South African cities**

<table>
<thead>
<tr>
<th>City</th>
<th>Congestion</th>
<th>Global ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cape Town</td>
<td>27%</td>
<td>33</td>
</tr>
<tr>
<td>Johannesburg</td>
<td>25%</td>
<td>48</td>
</tr>
<tr>
<td>East London</td>
<td>22%</td>
<td>65</td>
</tr>
<tr>
<td>Pretoria</td>
<td>22%</td>
<td>73</td>
</tr>
<tr>
<td>Durban</td>
<td>18%</td>
<td>98</td>
</tr>
<tr>
<td>Bloemfontein</td>
<td>12%</td>
<td>134</td>
</tr>
</tbody>
</table>

Source: Tom Tom (2014)

In the absence of a reasonable increase in road space, congestion could compromise the ability of the country to remain competitive (Kumar, Zimmerman and Agarwal, 2012). The congestion also can affect the performance level and nature of the road infrastructure to accommodate a large volume of vehicles on routes in and around all provincial and major national routes during peak periods (Department of Performance, Monitoring and Evaluation, 2012). The reduced performance level of the infrastructure may also decrease the effectiveness and efficiency of road transport to move goods and people from one place to another (Walters, 2012).
CHAPTER 4: CASE STUDY OF MOHLAKE RURAL COMMUNITY

4.1. Introduction

Mohlake rural community is situated in the Leolo mountain range under Sekhukhune District Municipality in Limpopo Province. The community is approximately 40km North-North-West of the town of Steelpoort and 250km North-East of Johannesburg. Officially, Mohlake uses Schoonoord as its administrative capital to access certification of documents, applications for Identity (ID) books and resolution of legitimate disputes faced by community members (Oomen, 1999:5). The community is still traditional, everybody still believes in the Kgoši (Chief), people make clay pots, make calabashes and keep domestic animals such as cattle, goats, sheep, donkeys, dogs, cats, pigs and chickens (Oomen, 1999:2).

The choice to conduct research about the Mohlake rural community is because its road infrastructure challenges resulted from poor roads infrastructure development. The community has limited access at road transport services and has no road infrastructure (Servaas, 2000:19). However, bakkies and tractors perform transportation purposes for the community (Oomen, 1999:2). The rationale behind carrying out the research in Mohlake is to highlight the community’s road infrastructure challenges pre and post the 1994 democratic elections.

In this chapter, the reference from 1999 source was used because there was no other research done after this date. It is also acknowledge that the reference may be outdated however, the data used in it is still relevant to the research as there were no bigger changes made in the community under studied.

4.2. Pre 1994 democratic elections in South Africa

Historically, Mohlake rural community is served by small footpaths as the main route networks across the mountains that connect it with its neighbours. The footpaths are
narrow, are among the rocks and trees that make walking difficult. The only road for motorised vehicles leading to Mohlake before 2006 passes Hoepakranz coming from Schoonoord (Oomen, 1999:3). The road was in such bad condition that transport owners were discouraged to visit the community. Similarly, the bad condition of the road was forcing residents to use donkeys (animals’ transportation) to perform transportation duties for them (see fig: 4.2.1. below). In most cases when someone got sick or died, people were forced to walk down with the patient or deceased, using a traditional wooden stretcher (see fig: 4.2.2. below), to meet an ambulance or hearse at the main roads available in the neighbouring communities.

Fig: 4.2.1) Animals’ transportation

Sourced: Google Images (2015) or

The effects of poor road development in Mohlake forced community members to rely mostly on non-motorised transport to perform the duties of collecting and delivering goods. A Draft National Non-Motorised Transport Policy identifies the Non-Motorised Transport (NMT) as ‘all means of transport that are human powered. Non-motorised transport includes walking, animal-power, bicycling, and variants such as small-wheeled transport (like skates, skateboards, wheelbarrows and hand carts) and wheelchair travel (DoT, 2008:9).’ Non-Motorised Transports (NMTs) such as animal carts and human power were and still presently are the means of transport for goods applicable to Mohlake rural community for
many years (DoT, 2008:9). NMTs like wheelbarrows and bicycles were infrequently used in the community because of the landscape which is not friendly.

According to Servaas (2000:15) NMT in Mohlake rural community played and still is playing a dominant role as an affordable and main mode of transport; it is, however, sometimes unpleasant and dangerous. Animal-powered transport in Mohlake is considered as the most beneficial one, particularly for social and economic purposes (DoT, 2008:9). Animal power transport in this community provides important local feeder transport between farms, families and roads - complementing motorised road transport that could not reach the community (DoT, 2008:9).

The NMT (like donkey trailer) is primarily used for collecting and delivering goods, and for longer communal and non-workable distances (Institute for Transportation and Development policy 2004:10). The donkey trailer transport is mainly used for collecting and delivering maize and sorghum from the fields after reaping, and also used to collect and deliver maize meal, sugar, rice and flour from shops. In the community households with animal transport (carts or pack animals) have wider contacts with traders and other households.

People in the community also perform transport duties of fetching water from the rivers to prepare food, for washing and bathing and further, they collect firewood from the mountains for cooking. People walk long distances to bring the sick, injured and deceased to emergency facilities (Institute for Transportation and Development policy 2004:8). The duties of carrying the sick, people with disabilities and deceased were performed using a traditional wooden stretcher. For people with disabilities to use wheelchairs in the community was very challenging because the conditions (DoT, 2008:11).

In general, poor road conditions have caused lower visiting rates by Mohlake residents to health facilities like clinics, hospitals and surgeries and shopping centres. The nearest hospitals hardly visited by residents are Gowef Mandagshoek Hospital (approximately 40km-50km) in East, and Jane Furse Hospital and St Ritas hospitals (roughly 25km-35km west of
the community). Oomen (1999:17) indicates that ‘the only nearest local clinic accessible was in the neighbouring village of Semonoko, built by the Baditaba Development Forum’. When they started building the clinic, the government promised to supply staff members and equipment. However, the clinic has collapsed while still empty and unoccupied. Other clinics found are in Schoonoord and Manganeng, almost 10km-20km to the west of the community.

The issue of unavailable road transport due to poor road conditions has caused Mohlake school learners to walk longer distances, of about (2km-5km), to the nearest schools. In the community, Honoko is the only local primary school available for Grades R-7 class. There are three other primary and secondary schools which can be accessed by the children. The secondary schools are Phutimogolodi (2km) walk to the north of the community, Lobamba High and Mabhedla Primary (3.5km) walk to the east; lastly there is Moleshatlou High, Pitsi Primary and Modiketse Primary roughly (5km) walk to the west.

For the residents to go for shopping can take them (5km) walking to Ga-Maila Mapitsane or (8 km) to Swale in Mandagshoek to catch a public transport. The only nearest shopping centres available for this community are Moratiwa Mall in Monsterlus (62km), Jane Furse Plaza and Crossing (25km), both in Jane Furse, and Burgersfort (56km) and Steelpoort (37km) both in the Greater Tubatse Municipality. Poor road conditions have made trading very difficult for residents and visitors (sellers and the buyers).

The poor road conditions have led some residents to relocate to neighbouring communities like Ga-Maila Mapitsane, Manganeng, Dihlabaneng, Jane Furse, Mamone, Glen Cowie and many more. Relocation has caused brain drain in the community, hence people with knowledge and skills left for communities where road transport services were better.

**4.3. Post 1994 democratic elections in South Africa**

After the 1994 democratic elections, the government rehabilitated the old road leading to Schoonoord using a level grader. The rehabilitation process has increased the volume of
traders visiting the community. Further, some of the community members developed their own businesses. Moreover, farming increased as a result of tractor owners being attracted to the community.

A new additional road was also developed in 2006 leading from Ga-Mokadi in Ga-Maila Mapitsane to Mohlake, Mohlakaneng, Ga-Komane and Pitjaneng. The commitment from the government to add a new road leading to this community had slightly improved the residents’ lives. In particular, these improvements are largely experienced by old-age pensioners previously getting paid out their pensions at Ga-Maila Mapitsane, Ga-Magolego, Mashite, Manganeng and Schoonoord. The old-age pensioners are now getting their pensions in the village, instead of them hobbling down on tough mountain terrain to get their money in the neighbouring communities.

These investments of new rural road construction and maintenance have had a positive impact on the socio-economic development of Mohlake rural community (World Bank, 2008 and Mashiri et al., 2008). The development of new roads has also reduced the use of donkeys to collect goods such as flour, sugar, maize meal and rice from shops. Likewise, the use of human power to perform transportation duties has also decreased as compared to the pre-1994 era. Furthermore, the investment in new roads construction and existing roads rehabilitation has increased the growth in the number of rural agri-businesses, trade and expansion of already existing businesses in the community (Banister and Berechman, 2003).

At present Mohlake rural community is slowly developing, like other neighbouring rural communities such as Jane Furse, Ga-Maila Mapitsane. The development is seen in the reconstruction of Honoko Primary School which is underway and is performed by Bituquip Construction CC at a value of R22 million. It is expected to take nine (9) months to complete. Major capital intensive developments are taking place in Mohlake rural community. However, the residents complain that the maintenance of their roads is still very slow; and other social services like the building of a community clinic and office were not addressed.
Poor road conditions are a result of the lack of implementation of the existing national road policy, and unequal distribution of public funds to meet all the community’s development needs. The lack of policy implementation has run against the Rural Transport Strategy for South Africa (RTSSA) 2003, which set out two main strategic thrusts for rural development (DoT, 2003:18-19). The national rural transport strategies abovementioned are:

- To promote coordinated rural nodal and linkage development.
- To develop demand-responsive, balanced and sustainable rural transport systems.

It is imperative for the central, provincial and local government to foster community development by boosting rural road connectivity and programmes that are essential for communities’ development. Further, the involvement of the private sector and community organisations in rural road planning could be an empowering strategy in using diverse information and local knowledge and skills. National Telecommunications and Information Administration (NTIA) (2015:8) highlighted that the private sector and community organisations can initiate a planning process that encompasses a comprehensive effort from all community stakeholders.

Further, NTIA added that the private sector and community organisations can seek input from businesses, residents, government leaders, public safety officials, community institutions (like, traditional leaders) and non-profits. As a result, a comprehensive community approach may help identify all unserved and underserved areas and leverage all existing resources. Moreover, the initiative of partnering with the private sector by all spheres of government can ensure that marginalised communities in the whole country achieve equitable development.
CHAPTER 5: THE RESEARCH FINDINGS AND ANALYSIS

5.1. Introduction

This chapter starts by presenting the findings obtained from the literature reviewed in Chapter 3. It gives the overall findings on road infrastructure development in marginalised communities in South Africa. The case study of Mohlake rural community (in chapter 4) is used to examine some of the challenges faced by marginalised communities in South Africa regarding roads and road infrastructure.

5.2. The findings from the literature review

5.2.1. Introduction

The reviewed literature in Chapter 3 indicates that road infrastructure development has an impact on the economic and social development of any country. It is in the literature that a community which has less or no access to good infrastructure remains isolated and excluded from economic opportunities and other social activities. In addition, a community which is poorly served in terms of roads which can connect it or lead to national and provincial roads may be inaccessible and unable to reach public facilities provided by both the public and private sector.

5.2.2. Economic impacts of road development

The reviewed literature shows that roads have a big impact on the economic development of the country. Road infrastructure can be considered as a certain type of capital available to a region or a country (Van Rijn, 2004:10). In addition, investments in road infrastructure can also support market expansion, leading to economies of scale opportunities. For instance, foreign direct investment (FDI) can be attracted to South Africa because of the high-quality road infrastructure that facilitates efficient logistics.
It is clearly stated in the literature that road transport is a servant of trade, a servant of exports and imports, a servant of regional integration and the driver of tourism and human exchange in all spheres of human existence (Chikunga, 2013). Within the country, roads connect remote areas with centres of trade, and connect centres of industry to global markets, spurring the growth of trade (Yong Kim, 2014). Roads provide the necessary means for trade to occur, and those towns and communities that aggressively built roads were more likely to flourish (Munroe, Schmidt and Westwind, 2006:3).

The literature indicates that road infrastructure does not do anything itself. It only facilitates transport. The emphasis in the literature is more on road investments that can have an annual economic impact due to increased travel through a region, or because the highway enhances the access and competitive position of the country or region. Moreover, roads can improve connectivity for South Africa-based businesses to have a greater access to foreign markets, encouraging exports, and increasing competition and choice in the home market from foreign-based producers (Oxford Economics, 2011).

The literature shows that roads constitute an economically vital form of transport infrastructure that has the potential to contribute to the productivity and economic growth of the economy (Thompson, Rosenbaum and Hall, 2008:1). The impact may be direct and indirect. The direct effect arises because changes in road transport alter the level of output by making private labour and capital inputs more or less productive. The indirect effect arises because an increase in road transport will affect the marginal products of labour and private capital, which in turn influence the chosen quantities of private inputs. Accordingly, if road infrastructure has any effect on private production, this effect is most likely to be found in the manufacturing sector, more than in others.

The emphasis from the literature is that roads are important for transporting intermediate and finished goods as well as to employees for commuting to work. In addition, it is indicated that roads increase the quantity of transportation services available to firms, thus leading to lower transportation costs. Further, roads can impact on firms’ operations, ensuring that produced consumer products are delivered to markets on time. Accordingly,
the production theory indicated that road infrastructure is a public input for the manufacturing sector and for trade, contributing to the economy. In fact, road transport is an integral part of the process through which production inputs are converted into goods and services that are necessary to satisfy human needs (HSRC, 2008).

Roads exhibit a characteristic sometimes referred to as ‘public goods’; when they enhance productivity and directly enter the production function of a firm as a factor of production (Stephan, 1997:6). Public goods have the characteristic of being ‘non-rival’ in consumption; that is, if one person consumes the product, others still can do so. In addition, multiple users can use the same portion of road at different times without cost to others. As long as no congestion occurs, the addition of another vehicle does not impose costs on those otherwise using the road (Munroe, Schmidt and Westwind, 2006:3). As a result, roads can be factors that mitigate congestion problems and save time and energy. Moreover, a road network that offers benefits in excess of costs may generate a positive net economic impact, and vice versa.

Another finding of the study is that the impact of road infrastructure to the economy may be the income arising from tolled national or provincial roads. Further, it is argued from the literature that tolls can provide a mechanism for financing construction and maintenance for new roads. In states and regions which are facing budget problems and limited debt capacity, toll roads can offer access to outside financing for road maintenance and rehabilitations (Munroe, Schmidt and Westwind, 2006:3). Moreover, applied technological innovations can increasingly make possible for effective use of time-of-day pricing on toll roads to control and mitigate problems of congestion.

The literature findings also show that improved roads facilitate better traffic flows as drivers are able to avoid lower speeds, avoid congestion as well as indirect routes. Equally, investment in road infrastructure could improve and mitigate the number of road accidents expected on routes. The improvements resulting from road investment can lessen congestion on the roadways to ensure that people’s travelling schedules are not affected.
The improvements can affect travel time, and also affect vehicle operating costs. Generally speaking, travel at a consistent speed uses less fuel and depreciates a vehicle less quickly.

5.2.3. Social impacts of road development

The findings from the literature indicate that most of the roads in South Africa were built with public funds and are free to users, and are viewed as socially beneficial. Munroe, Schmidt and Westwind (2006:1) assert that roads provide linkage between communities and access for citizens to vital services. Further, roads provide people with access to basic services such as health, shopping centres and education. The social impact of roads across various segments of society can be viewed as secondary or even tertiary concerns relative to economic and environmental impacts (Markovich and Lucas, 2011; Wanjiku 2014:2). While social impact assessment tends to focus on the avoidance of adverse social impacts, and also provides a scene for planning how to maximise the beneficial impacts of a proposed development. Wanjiku (2014:2) beneficial impacts can include: a better standard of living due to increased access to employment, business opportunities, training and education, greater access to and from a community and increased funding to improve programs.

It is stressed from the literature that roads may be used to limit exclusion. In addition, roads provide networks that can benefit the marginalised communities by facilitating public transport services (Dimitrov, 2010). Similarly, public transport mobility could be a facilitator in increasing accessibility to poor rural and or peri-urban areas. Walters (2008) argues that good road infrastructure may be a significant catalyst for development and poverty alleviation in the marginalised communities of South Africa; hence, its improvement could give access to marginalised communities to better social services. More importantly, the contribution of roads can be seen when they cater for the mobility demands of all people regardless of their geographical location.

The literature further shows that the road sector also generates or supports employment in the various road transport industries that provide support to the movement of goods, services and people (TETA, 2011). Through the increased accessibility offered by improved
road networks individuals gain access to a wider range of employment opportunities, while firms gain greater access to new and existing markets (DoT, 2012). Further, the direct expenditure on road infrastructure and operations can generate employment and income for individuals involved in the construction and operation of transport facilities and supplier industries (Weisbrod & Reno, 2009). Road constructions can contribute significantly to the growth of the Gross National Product (GNP) of the country.

For example in 2010, road transport made a total contribution of approximately R103.6 billion to the national economy (DoT, 2012:54). This makes road transport by far the largest contributing mode of transport to the overall transport sector. Employment in road construction may be used to benefit the poor (Booth, Hanmer and Lovell, 2000). Furthermore, road construction and maintenance projects can absorb unskilled labour in areas where poverty is particularly severe and employment opportunities outside of agriculture are rare (Booth, Hanmer and Lovell, 2000).

5.3. Findings from the case study

The research shows that Mohlake rural community is one of the marginalised communities in South Africa which need attention in roads infrastructure development. It is argued that the community is poorly served by the two available roads (see Figure 2.2.4.1 & 2.2.4.2 in Chapter 2). In Chapter 2, both Figure 2.2.4.1 and Figure 2.2.4.2 show the footpaths in green arrows, the old road before 2006 in white arrows and the new road developed in 2006 in light green arrows.

In Chapter 4 and figure: 2.2.4.1 in chapter 2, the study clearly indicated that the old road leading to Mahlake rural community is coming very far from the community of Schoonoord. The road runs along the mountain, crossing the community of Ga-Sekele, Mokhontong, Ga-Mokgwadi, Semonoko and Hoepakranz before reaching Mohlake. These finding from the two chapters (2&4) confirm that it was difficult for the community to use this road during emergencies and in bad weather conditions. In addition, figure: 2.2.4.1 shows the footpath leading from Mohlake to Ga-Maila Mapitsane is a shorter distance compared to the old
road. However, it is very difficult to walk along the footpath because it has many rocks and frightening bush.

Moreover, the development of the new road in 2006 shifted the use of the old to the new road (see, figure: 2.2.4.2). Many residents and relatives of neighboring communities of Mohlake and motorists visiting these communities prefer the 2006 new developed road than the old road because is convenient, faster and short. The new road leading to Mohlake rural community, starts from Ga-Mokadi then crosses the community of Mohlakaneng. The road is shorter in terms of distance for Mohlake community as compared to the old road leading from Schoonoord.

However, the new road does not fully address the transport needs and demands of the community as expected because its maintenance is poor (Rogan, 2006). During heavy rains the road is eroded by water and suddenly the maintenance costs to increase. For that reason, if the maintenance is not carried in time road transport mobility and access to the community drops, as a result people have to use the footpaths. Equally, other sections of the community cannot be reached by road transport, then, the only modes of transport to access those sections are NMTs is illustrated in chapter 4, see figure: 4.2.1.

The findings show that animal transportation is also critical in lifting people out of poverty. In Mohlake community animal transportation is associated with the transport of goods (like, agricultural products, groceries and animals’ manure) and not people (see, figure: 4.2.1., in chapter 4). In addition, human power is considered as the key road transport mode used to serve areas where animal transport cannot reach. Men, women and children perform the duties of collecting fire-wood from the nearest mountains, fetch water from the rivers or wells and sell products within the community. Men perform transport duties by taking the sick, pregnant women, people living with disability, injured people and dead people to the respective facilities (Porter, 2013) (see, figure: 4.2.2., in chapter 4). Further, female trips are dominated by visits to church and medical services, which is partly explained by the fact that females take responsibility for children’s health care.
It is argued from the study that getting to school in Mohlake is costly in terms of time, energy and money. Further, dropout rates are high; attracting and retaining quality teaching staff in community schools is difficult. The distance between home and school, the lack of appropriate, affordable, and safe road transport limits the achievement of the universal primary education goal that Mohlake residence could benefit from (DoT, 2007).

The children have no choice but to walk to school and they have to cross rivers during the rainy season. They end up missing classes because they cannot cross the river or it is dangerous to walk during the storms. The little children, especially the ones in pre-school and primary school have some difficulties walking to school because the area has a dense forest which the children have to cross (Venter, 2013). In addition, the majority of the community households are too poor to take their children to boarding schools. Moreover, rates of absenteeism from school are higher because children tend to perform income generating duties.

5.4. The research analysis

5.4.1. Theoretical analysis

5.4.1.1. Introduction

The theoretical framework guiding this study argues that the roads infrastructure development, improvement and intervention can contribute to improve socio-economic conditions (improved economic potential, such as trade and improved access to social activities, such as education and health services) for the marginalise (rural and peri-urban) communities. It is argued that improved accessibility of marginalised communities can resulted in reducing travel time or increasing the potential to travel to social activities, economic opportunities and administrative centres.

Accessibility can be measured as the quantity of economic or social activities that can be reached using the transport system. Improvement in accessibility resulted from a well-
developed road infrastructure could also increase the market size for small local businesses, local traders, local tourism and local and regional development leading to increased competition. The development of road infrastructure can be measured by improvement, repair or building of roads, bridges etc., and the promotion of existing non-motorised transportation in the country.

The relation between road infrastructure development and improved welfare has been examined in a number of studies as further detailed in this study. However, it should be noted that the problem of attribution is a major concern for rural and peri-urban infrastructure development. Many welfare and poverty related factors in these communities are influenced by various factors other than road infrastructure development. The problem of endogeneity implies that many effects and impacts originally attributed to improvement in road infrastructure development for marginalised communities may also be influenced by an initial set of factors that caused the road to be allocated to the particular area in the first place. To guide the analysis, a distinction will be made between effects and impact. Effects are expected to occur before, and with greater certainty than, impacts.

According to the OECD, effects can be characterised as the "intended or unintended change due directly or indirectly to an intervention". Impacts in turn are defined as "positive and negative, primary and secondary long-term effects produced by a development intervention, directly or indirectly, intended or unintended" (OECD, 2002). Howe (2005) presents a process of socio-economic change which distinguishes between effects and impacts. The effects and impacts associated with road infrastructure interventions are discussed below:

5.4.1.2. Effects

Clearly an immediate effect of rural road infrastructure development is the direct employment generated by the construction of the roads. For example the construction of road to Mohlake rural community in 2006 has adopted a labour intensive methodology for improvement of secondary infrastructure (Danida, 2004: 15). Further crucial link is the
transport of goods and people coming from this road. It is very important because since the road was developed, then opportunities to access Mohlake were created and materialised through available transport services.

There is an argument that a change in road infrastructure intervention can be accompanied by an increase in access to marginalised communities (like, Mohlake), demand for transport services and a corresponding decrease in the vehicle operating cost (van de Walle, 2007). In the ideal case, this in turn will trigger competition and an associated decrease in road transport shortages. Though, an affordable means of road transport may less be available because of lower competitive road transport services.

Howe states that “there has been a tendency to assume that road investment alone will lead naturally, through spontaneous interventions by the public private partnerships to improve services.” But, other factors such as the road infrastructure development and network will also have an impact: Improved roads may not attract road transport services, if access to them is not linked by other roads of decent quality, bridges, ferries etc. The nature of the institutional framework for public and private transportation may also influence the decision of transport operators to set up business in a given area.

5.4.1.3. Impacts

For example, the locational theory in chapter 2 stressed that ‘if household/ or passenger travelling falls due to increasing distances from/or to the community, the amount each household/ or passenger is willing to pay for transport will become more and the number of travellers/ or visitors will eventually decline.’ Furthermore, the production theory in chapter 2 highlighted that ‘a distance is a greater determinant of the function (f) of road infrastructure in facilitating the movement of people and goods (y/ or outputs) and the utilisation of road transport services (x/ or inputs) at the lowest possible cost and time.’ The theory asserted that the longer it takes on a time of traveling on a longer distance then the high the price of delivering the people and goods it may be.
All of the expected impacts with respect to road infrastructure development listed in (2.3. Section B: Theories, page: 20-44) will only materialise to the extent that the above-mentioned transport changes appear. It is also assumed that agriculture is the main economic activity in the road influence areas, a productivity increase is likely to materialise through reduced cost of acquiring farm inputs and increasing output prices (Dercon et al, 2007). As noted in this study rural roads are the first priority to link farmers to towns to facilitate market entry of smallholders.

For example in Mohlake rural community, investment in new 2006 rural road has contributed to access of communities’ households of Mohlakaneng, Ga-Komane and Pitšaneng and transport services operation. Further, the improved access in marginalised communities may also create opportunities in terms of permitting entry into employment outside agriculture, like, the non-farm employment in shopping and administrative centres (like, jobs in the service sectors, tourism or in processing industries). Furthermore, the rehabilitation of old road leading from Schoonoord to Mohlake, for example, has led to a significant increase in off-farm opportunities as well as female employment (Lakshin and Yemtsov as quoted by van de Walle, 2007).

At the same time demand for other types of labour may be negatively affected and some groups have needed to seek other types of employment as a result of increased competition. Crucially, income and poverty-related impacts have materialised as a result of the above-mentioned employment and productivity-related changes. Further down the chain of causality, a link to social development impacts such as benefits derived from increased access to and use of health and education services has been expected. As noted by Howe the effect may also materialise as a result of the increased willingness of professional staff to work in marginalised communities with improved access.

5.4.1.4. Distributional issues

It is reported that even if aggregate outputs / or measured in terms of road infrastructure development are forthcoming there will almost certainly be losers too. This is a timely
reminder that the impact of any rural and peri-urban roads projects is likely to differ according to the heterogeneity/or diversity of households. This may apply in particular to income level and gender. Other factors that could determine the volume of the impact are initial geographical location, level of education, or influence (van de Walle, 2007: 10).

- **Income level.** As pointed out by Chatterjee *et al.*, (2004: 5) the extreme poor may be "insensitive to road access and may even, at least in the short term, lose income opportunities." They may however benefit in the longer term when income and employment levels increase or when they benefit from the increased welfare of relatives.

- **Gender.** As reported by Danida (2004) women have most acutely felt the needs concerning access to basic social services. At the same time, women may also face socio-cultural barriers that influence their access to improved roads. The study in Uganda has shown that facilitating women's access to bicycles may serve to decrease their workload partly as a result of time savings.

Finally, impact will always take time to materialise, and the nature of the effects may vary over the short, medium and long term. For example, certain jobs and activities may be lost in the short term as a result of a new or improved road, but those affected may end up taking better paid jobs in the medium to long term (van de Walle, 2007).

### 5.4.2. Historical analysis

Martínez (2011) indicates that ‘roads are by nature a contested subject. Although they represent vital infrastructure to enable the flow of people, goods and ideas, their potential detrimental effects for humans and the environment have been a constant source of debate and criticism.’ According to Martínez, this is particularly true for a country like South Africa, where the development of roads has been directly associated with environmental constraints, political interferences, resource extraction, colonisation and dispossession of indigenous peoples. In essence, the impact of roads goes far beyond their direct social and economic costs and benefits. In many regions of South Africa, roads have a strong evocative
power, as they represent spaces that materially and symbolically embody ideas such as modernity, progress, backwardness and development. The historical analysis attempts to document the past, present, and likely future of roads in South Africa, in particular for marginalised communities.

The historical analysis shows that South Africa experienced social and economic challenges and road infrastructure development has been viewed as an ideal solution to transform marginalised communities. Inadequate infrastructure and funding may lead to poverty, social exclusion and inequalities among the marginalised communities. Although there are other social and economic drivers that have led the marginalised communities into destitution and imbalanced development, road infrastructure is regarded as the economic solutions that can open market opportunities for these communities. From a historical point of view, when most of the marginalised communities walked long distances while carrying goods on their heads and backs, they were forced to innovate. This resulted in the indigenous technology of non-motorised transport (for example, see figure: 4.2.1., Animals’ transportation and Figure: 4.2.2., Wooden stretcher). People were also using wagons and carts to deliver goods and to transport people, while other people used donkeys, camels and horses to travel and to transport goods on land. These types of development were crucial and benefitted the past societies by transforming their economies.

The historical analysis indicates that around 3,500 BC major transformations related to transport infrastructure happened. The change was experienced when the wheel was invented to complement walking and other animal powered modes of transport. The oldest wheel that archaeologists have found came from Mesopotamia, an ancient civilisation in the Middle East (DHWTY, 2014). It was used to help people to travel faster and furtherer than was possible on foot. It also made it possible to transport big loads. Much has been improved to cope with technological changes and with competition, trade and traveling demands to ensure that the social and economic development of all South Africans is improved.
Currently, South Africa is rated as one of the fastest growing economies among the developing countries. The growth is evident in infrastructure development, which is where the government has made its commitment to ensure economic and social transformation. The government has considered developing roads and other infrastructure facilities as part of its programme to make the country more competitive. Since the democratic elections in 1994 South Africa has attracted many people from across the world to settle in the country. Locally, people are relocating to the urban areas of the country. The population migration is hugely experienced from marginalised rural areas, other African countries and the rest of the world. The population influx has created the depletion of urban space and increased pressure on infrastructure and services provision in the country.

5.4.3. Situational analysis

5.4.3.1. Demographic background

Statistics South Africa (StatsSA) (2015:7) estimates that the mid-year population is estimated at 54.9 million. The black African population is in the majority (44, 23 million) and constitutes approximately 80% of the total South African population. The white population is estimated at 4.53 million, the coloured population at 4.83 million and the Indian/Asian population at 1.36 million. Further, StatsSA has shown that the South African population has increased between 2002 and 2015. The estimated overall growth rate increased from approximately 1.28% between 2002 and 2003 to 1.65% for 2014–2015. Moreover, the provincial estimates show that Gauteng has the largest share of the population, followed by KwaZulu-Natal and Eastern Cape. By 2015, approximately 11.3% of South Africa’s population live in the Western Cape. Northern Cape has the smallest population (2.2%). Free State has the second smallest share of the South African population, constituting just over 5% of the population (StatsSA, 2015:12) (see Table 5.4.3.1.1 and Table 5.4.3.1 below).

Tab: 5.4.3.1.1) Mid-year population estimates for South Africa by population group and sex, 2015
<table>
<thead>
<tr>
<th>Population group</th>
<th>Male Number</th>
<th>Male %</th>
<th>Female Number</th>
<th>Female %</th>
<th>Total Number</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>African</td>
<td>21 653 500</td>
<td>80,6</td>
<td>22 574 500</td>
<td>80,4</td>
<td>44 228 000</td>
<td>80,5</td>
</tr>
<tr>
<td>Coloured</td>
<td>2 334 800</td>
<td>8,7</td>
<td>2 498 100</td>
<td>8,9</td>
<td>4 832 900</td>
<td>8,8</td>
</tr>
<tr>
<td>Indian/Asian</td>
<td>688 100</td>
<td>2,6</td>
<td>673 900</td>
<td>2,4</td>
<td>1 362 000</td>
<td>2,5</td>
</tr>
<tr>
<td>White</td>
<td>2 201 900</td>
<td>8,2</td>
<td>2 332 200</td>
<td>8,3</td>
<td>4 534 000</td>
<td>8,3</td>
</tr>
<tr>
<td>Total</td>
<td>26 878 300</td>
<td>100</td>
<td>28 078 700</td>
<td>100</td>
<td>54 956 900</td>
<td>100</td>
</tr>
</tbody>
</table>

Sourced: Statistics SA (2015:7) or
(http://www.statssa.gov.za/publications/P0302/P03022015.pdf)

Tab: 5.4.3.1.2) Mid-year population estimates by province, 2015

<table>
<thead>
<tr>
<th>Province</th>
<th>Population estimate</th>
<th>% of total population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eastern Cape</td>
<td>6 916 200</td>
<td>12.6</td>
</tr>
<tr>
<td>Free State</td>
<td>2 817 900</td>
<td>5.1</td>
</tr>
<tr>
<td>Gauteng</td>
<td>13 200 300</td>
<td>24.0</td>
</tr>
<tr>
<td>KwaZulu-Natal</td>
<td>10 919 100</td>
<td>19.9</td>
</tr>
<tr>
<td>Limpopo</td>
<td>5 726 800</td>
<td>10.4</td>
</tr>
<tr>
<td>Mpumalanga</td>
<td>4 283 900</td>
<td>7.8</td>
</tr>
<tr>
<td>Northern Cape</td>
<td>1 185 600</td>
<td>2.2</td>
</tr>
<tr>
<td>North West</td>
<td>3 707 000</td>
<td>6.7</td>
</tr>
<tr>
<td>Western Cape</td>
<td>6 200 100</td>
<td>11.3</td>
</tr>
<tr>
<td>Total</td>
<td>54 956 900</td>
<td>100</td>
</tr>
</tbody>
</table>

Sourced: Statistics SA (2015:12) or
(http://www.statssa.gov.za/publications/P0302/P03022015.pdf)

5.4.3.2. Specific challenges faced by urban and metropolitan areas
5.4.3.2.1. Introduction

In urban and metropolitan communities road conditions are far better than in the peri-urban and rural areas. The road conditions in these communities have increased transport accessibility and also improved the mobility of goods and people. The road systems are technically high and competitive and support the social and economic development of South Africa. The effects of high transport infrastructure development are noted as the key technological solution that makes urban travelling more convenient and efficient. However, the inability of the roads to cope with the high volumes of traffic has resulted in more road accident occurrences. In fact, this is evident in the urban cities of Johannesburg, Cape Town, Pretoria, Durban and Port Elizabeth in which road safety is a major concern. Further, tolling of urban roads has raised concerns among motorists about the increased costs.

5.4.3.2.2. Road Congestion

The literature indicates that roads can be exposed to traffic congestions which can delay the delivery of goods or raw materials to the production sites and lead to inefficiencies in the operation of the transportation system (e.g. in terms of goods movement). In general, the impact of traffic congestion may also be seen in unreliable travel times, inefficiencies in vehicle operation (e.g. excessive fuel consumption), reductions in levels of comfort and convenience, reduced safety (e.g. more bumper-to-bumper accidents), increases in automobile insurance premiums (based on more accidents), health impairment (e.g. increased stress, increased incidents of asthma and other respiratory diseases caused by breathing higher concentration of fumes), and reduced business productivity and economic vitality.

South Africa does not have many big city centres but those available are six metropolitan municipalities which are growing at a fast rate. The growth is due to population movements in the country, which could be the source of population density in the cities; this compounds the traffic congestions problems. Since the 1950s, the rate of urbanisation in South Africa has increased rapidly. Today 32 million people live in towns and cities (Time space research,
Indeed, this rapid population growth may increase the use of private motorisation in the cities and townships because public transport does not cover all the areas of human settlement. Further, rapid urbanisation brings many problems for the country as it places huge demands on land, water, housing, transport and employment (DoT, 2006).

5.4.3.2.3. Road tolling

The tolling of urban roads has raised concerns for motorists. According to Wikipedia, quoted by Pienaar, ‘a toll road is a privately or publicly built road for which a driver pays a toll (a fee) for use.’ Nieuwoudt, quoted by Pienaar, suggests that tolls be charged on roads where congestion is common (Pienaar, 2012). Pienaar adds that tolls can be used to discourage users from making unnecessary trips. The main advantage of toll roads is to enable the public sector to contract the private sector for the construction, operation and maintenance of the road for a period of 25 to 30 years. The private sector could raise the required capital sooner due to better credit rating and cost of finance (Haiden 2003:4). The roads could even attract foreign investment. The revenue collected on a toll road can be dedicated to expenditure on the scheme. Moreover, users can have access to the advantages of a better road sooner than they would have under a public sector funded scenario.

However, toll road schemes cause an increase in investment spending, which could have an inflationary effect. This effect could, however, be compensated for by exploiting other forms of investment. Pienaar (2012) insists that the high service of a well maintained toll road could have a greater cost-lowering effect on the price of consumer items than the cost-increase caused by the toll tariff. The introduction of tolls along corridors can cause significant traffic diversions. For example, when tolls were implemented on the N1 between Pretoria and Bela-Bela a traffic diversion of 30-40% to the non-tolled alternative was experienced (Kekana, 2006).

This traffic diversion can have serious impact on regular users of the alternative route, such as: a) increased vehicle operating costs b) congestion c) environmental hazards d) increased number of accidents, and e) premature failure of pavement. In addition, the indirect effects
may also be experienced along the alternative route, such as a) reduced pedestrian safety b) decreased land value, and c) impact on prices of goods and services (Kekana 2006:3-4). The tolling of roads can further cause institutional drawbacks because if a toll scheme were to fail, taxpayers and ratepayers would have to bear the financial burden of the outlay cost (Haiden 2003:5). Furthermore, inequity can occur because road users would be forced to have additional cash expenses. Not all users benefit equally from toll roads, since some value their time and safety more than others (Haiden, 2003:6). Haiden asserts that toll roads could lead to dispersal of development due to people attempting to avoid tolls. It could also lead to unnecessary duplication of routes to capture traffic that would have used the toll route. This expansion might have adverse effects on sensitive environments.

Table: 5.4.3.2.3.1) Distribution of toll effects on individual drivers

![Table Image]

Source: Standish (2010:77)

The table shows that:

- 22% of the sample will spend more than 3% of their income on tolls
- 11% of the sample will spend more than 5% of their income on tolls
- 1.3% of the sample will spend more than 10% of their income on tolls.

According to Standish (2010:87) the study assumes all toll tariffs are passed on to the consumers regardless of the income they are earning.
5.4.3.2.4. Influx of population migration

South Africa’s cities contain half of the country’s population, and public transport systems are struggling to cope with the rapid population growth. The human settlements on the edge of cities, which became a cheaper option for most people after the 1994 democratic elections, are very costly for the state to improve. The 1994 democratic elections fuelled rural-urban migration as the historically disadvantaged individuals moved to the urban areas in search of employment and a higher quality of life (Situma, 2002).

Statistics South Africa (2015:1) has shown that for the period 2011–2016 it is estimated that approximately 243 118 people will migrate from the Eastern Cape, and Limpopo is estimated to experience an out-migration of nearly 303 151 people. During the same period, Gauteng and Western Cape are estimated to experience an inflow of migrants of approximately 1 169 837 and 350 569 respectively. These assumptions imply that Gauteng and Western Cape receive the highest number of migrants; Mpumalanga and North West provinces also receive positive net migration. The Eastern Cape, Free State and Limpopo experienced the largest outflows (StatsSA, 2015:12). This type of transition has caused the state huge amounts of money in increasing service delivery and infrastructure development in energy, housing, sanitation and roads.

Major cities in the country face urbanisation and the fragmentation of households, resulting in more, smaller households (Mtantato, 2012). In addition, this transition has encouraged skilful people out of their rural communities to urban centres, causing out-flow of skills. This has left a huge skills gap in many marginalised communities. Such movement of people across provinces and borders means that there is a huge demand for road transport facilities (DoT, 2001).

5.4.3.3. Specific challenges facing peri-urban and rural areas

5.4.3.3.1. Poor road conditions
In marginalised communities of South Africa (like, peri-urban and rural) the major obstacle for communities’ development is the condition of their roads, resulting from lack of political representation, and political interference and affiliation. The lands of peri-urban and rural areas are isolated from the mainstream economy and its benefits. The colonial and apartheid governments created distance and division between urban, peri-urban and rural areas by neglecting the provision of roads to support marginalised communities. Further, the new democratic government elected in 1994 also failed to support these communities. The government has shown commitment by allocating a total of R9.3-billion to be spend in 2014/15 and a further R9.9-billion in 2015/16 to upgrade the country's ageing road infrastructure in order to ensure quality and safer roads (http://www.southafrica.info/business/economy/infrastructure/transport-120814.htm).

Further, provincial spending on road infrastructure has been increasing in billions rands annually.

However, the former minister of transport indicated that on average more than 30% of marginalised communities of South Africa’s roads are in poor to very poor condition (DoT/NFLS, 2005:12; DoT, 2011). The plans to build and upgrade roads are moving slowly, to a point which forces the people to migrate to urban communities. The lack of upgrading and maintain roads of these communities is blamed on shortage of funds and lack of capacity from the provincial and municipal governments responsible. The majority of these roads are not tarred and are bumpy. The state of these communities’ roads has impacted households in that they struggle to access social services such as health and education. The poor conditions have affected transport accessibility and availability to move people and goods. In these communities people walk long distances to reach the main roads and get transport services. Driving to other sub-districts and health facilities is quite a problem, particularly in the rainy season. This demonstrates the problems the people experience in trying to reach some of the public facilities (see also a case of Mohlake rural community).

5.4.3.3.2. Poverty and inequalities
In rural areas, the literature shows that road conditions are very bad and cannot support or facilitate movement of goods and people. It is argued that a sizeable portion of the country’s marginalised people still do not even have adequate access to road transport. Accordingly, a lack of good roads and non-affordability of transport has locked low-income groups outside the mainstream economy (Lucas, 2011). In most marginalised communities (in particular rural and peri-urban) of South Africa poverty remains a predominant problem affecting farming activities and marketing of products. It may also impair growth, which is seen as a central aspect of poverty eradication by the government (The Tanzania Forum Group, 2003).

In fact, the literature shows that poverty has been aggravated by the fact that the marginalised communities are poorly served with roads and road infrastructure. In addition, the marginalised communities (peri-urban, tribal, traditional, rural and farm communities) also have inferior access to basic social services and the economic mainstream. In most marginalised areas South Africans are still trapped in the legacy of racially segregation. The apartheid system not only segregated races, but also entrenched inequality in the different forms of housing, geographical location and distribution of facilities (Mtantato, 2012).

5.4.3.3.3. Social Exclusion

In the literature it is indicated that the most of the marginalised communities are excluded from participating in activities that have been considered the norm within societies (Mtantato, 2012). In addition, a lack of road development to support mobility in marginalised communities can be a causal factor of social exclusion (Kenyon, Lyons and Rafferty, 2002). With respect to road services provision and social exclusion, low-income groups make fewer trips by motorised transport and more of their trips have been undertaken on foot. As a result, they are restricted to services that can be accessed within a walking distance.

Among the marginalised communities, children, people with disabilities and the elderly suffer most, their ability to make trips being deterred because of their vulnerability as
pedestrians (Gwilliam, 2010). It is argued that a lack of good roadways contributes towards impoverishment and social exclusion.

5.4.3.3.4. Lack of road infrastructure

The literature shows that the unavailability of road infrastructure to support the mobility and accessibility of all citizens (including people with disabilities) has been identified as a big problem in South African. It is argued that a lack of roads and road infrastructure in marginalised communities prevents people from accessing work, education, health facilities and community and welfare support services (Dimitrov, 2010).

In fact, road infrastructure of most marginalised communities is in a terrible state which needs to be upgraded and maintained to support development. The South African Local Government Association (SALGA) (2011:3) highlighted that the Municipal Infrastructure Investment Framework (MIIF 7) for South Africa indicates a huge discrepancy with regards to total municipal road length in South Africa. This means that the proportion of rural households that is not reflected in the StatsSA data as poor as well as businesses and institutions do not contribute to the cost of constructing and maintaining the road infrastructure in their areas.

The most critical factor in road infrastructure development is funding to respond to mobility and freight demands (DoT, 2005). It is argued that rural municipalities are the ones struggling with road infrastructure financing and are inundated by road infrastructure backlogs, as compared to their urban counterparts. Further, its absence can slow down investment flows, which are soon redirected away from the country. Furthermore, there is a lack of institutions responsible for improving road infrastructure and road transport services in the country. In addition, South Africa’s road development has been hampered by lack of a skilled work force and poor leadership (Rust et al., 2008).

The road infrastructure deficit varies significantly across the nine provinces of South Africa, ranging from the need to renew existing road networks to addressing growing congestion.
These challenges can constrain economic growth creating difficulties that will hamper development, and restricting access of local communities to essential services, such as education and health (Weisbrod & Reno, 2009). In addition, road infrastructure investment may stimulate international trade by improving strategic links in the freight transport networks, including ports and cargo-handling airports as well as rail (OECD, 2002).

5.4.3.4. Common challenges faced by South Africa

5.4.3.4.1. Road Safety

The findings from the literature show that one of the critical areas in South Africa’s roads sector is to reduce road traffic fatalities as part of its commitment to the UN Decade of Action for Road Safety. Venter et al. (2013) have shown that safety in road transport industries (like taxis, freights and buses) as well as private motorised vehicles can be jeopardised by reckless and unsafe driver behaviour. One of the most important aspects of road safety is the condition of the roads. It is of utmost importance for road safety that the roads are constantly monitored and repaired (https://www.arrivealive.co.za/road.aspx#sthash.3gIqseUG.dpuf). In addition, safety issues also revolve around poorly maintained vehicles that are unsafe to operate.

The situation is worse in rural and peri-urban areas, where existing roads are narrow, unpaved and in bad condition due to lack of regular maintenance. In fact, most of the roads are very slippery in wet conditions during the rainy season and are thus dangerous for driving on, especially those without side protection and are constructed on terrain with steep hills and deep valleys (DoT, 2005a). In addition, some bridges have been in a state of disrepair and dangerous for use by vehicles.

5.4.3.4.2. Health issues

Djemai (2009:2) argued that in the context of the HIV/AIDS epidemic, road infrastructure is highlighted as a transmitter of the epidemic from region to region. Through the
displacement of people, trade along roads contributes to rapid HIV propagation. Evidence suggests that HIV and AIDS control has been impacted negatively by the road transport sector in the country (Pillay, 2011). It is argued that road infrastructure facilitates physical communication, may also accelerate the spread of the HIV/AIDS epidemic, and facilitates the access of the market for condoms and for knowledge about the HIV/AIDS epidemic (Djemai, 2009:7).

DoT/NFLS, (2005:17) showed that 50% of South Africa’s long-distance truck drivers in SMME sector have been found HIV/AIDS positive. The study suggests that loneliness and fatigue could be the cause of the drivers to search for sex-workers at truck stops. What aggravates the situation is the availability of sex workers along the main corridors and especially around toll plaza and truck stopping areas. Equally, the rest stops and delays provide multiple opportunities for sexual encounters that transmit HIV/AIDS and other STIs. This puts long distance truck drivers, other mobile workers, sex workers, and the people who live along the route at increased risk of HIV/AIDS (Hooks and Silué, 2009)

The findings also indicate that road construction can have a negative impact on the health of the society. Road workers spend long periods away from their homes and families. Typically, some of these workers work in isolation while others live for weeks at a time with the same small group of fellow workers. They frequently face the temptation of sexual relations with multiple partners (ILO, 2005b).

5.4.3.4.3. Funding constraints

Most roadways are funded through national treasury, road charges and payments and gasoline excise taxes. These taxes do not measure costs imposed by driving (like, fines) and also fail to address differences in fuel economy and the maintenance costs associated with different vehicle weights. In addition, revenue from the tolled roads grows very slowly, to an extent that it cannot cover all road damage caused by high traffic volumes and heavy freight transport.
Road developments without self-financing tolls do not generate in-coming cash flows similar to that of typical private-sector investments. This situation creates the primary challenge associated with valuing most roads in the country. It is argued from the literature that roads involve transaction costs in the form of delays at toll plazas that reduce their public acceptance. The ability to minimise the costs for obtaining inputs and selling the outputs is a critical challenge for every country. The increase in accidents and slower travel during road construction creates road-user costs as well.

Given the problems of identifying users and making determinations about who uses the road when and at what price, the costs of these negotiations make a market solution infeasible. This failure to adjust prices to demand conditions eliminates an important element of road pricing, i.e. the pricing that matches supply with demand and sends signals to those who can delay or eliminate trips to do so, while having those using the road pay the full cost of the privilege.

5.4.3.4.4. Lack of institutional capacity

Effective infrastructure requires strong and fair institutions and should include an element of enforcement to ensure all actors from individuals to government bodies comply with tenure rules and regulations (UN Habitat quoted by Masum, 2011:3); and sufficient institutional capacity is the vehicle to get effective and efficient institutions. This has great relevance in road infrastructure systems which are concerned with social, legal, economic and technical frameworks within which land managers and administrators must operate (UN-ECE quoted by Masum, 2011:3).

The concept of ‘institution’ is challenging to grasp, as the term is used with a variety of different meanings (UNESCO, 2009). However, it can include both the framework of rules (both formal and informal) which define the inter-relationships between stakeholders and resources, and also the organisations which often define, work within and implement policies relating to these arrangements (World Bank, 2004). Institutions, therefore, include locally constituted informal norms and processes, and more formal national legal
frameworks and government departments and relevant organisations (Masum, 2011:3). The road sector institution is paramount in the success of road development systems while the ‘capacity’ of the institutions enables them to perform effectively and promote successful transport services.

The term ‘capacity’ can be conceptualised as the ability to achieve a certain objective in a certain field. According to UNDP quoted by Masum (2011:3) and Enemark (2003:2), capacity can be defined as the ability of individuals and organisations or organisational units to perform functions effectively, efficiently and sustainably. Enemark (2003:2) argues that the concept of capacity building should be viewed in a wider context to include the ways and means by which the overall goals are achieved. It is worth noting that capacity can be conceptualised as the ability to influence and foresee change, exercise informed decision-making concerning policy, implement policy decisions through programme development, wisely obtain and manage resources, and conduct meaningful evaluation as a guide to future behaviour (Masum 2011:3). In this respect, ‘capacity’ in road sector institutions may have three different dimensions:

- Resource based capacity: human resource, funding, technology and infrastructure
- Administrative capacity: Ability to apply road policies and legislations in an efficient and effective way, as well as to support the competent decision-making process
- Managerial capacity: Ability to perform the functions with effective managerial process and proper coordination with other organisations.

It is evident that if institutional capacity is weak, the institution will be unable to effectively carry out its road infrastructure strategies and policies. Masum (2011:4) insists that the quality of institutional performance will be affected in terms of three good governance criteria: accountability, efficiency and responsiveness. Such weaknesses prohibit further the strategic thinking and problem-solving capacity, providing an avenue for ethical irresponsibility, including corruption practices. Therefore, adequate institutional capacity can be identified as one of the missing links in road infrastructure development in South Africa and many other developing countries.
In developing countries of Africa, many leaders have recognised the importance of infrastructure by setting a Programme for Infrastructure Development in Africa (PIDA) (http://pages.au.int/infosoc/pages/program-infrastructure-development-africa-pida). PIDA is a joint initiative of the African Union Commission (AUC), the New Partnership for Africa’s Development Planning and Coordination Agency (NPCA), and the African Development Bank (AfDB). PIDA is grounded in regional and continental master plans and action plans as well as other relevant work undertaken by the African Union (AU). This is a multi-sector programme covering Transport, Energy, Trans-boundary water and Telecommunication/ICT. It is dedicated to facilitate continental integration in Africa through improved regional infrastructure and is also designed to support implementation of the African Union Abuja Treaty and the creation of the African economic Community.

In South Africa, the government has also recognised the role of infrastructure by setting Presidential Infrastructure Coordinating Commission (PICC). The plan is intended to transform the economic landscape of South Africa, strengthen the delivery of basic services to the people of South Africa and support the integration of African economies. PICC’s is designed to assess the infrastructure gaps through spatial mapping which analyses future population growth, projected economic growth and areas of the country which are not served with water, electricity, roads, sanitation and communication. Further, the plan has seventeen Strategic Integrated Projects (SIPs) developed and approved to support economic development.
CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

6.1. Introduction

This chapter summarises the findings presented in Chapter 4 as well as providing the conclusion and policy recommendations. It is divided into three sections. The first section gives a summary of the study. The second part provides the conclusion on the findings obtained on roads and infrastructure development aimed at improving the marginalised communities in South Africa. The last section provides policies relevant for consideration to address this phenomenon.

6.2. The summary of the study

Road infrastructure plays a critical role in development as it enables transport industries and services to deliver people and goods from one location to the other. In addition, it enables transport to support passenger/ or users to access locations of public services (like health facilities, shopping centres and education) and locations of production services (like trade and market centres, manufacturing and production firms) within the economy. Further, roads give users an opportunity to access employment opportunities. Moreover, road development can contribute to the income of community members, particularly in areas where construction and maintenance of roads is taking place.

It is worth noting that the benefits of roads include minimising challenges which might jeopardise the movement or relocation of people and goods. The benefits of road development can be diminished by road safety due to high road accidents and congestion on the roads. These two characteristics affect the ability of different industries to move people or goods to their required locations. Typically, a failure or delay by transport industries to perform their duties may hamper the competitiveness of the economy and affect the social activities of the community as a whole.
It is also argued that the benefits of road development have not been equally distributed in South African. While some regions have benefited from road development, others have often been marginalised, which tends to worsen exclusion, poverty and inequality. In fact, poor marginalised communities in South Africa (like Mohlake rural community and others) often suffer from inadequate or unavailable access to public transport due to the poor conditions of roads leading to them.

In general, poor road conditions also have a negative impact on the transport companies’ ability to ensure that goods and people are moved to the required locations. It is assumed that when roads are in poor condition transport companies are discouraged to provide the community in question with transport services. Similarly, if the transport companies opt to provide the service then they may increase their transport charges to cover the damages incurred. As a result the poor road conditions force some of the community members to relocate their families or businesses to areas with good road conditions. In fact, the relocation of people may also cause brain-drain in the community because people with good skills, knowledge and expertise could decide to leave their areas as a result of poor transport services.

It also important to note that road development relies mostly on public funding from the national government. As a result, the national government is faced with many competing social services to provide for (like health, education, water and sanitation, social grants, energy and electricity etc.); all these need allocation from the public purse. Further, the money generated from tolled roads, transport payments, fines, parking and road traffic fines is low compared to revenue collected from employees and companies. The shortages of funding have forced the government to become slower in implementing other road transport modes (like animal powered transport and bicycles) into the national road infrastructure strategy.

This study emphasises that in order for the existing road infrastructure strategy of 2006 to contribute to social cohesion it needs to apply socially inclusive development strategies and also take an integrated approach. Further, the study indicates that for South Africa to meet
the mobility and accessibility demands, its main objective should be to examine the critical challenges and backlogs of roads and road infrastructure development in the country, and constraints that hinder the development of marginalised communities. Against this backdrop, the study will explore key interventions that can contribute to road infrastructure development in marginalised communities of South Africa.

The general focus of the study is at the national level, while road issues at the provincial and local level are not ignored. That is to say, the study explores the importance of roads for the whole economy while the impact of poor roads on a specific community (Mohlake rural community) is elaborated to give practical examples of road issues in the country. As a literature-based study, this research was undertaken through a qualitative analysis using both secondary and primary methods (like, Case Study) for data collection. The qualitative study was adopted in response to the research questions.

The data analysis method adopted four theories of road transport as a conceptual framework to help in the analysis of the findings in order to locate this study within the broader study development. Certainly, this analysis requires an understanding of the interplay between social, economic and political environments. Overall, the study hopes to contribute to the body of dedicated academic research in this field of knowledge.

6.3. Conclusion

In this study the impact of road infrastructure development on marginalised communities in South Africa is analysed using conceptual framework of four theories for road transport an existing secondary sources and case study strategy to provide the data. The results from the application of one (innovation theory) of the four theories for road transport indicate that social and dynamics institutions are key knowledge carriers to ensure that road infrastructure development takes place to address some of development issues or challenges in marginalised communities of South Africa.
It is argued that innovation system combines a specific theoretical perspective on the economy with certain flexibility in terms of what parts of the economy should be included and emphasised in the analysis. Innovation system rejects the concept of generalisation but argues for the broader view of accepting institutions both formal and informal as integral to the country’s development of a competitive road infrastructure that supports all transport modes. In addition, innovation system can be used to understand and explain economic growth and economic development (Lundvall, 2007:18).

In fact, to promote and developed marginalised communities (like, rural and peri-urban areas) of South Africa and their social, economic and political activities requires regional/ or local institutions’ cooperation and interactions. In view of that, regional innovation recognises policies that may support the local workforce with skills reflecting local and tacit knowledge, the local knowledge and service infrastructure and spin-offs from local institutions. Moreover, regional innovation recognises local/ or regional organisations (in the fields of research, education and technology transfer) to promote/ or improve communication and cooperation between the regional/ or local institutions, which can lead to a sufficient flow of knowledge and technological development.

Technological Innovation recognised that technology development may focuses on micro-level other than macro-level to create new opportunities and improve competence building. In addition, the competence building and policy learning recognises that both the generalist policy-maker and the life-long specialised policymaker need to be combined to work together in the real world to achieve the process of development. It may be accepted and draw policy implications from the fact that learning process and knowledge base are major medium to transform innovation into development value and that the capability to engage in such learning process and knowledge base are very different among regions/ or communities. Lastly, innovation system highlights that for every country/ or region to be linked to others, it is important to improve road infrastructure at the regional/ or local level while supported by national level.
The rational to consider innovation system at the regional/ or local level is that many inequality and exclusion issues perpetuating poverty adhere to regional/ or local boundaries, and have strong correlations with poor road conditions prevailing in marginalised communities.

The innovation system approach accepts both the bottom-up and top-down approaches as key in planning and implementing road infrastructure strategies/ or plans that will link South Africa with the neighbouring countries. The notion further disregards the linear process in road infrastructure development because both formal and informal institutions should participate to ensure that development takes place.

Innovation system approach adds that the involvement of the private sector could provide additional funds and expertise relevant to improving road infrastructure in the country; while the involvement of the community may be in the supplying of labour and tacit knowledge about the location where the processes of development will take place. The concepts emphasised that without both formal and informal institutions’ involvement then exclusion will occur. Further, the abilities, skills, resources, capacities and experiences of local affected individuals will not be considered in the road development process. Moreover, the integration of other strategies like non-motorised transportation into the road transport industry and technology development will not be taken into consideration.

The essence of the innovation system approach in road and infrastructure development is the improvement of current practices and promotion of local knowledge to serve the needs of all road users including those in marginalised communities. The notion of the national innovation system seeks to ensure that all road transport policies, strategies and guidelines are improved to ensure a successful road infrastructure that may address all economic and social challenges of development in South Africa.
6.4. Recommendations

6.4.1. The road infrastructure strategic framework for South Africa 2006

The need for the framework was to address a number of key challenges facing road network of the national, provincial and municipal governments to ensure that road transport plays a meaningful role as a catalyst for development. However, poor road conditions and lack of road infrastructure in marginalised communities still remains. Therefore, it is important for the three spheres of government to remain accountable to support the implementation of this strategy. Without the proper implementation of this strategy South Africa’s marginalised communities will remain excluded.

6.4.2. A sustainable funding model for roads infrastructure at municipal level

At the municipal level road infrastructure for poor households in both rural and urban communities is funded through conditional grants. More importantly, in rural areas there is no property rates tax payment, and while in urban areas there is property rates tax payment most of it is taken up by salaries, bulk payments for water and electricity and only a limited amount of funds is left for road infrastructure and operations and maintenance. This clearly causes the on-going failure of many municipalities to recover from maintenance backlogs, and increases in road infrastructure expenditure for the country. There is a need for a protected road maintenance funding stream to safe-guard road infrastructure investments.

The proposed municipal roads infrastructure grant should be funded through monies from the Municipal Infrastructure Grant (MIG), Urban Settlement Development Grant (USDG) and the sharing of the general fuel levy; and it needs to be a conditional grant. It is, therefore, important that the district municipalities be the category municipality with maximum capacity and technical know-how to support this plan. The proposed municipal roads infrastructure grant must seek to address road backlogs in all municipalities in both poor and affording households.
6.4.3. Rapidly scale up road safety programmes and crash reporting capacity to save lives and promote economic development

South Africa relies heavily on road-based transport for the movement of people and goods. Yet it must be noted that the country faces many road safety related challenges. There are approximately 1 million crashes a year in the country, resulting in over 40 deaths a day, 20 people permanently disabled, and several hundred suffering serious injuries. These crashes cost approximately R133 billion in 2011 to the State, communities and individuals (SANRAL, 2012:31).

South Africa, therefore, fully supports the Decade of Action for Road Safety called by the Commission of Global Road Safety, and endorsed by the United Nations Road Safety Collaboration. This global drive to curb the carnage on the roads was officially launched in May 2011, and has the primary goal of reducing road deaths by half by 2020. Based on the recommendations of the World Health Organisation’s World Report on road traffic injury prevention, countries are encouraged to focus on the following five road safety pillars: (1) road safety management (2) infrastructure (3) safer vehicles (4) road user behaviour, and (5) post-crash response

6.4.4. Capacity building development at all societal levels

A successful local authority policy requires capacity building at the local level to create a body of experienced and well trained technicians and transport managers, who are able to advise local leaders on their choice of system and policies, based on current practice. Local authorities should therefore have a sound knowledge of transportation facility design, environmental impact mitigation, traffic flow analysis, traffic control and transportation planning. If not, then the lack of capacity (human and financial) can hinder further development of NMT for scholars (DoT, 2008:31).

The capacity building involves the creation of an enabling environment, where local institutions (like NGOs, CBOs and local SMMEs) and adequate human resources are present.
to share views, knowledge and ideas in the planning process. The provincial government of the Western Cape and the Department of Transport and Public Works (2009:18) add that the capacity building development can encourage a culture of inclusiveness that will broaden options for mobility. Moreover, this may provide more equitable access to social facilities (like education, health, police stations) and support quality of learning. Regulations need to be updated to include all modes, and municipalities need to decide how best to adapt planning and controls to suit their circumstances.

The capacity building can develop a resolution to address lack of manufacturing capacity of bicycles to circumvent importation of bicycle parts from Asia and assembled in South Africa (DoT, 2014). The ability of the country to build manufacturing capacity locally to support the economy can create jobs and develop local small businesses in the long run. Furthermore, explore partnerships (like public-private partnerships) with other role players to increase the number of funding possibilities and bicycle manufacturing to promote sustainable development.

6.4.5. Public-private partnerships (PPPs)

The key objective for this study is to address poverty and, in particular, inequality and exclusion; and create an inclusive economy that supports all areas including marginalised communities. Roads are expensive to develop and maintain. According to the Council for Scientific and Industrial Research (CSIR), the total asset value of South African roads in 2010 has been estimated at R1 trillion, with the value of the paved road network probably making up about 80% of this (about, R800 billion). New roads and major repairs of existing roads typically cost about R3.5 million per kilometre for a secondary road, while constructing and maintaining heavy freeway structures can cost much more.

Therefore, it is important for the public sector to partner with the private sector to ensure infrastructure in the road sector is developed, operated and maintained and that it responds directly to the country’s priorities and the National Development Plan. The public private partnership in road infrastructure development, in general, can be a contractual
agreement between the public and private sectors aimed at better delivery of roads projects. The partnerships that the government in South Africa would enter into would help in accelerated implementation of road projects with new approaches and better management techniques that are at the disposal of the private sector.

As the private sector has the capability to invest in terms of resources to handle large and complex road projects, the resource-strapped public agencies have an option to prioritise their social commitments. The participation of the private sector has social benefits as it can help in empowerment of local contractors and consultants and paves a way for entrepreneurial development. This helps the governments in Africa to plan and allocate their resources for better use elsewhere.

6.4.6. Social cohesion and community involvement

The strategic intent of the programme is to ensure that all community members of South Africa take an active role in their communities and that they participate in the planning and implementation of government programmes and in service delivery. In addition, provincial and municipal government could form strong links with communities, NGOs and other civil society structures to promote active citizenry and empower the unemployed, the youth and women.

These interactions with others strengthen rural people’s identity, build their self-esteem, develop a sense of belonging, close inter-generational gaps and contribute to building a better life for all. This connectedness fosters a sense of belonging that will propel young people to reach their personal goals and develop their full capacity. In essence, social cohesion helps young people to become aware of themselves, their rights and responsibilities. This process is, therefore, equally important in the holistic development of the society.

It is recommended that government (both provincial and municipal) should enhance participation of rural people in road development and planning. More importantly,
government needs to recognise that marginalised communities have diverse road needs and interventions should be designed according to their context in order to strengthen social cohesion to effectively integrate community development programmes in government strategies.

6.4.7. Regulations

Law enforcement will be required for purposes of the Road Traffic Quality System (RTQS) and overloading. Law enforcement in the transport industry should not be negotiable. Many accidents, often fatal, are attributed to break failure, burst tyres and other vehicle defects which are a sure indication that operators are not fulfilling their duties in respect of ensuring the roadworthiness of vehicles. In fact, government officials in some vehicle testing stations who issue certificates of roadworthiness to un-roadworthy vehicles should be held accountable for their actions and face the wrath of the law.

Moreover, government should develop an effective and visible traffic enforcement strategy to improve road safety in the minibus taxi industry, acknowledge its vital role through adequate investment and provide education and training to make sure that taxi operators are made aware of road safety and customer care levels.

6.4.8. Congestion and Travel Demand Management

According to the Johannesburg Roads Agency SOC (LTD), in 2011 a survey showed that 78% of 3.8 million drivers on Johannesburg roads are stuck in severe traffic jams daily. In this regard, the government intends to introduce Travel Demand Management (TDM) strategies. These will assist in changing travel behaviour to increase transport system efficiency. TDM measures and strategies do this by reducing the demand for transport in peak periods, and by reducing reliance on cars, especially the use of single-occupant-vehicles (SOVs). Further, the tolling of urban roads, high parking charges and congestion charges are some of the available mechanisms for increasing the costs for private car use and pushing car users
towards public transport. However, public transport alternatives need to be in place (the positive side) to make this fair and practical as an incentive.

The key proposed TDM strategies are: (1) Prioritising public transport on the road network system (2) Promoting ride sharing to decrease the number of individuals per private car (3) Promotion of flexi time, variable working hours and other employer policies to reduce private car use in work to home trips.

6.4.9. The prioritisation of Non- Motorised Transportation (NMT) services

An NMT strategy can be used to address some of the challenges faced in marginalised communities, in particular for school children who experience long walking distances. For example, shorter distances can be made more attractive for pedestrians and cyclists through land design and NMT interventions that are more convenient than vehicles’ routes. This will not be practical in all circumstances, but can be an intention for scholar transport that supports broader NMT objectives (Provincial Government Western Cape, Department of Transport and Public Works, 2009:10).

In the case of urban schools, the Non- Motorised Transportation (NMT) such as bicycles will be used as an alternative mode of transport that will relieve congestion on public roads and contribute towards reduced energy consumption and emissions. Shova Kalula is one example of strategy aimed at improving access and mobility of farm workers and women in rural, urban and peri-urban areas. The prioritisation of the Shova Kalula bicycle programme is to ensure that NMT programmes are promoted and integrated into the mainstream public transport system.

In rural communities, government can strengthen non-motorised transport services such as cycling and animal drawn carriages. Equally, supportive infrastructure (like tractor tracks, cycle tracks, footpaths) for the non-motorised transport can be pillars to sustain these modes because of the low operating costs and lower demand for infrastructure.
The development of NMT can be contextual and the development of the bicycles mode of transport in some marginalised areas can be critical for transporting school children/or lower income groups. Bicycles are the main land-based intermediate means of transport, and they can be important for peri-urban and rural transport aimed at carrying people and goods (Heyen-Perschon, 2004). Bicycles are capable of covering a distance five to ten times greater than walking. It the responsibility of all spheres of government to jointly developed key innovation strategies that are contextualised to their specific provinces and municipalities to address these ongoing challenges in the country.

6.4.10. Education and training

Education remains a key to unlocking the future of most marginalised communities in South Africa, in particular the transport users. It is evident that improved educational attainment remains a challenge that needs to be addressed to rectify the imbalances in the country. In fact this factor is a cause for concern, given that poor road development severely curtails the prospects of development in most marginalised communities.

It is recommended that government should consider driver training as a required subject for young people before they matriculate from secondary school. This training must include traffic comprehension and a thorough knowledge of road signage, as well as practical skills in driver training. Further, the department of education and traffic enforcement needs to consider the motor driving issues as being equally important, and they should be integrated into other aspects of education and education policy.

6.4.11. Control of population migration to urban areas of South Africa

In rural areas, people face poor road development needed for accessing services and facilities, which results in fewer employment opportunities and less information than in urban areas. There is also a great concern over the rural-urban migrants who are predominantly young, skilled, knowledgeable and innovative leaving their communities. Young people are attracted by possibilities that urban areas can offer. This reproduces the
cycle of rural impoverishment and exacerbates the urban bias with regards to current development initiatives.

It is recommended that uniformity is not an option in marginalised communities’ development. Innovation system stressed that service delivery to marginalised communities requires a trade-offs between equity and efficiency in making decisions on public infrastructure investments. Recommended strategies for service delivery would include (1) coordination and cooperation across municipalities and sectors; (2) public private partnerships; (3) support and assistance for voluntary community work and non-profit organisations; (4) mobile service units and (5) the use of technological development for service delivery. This can start by developing good road infrastructure (like bridges and surfaced roads) which will support the processes of development ideology to take place.

6.5. Evaluation

This study is an integral part of the process of ensuring that progress on achievement of the policy objectives is tracked and consistent evaluation of the policy is ensured. The study argued that improvement in road and infrastructure development targets is a mechanism of making government accountable to the economy and society about the road provision mandate regardless of geographical location.

Emphasis could be on assessing the relevance, performance, challenges, successes and the impact of road policies and infrastructure strategies designed to support socio-economic development of the country. The success of the study requires that capacity is built to carry it out meaningfully. This involves government making the appropriate budget allocations, enlisting the required skilled human resources and taking action to ensure appropriate institutional empowerment. In addition, the study stressed that the marginalised communities of South Africa are among the primary stakeholders and beneficiaries of road policy and infrastructure strategies.
The study emphasised an inclusive policy that focuses on holistic development of roads supported by good infrastructure. It is highlighted that the implementation of the policy must integrate not only the government’s policy planning frameworks, but also the communities directly affected by this policy development. Equally, all three spheres of government, the private sector and regional/ or local institutions, labour, religious organisations, social services, planners and environmental groups all have a stake in these issues and need to come together to develop a shared vision (Ontario Healthy Communities Coalition, 2003:3).

More importantly, they also need to look at what resources and capacities exist within the community and ensure that they are being used effectively. By sharing their information, expertise and resources and by working together, they will better be able to achieve their goals. The integration will prioritise marginalised communities’ development to ensure that the implementation process is carried inclusively and accountably. In addition, the study stressed that government should partner with civil society organisations in road policy planning and implementation to make development a reality.

The study suggested that it is also important to note the need to formulate contextualised strategies and action plans that can be aligned to communities’ specifications rather than generalisations. It is through a clear definition of roles and responsibilities of participating stakeholders as well as the provided capacity that the desired results can be achieved. For example, Ontario Healthy Communities Coalition (2003:1) argued that a clear understanding of what local governments do, and how they work, is an important first step in making valuable links between the community and its local government. And a stronger understanding about community groups will help governments to make the most of these partnerships and design inclusive developmental plans.
6.6. What the research can help to achieve in the future

- It is aimed at helping the government of South Africa to foster collaboration and partnership, especially with and between developing countries at the local, national, regional and global level.
- It is aimed at building on existing efforts and best practices and also focuses on user needs.
- It aims at fostering information exchange and knowledge development.
- It aims to promote networking and providing access to resources for all road users in the country, especially marginalised communities with limited access to various infrastructure services. In addition, where needed, networks should be established to cross-fertilise disciplines and promote integration where appropriate.
- It targets enhancing the sustainability of existing and future road infrastructure capacity building efforts by building awareness amongst decision makers in developing countries and South Africa.
- It aims to facilitate the development of comprehensive, sustainable capacity building efforts that address road infrastructure capacity needs, education and training, and building local institutional capacity. This must be accompanied by educational outreach to decision makers, which reinforces the value of road infrastructure development. Significant initial investments with multiple stakeholders are required to ensure that these resources are available on an ongoing basis. Further, training and mobilisation in marginalised communities related to infrastructure capacity building efforts should focus on service provision and utilisation.
- It is aimed at facilitating the development of national and regional capacity - governments and regional institutions are aware, to varying degrees, of the socio-economic benefits of road infrastructure for sustainable development. Also they invest, to varying degrees, in research and operations, and with different balances of activities. In addition, value can be added by building on existing national and regional mechanisms (especially in developing countries like South Africa) to leverage human, technical and institutional capacity to access, use and share data, information, infrastructure and services.
Lastly, it aims to engage all three spheres of government, the private sector and regional/ or local institutions, labour, religious organisations, social services, planners and environmental groups on road infrastructure development priorities by coordinating existing and planned road infrastructure efforts and collectively identifying priorities. Marginalised communities should be better positioned to attract resources to address human, institutional and infrastructural gaps in road infrastructure development. Further, an integrated and coordinated approach would facilitate engagement with the all three spheres of government, the private sector and regional/ or local institutions, labour, religious organisations, social services, planners and environmental groups and thereby interact with each other to exchange information about needs and resources, become engaged in the planning and decision-making processes that affect them, and work together to achieve the common goal position road infrastructure development to align with donor priorities.
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