

CHAPTER 11

EMERGING TRANSPORT REALITIES



11.1 Introduction

This chapter provides an overview of transport themes that have emerged as being pertinent to completing the synopsis update and that are important to the transport community in South Africa and, therefore, merit singling out. The themes include:

- **Urban transport and smart cities**
- **Transport demand management**
- **Integrated transport**
- **Accessible or universal transport**
- **Road safety**
- **Rural transport**
- **Tourism and transport**
- **Agri-parks**
- **Science, technology and innovation in transport**

Road safety as opposed to transport safety has been examined as the current view in transport is that South Africa's road safety record, reflected in current trends, is a serious concern. This does not mean that transport safety is not important in other modes (including air, rail, pipeline & sea). Each of these modes have existing guidelines, regulations, practices and policies in place. These modes have in general a much better safety track record. Road safety is a function of driver behaviour adhering to regulations and policies. Addressing the challenges in road safety is of greater importance currently.

In many respects road networks are "open" networks opposed to the "closed" networks of air, rail, pipeline & marine networks. "Open" implies access to and interaction in the same system by many millions of drivers or operators exhibiting different and inconsistent driver behaviour. "Closed" implies access to a transport network is limited, well defined in terms of route, is fixed and or controlled. Due to the interaction and decision making of drivers on the "open"

road network, the likelihood or statistical changes of incidents occurring are much higher than on closed or contained networks. For this reason this chapter examines the challenges associated with road safety opposed to transport safety and formulate interventions to turn the existing trends around.

There are also known safety concerns to commuters using the rail network. This safety concern is more associated with the personal safety of use of the network to the commuters rather than the operating safety of using railways as mode of transport. This may explain some commuter's reluctance to shift from road based modes to rail. This issue has been raised in Chapter 8 of this report and it has suggested that a possible intervention in reducing road accidents is to address personal safety of commuters on the rail network to encourage modal shift.

This chapter highlights current and emerging realities relevant to these parameters and the primary issues and/or challenges faced in each, along with a concise set of recommendations.

11.2 Urban Transport and Smart Cities

The objective of urban transport and smart cities is to ensure that public transport becomes the basis for providing effective access to jobs, opportunities, education and social facilities. The intension of the smart city concept is to dramatically improve the quality of public transport targeted at the current public transport market whilst ensuring that structural upgrading attracts a steady increase in market share. A couple of planning and policy principles that have come to the fore at municipal level over the last few years support this intention, including the development of integrated rapid public transport network plans (IRPTNs) as well as transit-orientated developments (TOD). TOD refers to mixed use residential and commercial areas designed to maximise access to public transport and, often, to incorporate features to encourage public transport ridership. In supporting smart cities, TOD will be able to support the requirements of public transport in that it creates spatial density and attracts regenerative development around public transport corridors that help build passenger numbers. **Figure 11-1** illustrates the TOD concept. After nearly two decades since the publication of the White Paper of National Transport Policy, public transport in South Africa is still inefficient in some instances and not focused sufficiently on the customer. Its levels of reliability, predictability, comfort and safety are still poor for some of the modes, as well as promoting accessibility to the service and being universally accessible

The following issues supporting the challenges have been defined in relation to urban transport and the smart cities concept:

- Limited integrated land use and public transport planning is taking place in South Africa.
- Public transport does not play a big enough role in supporting accessibility and mobility objectives.

- Public transport roll-out is being constrained by a lack of institutional capacity (people and structures in place to implement policy).
- There is no drafting and approval of a public transport restructuring and roll-out plan for South African cities.
- There is no public transport system strategy for cities and towns.
- There is no central coordination for integrated rapid transport network (IRPTN) planning and knowledge sharing to ensure consistency and best practice in implementation.



FIGURE 11-1: TRANSIT-ORIENTATED DEVELOPMENT CONCEPT

11.3 Transport Demand Management

With rising car ownership and use, pressure is mounting on the road network's ability to accommodate increasing levels of single-occupant vehicle (SOV) trips in urban areas in particular. The problem is exacerbated by poor quality public transport connectivity and coverage and the absence of real opportunities for modal shift. In addition, the road network continues to be expanded without consideration as to how best to integrate land use and transport planning to slow down the pace of road network expansion to accommodate growing demand. The result is an increase in road-based traffic congestion, unacceptable levels of air pollution, and a reduction in human productivity.

Lessons from elsewhere in the world suggest that transport demand management (TDM) is a useful tool in conjunction with land use management (LUM) and transport supply management (TSM) to manage effectively the unabated growth in vehicular traffic. TDM is a general term for strategies that increase overall system efficiency by encouraging a shift from SOV trips to non-SOV modes or shifting car trips out of peak periods by influencing driver behaviour. In the main, TDM measures aim to influence travel behaviour for the purpose of reducing and/or redistributing travel demand.

In South Africa, there are no national policies/plans/guidelines to provide strategic direction to the role of TDM in transport planning or to indicate how and when it should be implemented. A comprehensive TDM policy to guide all spheres of government in terms of the full set of measures that are available and where and how these measures should be implemented, considering local site-specific circumstances, appropriate thresholds for implementation and the roles of and linkages between TDM, LUM and TSM, does not exist. TDM is incentivised in the integrated city development grant and is supported in the cities support programme. This only provides for metropolitan municipality support where it matters most. However, metropolitan municipalities rarely define a full package of TDM measures

or actions over a 5-year period. Limited attempts by district municipalities and municipalities are made to strategise the implementation of TDM measures and to integrate or combine such measures with TSM and LUM ones.

There is a public and industry misconception that TDM involves only hard measures such as road pricing, congestion charging and e-tolls when the toolkit, in fact, also contains a variety of soft measures. TDM measures are politically and publicly unpopular because, at present, TDM is communicated poorly and is sold on its own merits instead of its value within a wider, more balanced package of measures, including LUM and TSM. Most TDM measures are cost-effective overall but too modest to significantly impact overall travel patterns. Hence, their inclusion in a wider package of measures is essential. The consequences of the lack of a national TDM policy have resulted in ever-increasing traffic congestion, rising CO₂ emissions, infrastructure expenditure, mobility and urban sprawl, all of which impact negatively on the economy. Not having a national policy position also exposes the government to debates that distract from a spirit of cooperative governance and holistic decision-making. These considerations also imply that land use and transport policy integration has not been effective enough and that modal split objectives in IRPTNs have not been met.

There is national recognition that TDM must become a core strategy at the local and provincial levels of government. A comprehensive set of guidelines and policy is required. The emphasis on policy development should be to keep the expansion of the road network to a minimum and to focus on improving the quality and the application of demand management mechanisms.

The following issues and/or challenges have been defined in relation to transport demand management:

- There is no DoT national TDM policy that sets the direction to change driver behaviour using a balanced package of measures.
- TDM measures are erroneously stigmatised as tolling measures.
- Land use transport integration does not force the sufficient integration of LUM, TDM and TSM.
- TDM is not incentivised.
- Effective TDM implementation requires TSM and LUM implementation in support.
- Private sector development does not support TDM principles (e.g. no travel plans, high minimum parking ratios, schemes driven by tenant and not by planning policy that encourages sustainable development).
- There is a lack of appropriate integrated planning aimed at traffic congestion reduction.
- There is road freight congestion in urban areas, especially at or near termini (ports, container termini and airports).

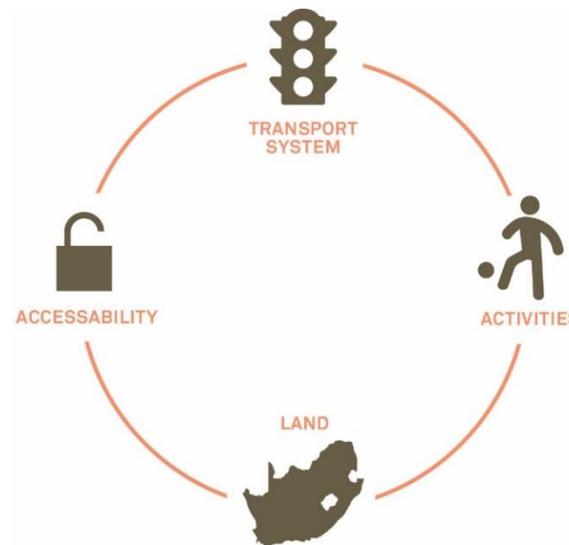
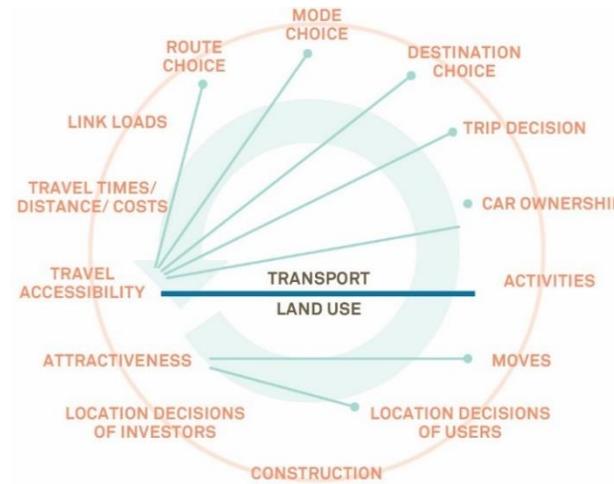


FIGURE 11-2: LAND USE TRANSPORT FEEDBACK CYCLE

11.4 Integrating Transport and Land Use

Transport planning in South Africa is done in a way that is somewhat uncoordinated and typically in modal and sectoral silos. There is a lack of consistency between transport and land use planning practice. This means that many transport projects that can derive increased economies of scale and efficiencies from integration are being implemented and planned in isolation. The disjoint between transport and land use planning is, for example, demonstrated where spatial planning policy has resulted in low settlement density and/or spatial segregation that are not supported by appropriate accessibility options or public transport provision. This results in higher transportation costs across the board, again resulting in reduced opportunities to access employment, increased poverty and reduced economic productivity. Whilst it is a legal requirement of the NLTA that all major cities prepare and implement integrated transport plans (ITPs), a review suggests that most plans are simply produced to fulfil statutory compliance with little action or follow-through in terms of implementation. ITPs also do not feature strongly enough in IDPs in terms of implementation. The objective of applying integrated transport planning is, therefore, to find a balance between spatial land use decisions and transportation planning so that the economic, social, cultural and physical potential of the transport system, as well as society as a whole, can benefit optimally from the planning and investment decisions made. It is vital that land use and transportation planning share common objectives and desired outcomes. Where options, goals and viewpoints differ, realistic solutions must be agreed upon to address community problems.

Trips being undertaken between points A and B are the result of activities, which take place at different locations. The recognition that trip and location decisions co-determine each other and that transport and land use planning, therefore, need to be coordinated has led to the notion of the land use transport feedback cycle (IRPUD, 1999). The

relationships implied by this term are summarised and illustrated in **Figure 11-2**.

- The distribution of land uses, such as residential, industrial or commercial, over the urban area determines the locations of human activities such as living, working, shopping, education and leisure.
- The distribution of human activities in space requires spatial interactions or trips in the transport system to overcome the distance between the locations of activities.
- The distribution of infrastructure in the transport system creates opportunities for spatial interactions and can be measured as accessibility.
- The distribution of accessibility in space co-determines location decisions and so results in changes in the land use system.

Integrated transport planning is, therefore, an ongoing process to ensure that all modes are treated equally and that all segments within the freight and passenger transport sub-sectors are adequately provided with an effective transport system. In reality, land use and spatial features change slowly over time. Appropriate and integrated upfront planning is important, what with a spatial vision only being realised 15 to 20 years after its initial planning. Good planning is not something that takes place over night but is a product of well thought-out interventions implemented in sequence with adequate demand-driven and developmentally driven infrastructure provision creating a sustainable environment.

To ensure that integrated transport planning takes place, it is a requirement that all authorities develop IDPs and ITPs and work hard at implementing them. Their purpose is to provide a vision to develop land transport services infrastructure and associated institutional arrangements for the different components of land use and transport (housing, environmental and funding components are also considered in the IDP) so as to meet current and future demands. An ITP demonstrates how the different transport components must be integrated to create an optimal transport system to

achieve the vision objectives and strategies adopted. The ITP is a plan that needs to be developed by considering vital inputs from the IDP, which provides guidance on the overall future development of the municipality. The ITP and IDP, when read together, deal with land use, economic development, engineering services, transport, health, housing, education, social services, and the environment.

The abovementioned provides an overview of the current requirements and policies and broad legislation that need to be considered in integrated transport planning. However, to integrate national, provincial and local level decision-making effectively, improved horizontal and vertical decision-making processes and forums are required, including the National Transport Forum. Without effective multidisciplinary implementation and a razor-sharp understanding of the strategic direction of travel, a break in the feedback loop between land use, transport, economics and infrastructure plans will result, which, in turn, will break the cycle of effective integration. Integrated transport planning needs to take into consideration not only the transport system but also land-use, economic development and infrastructure provision (water, electricity, sanitation). Integrated planning in these sectors will support progress towards integrated transport planning.

In some respects, integrated transport planning is erroneously considered an integration tool only and often the effect that land use, the economy and infrastructure have on the transport system provision is neglected. There is an intrinsic link between land use, transport and economic development; one of them does not occur without having an impact on the others.

Below is a summary of some emerging issues and/or challenges faced by professionals tasked to implement integrated transport planning:

- The prohibitive cost of data collection and the update of IDPs and ITPs are a burden on several local governments' budgets.

- IDPs place very strong emphasis on public transport and regulation but less emphasis on how to implement them.
- The implementation of an integrated approach to the development of sustainable liveable settlements remains challenging. The impact of economic development strategies on the spatial environment, institutional arrangements and the provision of related municipal services has to be evaluated. Where a negative impact occurs, typically the economic or spatial or service approach needs to be adapted. There is no such holistic approach in South Africa at this point. To move a city or settlement forward, there needs to be change in all planning and development components.
- The planning cycles and terms are unsynchronised.
- There is a lack of clear and effective leadership in the driving of integrated planning.
- Inadequate technical and managerial skills and institutional capacity.
- Poor accountability.
- There is a lack of monitoring, evaluation and feedback to improve systems and process.
- There is a variety of financing procedures, capacities and funding across the different spheres of government.

11.5 Accessible or Universal Transport

The objective of accessible transport is the provision of both universal and general access to transport services and opportunities to all public transport users, including special categories of passengers. Universal access within the context of transport refers to the provision of supporting facilities and rolling stock to give all passengers equal access to all modes of transport. Universal access requirements associated with transport and, specifically, public transport provision must consider and accommodate the diversity of passengers. The NLTA (Section 1) defines **“special categories of passengers”** as *persons with disabilities, the aged, pregnant women and those who are limited in their movements by children* and **“persons with disabilities”** to mean *all persons whose mobility is restricted by temporary or permanent physical or mental disability, and includes the very young, the blind or partially sighted and the deaf or hard of hearing*.

In addition, whilst not directly addressed in the NLTA or associated regulations, there is a grouping of people that is not clearly defined in the context of universal access, namely signage passengers. This group of public transport users consists of people who, for reasons of illiteracy, age, or lack of familiarity with the language or the language of the sign, are disempowered or disabled through an inability to access information that will enable them to use the public transport system more effectively.

Accessible transport and the universal accessibility of services have been addressed in a number of areas, policies and plans by the DoT since the inception of the NATMAP 2050. Recently, the DoT went out on an open public tender to solicit bids from service providers to develop regulations on universally accessible public transport. At provincial level, various provinces have either included universal access principles in their provincial land transport frameworks or developed policy statements (for example in the Western Cape and Gauteng).

As part of the development of ITPs, IRPTNs and IPTNs, all municipalities are obliged to define their accessible transport policy and implementation plans when developing these new systems and integrating existing services and facilities. It is a requirement from the DoT that all systems receive a public transport infrastructure grant (PTIG) and public transport operating grant (PTOG) and be given a universal design access plan (MyCiTi 2014). Major cities are also developing universal access policies for adoption by the council (TCTU Policy 2013).

Strategic issues and challenges relating to accessible and universal transport include the following:

- The high cost of accessible infrastructure and rolling stock provision
- The provision of accessible or universal transport in rural areas that responds sensitively to demand
- The high and ineffective operational costs of dedicated universal accessible transport
- The travel chain should be universally accessible, from origin to destination, which requires more than just the transport sector to create universally accessible solutions



11.6 Road Safety

South Africa has one of the world's poorest road safety records – ±31.9 fatalities/100 000 people while comparable developing countries have a much lower fatality rate, as shown in **Figure 11-3**.

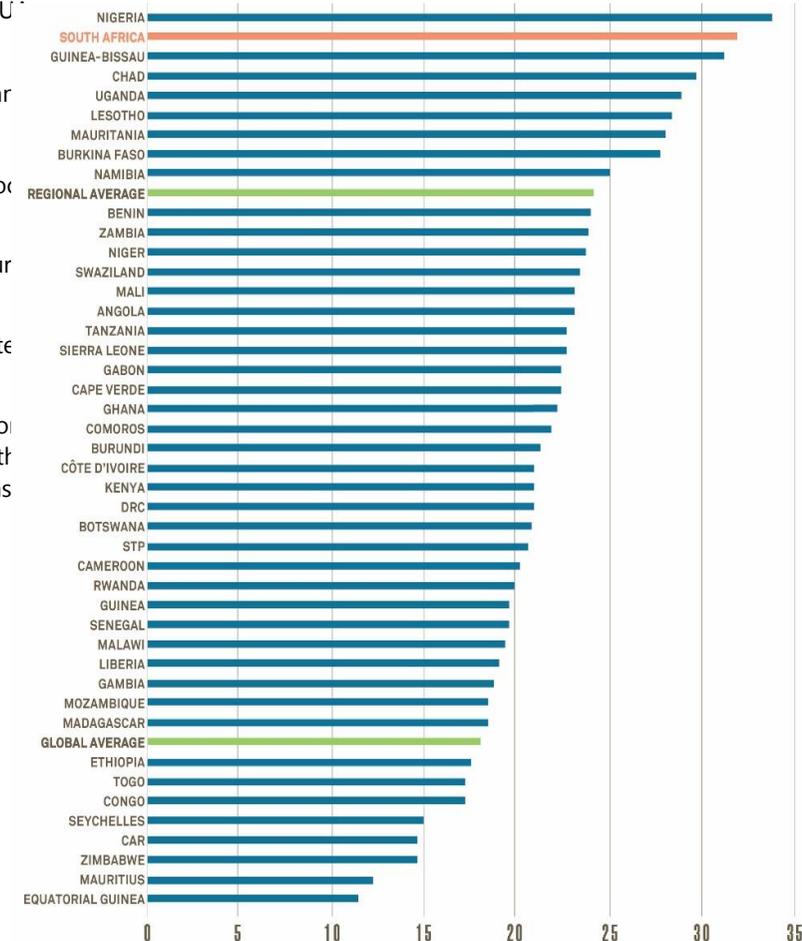


FIGURE 11-3: ROAD SAFETY STATISTICS: COMPARING SOUTH AFRICA TO OTHER AFRICAN COUNTRIES (Source: WORLD HEALTH ORGANIZATION, 2010)

For African countries, the average fatality rate is ± 24.1 fatalities/100 000 people, whilst, globally, the average is ± 18 fatalities/100 000 people. In South Africa, approximately 1 million road accidents are reported per year. The majority of the accidents that occur are caused by human factors, with, on average, over 40 people a day being fatally injured and at least 20 being left permanently disabled. South Africa is not achieving its road safety objectives. The poor road safety record has detrimental impacts on South Africa's economic productivity, costing the economy approximately R133 billion a year.

The DoT recently embarked on the Decade of Action for Road Safety 2011–2020 in line with the United Nations Global Plan. It aims to reduce accident statistics by as much as 50% by 2020 with 2010 being the base year. Since 2010, South Africa has experienced reduced road traffic fatalities, with the figures reducing steadily from 15,419 in 2006 to 12,702 in 2014 (according to the emerging National Road Safety Strategy 2016-2030).

Over the years, progress has been made in a number of road safety areas. Specifically, improvements have been made in the framing of the road safety challenges in the country, with an increasingly clearer and more holistic focus. Major themes across all strategies have been aligned to current best practice and a good understanding of the major problems facing road safety has been developed. However, reductions in road deaths have not decreased at the rate required for South Africa to achieve an aspirational 50% reduction.

Summarised below are some typical issues and/or challenges identified:

- Given overall inaccessible public transport, passengers travel in unsafe and aging vehicles
- Incoherent implementation of the road safety strategy
- Many good initiatives lack the funding required to enable implementation

- Data collection, analyses and the evaluation of the performance of safety initiatives take place inconsistently, resulting in delayed corrective measures being introduced
- Road safety enforcement is inconsistent and comes across as knee-jerk reactions to specific occurrences
- A very high number of fatalities (31.9/100 000) with a high pedestrian–vehicle accident rate
- Concern regarding road safety at rail level crossings
- The driver licencing system needs to be reviewed in terms of education and learning
- Inappropriate, reckless and aggressive driver behaviour.

11.7 Rural Transport

Rural South Africa is characterised by relatively poor connecting infrastructure in some provinces, large distances, sparsely populated regions, self-sustaining communities, dispersed demand and relatively low incomes. Because of this, and historical backlogs in service delivery, rural people have poor access to basic social services and the economic mainstream. Rural areas account for about 40% of South Africa's population, with about 21 million inhabitants living in rural areas. These areas' remoteness from major economic hubs and low population densities often mean that the provision of public transport infrastructure and services in these areas is financially unviable. The result is the isolation of rural communities with limited mobility options, which, in turn, results in the inability of rural area inhabitants to access economic opportunities in the formal labour market. This contributes to perpetuated poverty. Rural transport includes the following components:

- **Rural transport infrastructure (RTI)** – Includes all transport-related infrastructure, ranging from proclaimed district or feeder roads to village-level roads and non-motorised infrastructure such as tracks, trails, paths and footbridges, most of which are often not proclaimed or registered.
- **Rural transport services (RTS)** – Includes services provided by operators of all modes of motorised and non-motorised transport and private users (e.g. head loading, private vehicular transport).
- **Integrated public transport networks (IPTNs)** – Relates to the provision of improved accessibility and mobility by integrating public transport services between modes. Rural IPTNs also aim to promote the integration of transport infrastructure among modes.

Summarised below are some typical issues and/or challenges identified:

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- The accessibility of mainstream/formal transport infrastructure and services remains poor predominantly in rural areas
- The lack of sustainable economic activities in rural areas results in emigration from these areas
- Fragmented development patterns hinder consistent and integrated rural transportation system development
- Disjointedness between rural and urban transportation systems
- Low population densities of some areas
- The rural transport network is limited, carrying significant amounts of freight traffic in only some parts of the country
- The implementation of rural transport strategies is hampered by a lack of prioritised funding and technical or managerial capacity to oversee the roll-out of projects at district level
- A national strategic rural transport system that connects major nodes that focus investment and action does not exist
- Lack of off-road infrastructure such as paths and tracks for non-motorised transport modes
- Inadequate institutional capacity to implement rural transport planning
- Inconsistent planning, monitoring and execution
- Funding constraints.

11.8 Tourism and transport

Tourism cannot exist in isolation from transport due to its intrinsic relationship. There is a strong positive correlation between tourism and transport. Travelers and economic growth are therefore best served by cooperative and collaborative relationships between those who formulate and implement public policies pertaining to transport infrastructure and to travel and tourism. The improvement or modernization of transport or deterioration of the same has a direct impact on tourism.

Transportation links diverse destinations and carries people, commodities and services between these places. Tourism is much about travel and therefore the role of transportation in its operation is vital. The advent of air travel has shrunk the world and the motor vehicle have made traveling anywhere a possibility this reality together with changing work patterns and innovative marketing have propelled international mass tourism throughout the years.

The transport system used by a tourist has an impact on the tourism experience which explains how people travel, their choice on forms of holiday, destinations and transport modes. Tourism use different transport modes. Car travel is most widely used and the most dominant in the world tourism notably due to its flexibility, price and independence with the availability of cars at even cheaper prices means an increase in availability of this mode of transport and hence the growth of tourist volumes. Rail travel is another transport mode used by tourists, whereas air transport is the most effective in terms of long distance and speed but due to the high cost only a small proportion of people worldwide use it. Long journeys can be made in a small time period and with this a tourist can afford to visit different places in a limited time if the cost factor is ignored.

The improvement of modes of transportation coupled with low fares has created accessibility of areas once seen as off-the-beaten-track rise. Access to a specific tourism site differs according to the nature of the site, state of infrastructure, and the efficiency of public transport. Transport policies and

government decisions about tourism and transport therefore influences the destinations available to tourists. Failure of public sector to cope with demand concerning transport infrastructures may result in a lack of tourism development in such areas. The following issues and/or challenges have been defined in relation to the link between transport and tourism:

- Aging road network, its condition, the lack of funding, and the lack of road condition data and maintenance of a Road Asset Management System detracts from integrated planning between transport and tourism sectors.
- There is a capital investments backlog in rail infrastructure (e.g. ageing rolling stock, signalling equipment and track) and technology (whilst this is being ramped up by government the process must be fast tracked).
- Based on current planning there are different interventions per typology. In the main metros for example, Bus Rapid Transport (BRT) system are being rolled out on multiple main corridors. In other less populated metros or emerging cities there are no BRT lines. Public transport modes appear to compete against each other. A coordinated / master plan approach is required.
- Greater efficiency of passenger liner facilities in ports (e.g. Durban & Cape Town) are required to address capacity constraints to accommodate large volumes of passenger traffic.
- Due to sub optimal interaction between the transport and tourism sectors, less social economic growth potential and job opportunities are created.
- The private tourism sector is not playing a critical role in tourism planning.
- A land transportation sector not geared to service tourists
- Lack of inclusive, effective national, provincial and local structures for the development, management and promotion of integration between transport and tourism sectors.

11.9 Agri-Park Programme

An Agri-park is a networked innovation system of agro-production, processing, logistics, marketing, training and extension services, located in a District Municipality. As a network it enables a market-driven combination and integration of various agricultural activities and rural transformation services. The concept for Agri-park draws from existing models both, locally and abroad, including educational/experimental farms, collective farming, farmer-incubator projects, agri-clusters, eco-villages, and urban-edge allotments and market gardens. These models may exist on both public and private lands. Agri-parks can serve as transition zones between urban and agricultural uses. The focus of the Agri-park is primarily the processing of 'agricultural products' (and the mix of 'non-agricultural' industries may be low or non-existent). Of prime importance will be linkages between the parks and surrounding agricultural land for production;

The Agri-park approach will include the selection and training of smallholder farmers, as well as selecting farms per province for the placement, incubation and training of unemployed agricultural graduates and other agro-entrepreneurs.

The Agri-Park Programme forms part of Government's undertaking to review all land reform policies as enunciated in the 2011 Green Paper on Land Reform and the support that needs to be provided. The model will have a strong social mobilisation component so that black farmers and agri-business entrepreneurs are actively mobilised and organised to support this initiative. The DRDLR's strategic partnerships with key government departments such as the Department of Agriculture, Forestry and Fisheries and the Departments of Cooperative Governance and Traditional Affairs, the Department of Trade and Industry, the Department of Water Affairs and Sanitation and other spheres of govt.

Agri-parks are found in all 44 Districts of the Country. They link farmers to farmer production support units and in turn

"transport (that) does not endanger public health or ecosystems and meets needs for access consistent with.

- use of renewable resources below their rates of regeneration, and*
- use of non-renewable resources below the rates of development of renewable substitutes."*

OECD. 1996

connects the farmer production support units with Agri-hubs where processing takes place and also with Rural Urban Market centers where the products are sold to markets.

11.10 Science, technology and innovation in transport

The convergence of new technology, innovation and social networking that created the sharing economy is shaping major changes in transportation. Across the globe progress is made with technology that will reshape the way we move in the future – in some respects the future is here today. With the advent of:

- The Internet of Things (IoT)
- Digital Disruption
- Big Data
- Autonomous vehicle technology

The question that we are facing is how to not only respond to these changes, but what to do to position transport ahead of the "curve" and or at least part of the "curve" to stay relevant in the future. With improved connectivity and integration of data sets, a deeper understand is necessary about how people and goods will move in the future.

In some respects the typical way of planning for the future is carried out by looking back at past trends and interpreting such data and project it to the future to predict trends. This might be an old fashioned approach, because if we are plan for the future on the basis of what we saw in the past, transport of the future might not be that much different to what we have today. Or at least the rate of change or progress will be slower. Herein lies the challenge - we need to be bold and take a different view of what we would like our transport system to be like in the future, the type of technologies we employ, understand the reasons for travel and adding intelligence behind it to determine how different technologies will make travel faster, cheaper and more convenient. By applying science, technology and innovation in transport we will be able to change the face of transportation in our country.

Population growth and rapid migration to cities make it harder to predict and plan potential public transport routes that can answer the needs of inhabitants. In low-density cities and rural areas it is more difficult to introduce cost-efficient public transport due to increased distances and a decreased number of people per trip. If we introduce inappropriate technology it will take years to reverse transport strategies that do not answer the needs of our people, due to the cost and scale of underlying investments.

Investing in car orientated infrastructure causes lock-in that multiplies investment needs for a later shift to means of public transport. Moreover, low population density results in higher per capita transport energy consumption. Mobility based on fossil fuel-powered cars is increasingly becoming a liability for the world's cities. In many cities, car ownership is too costly for the majority of inhabitants, for example in Nairobi, Kenya, where only 1 in 7 inhabitants has a car. Prioritizing car travel excludes most of the population from adequate means of transport. Car travel is the most spatially inefficient transport mode, as it can carry only 2,000 people per hour on a 3.5 metre-wide lane in the city, in comparison with up to 20,000 people via a single-lane BRT or LRT.

Traffic congestion causes economic damage to cities. For example, in Mexico City, Mexico the average daily commute time is 2.5 hours, creating a loss of 2.6 per cent of gross domestic product. The cost of traffic congestion is 10 per cent of the gross domestic product of Lima, Peru and 3.4 per cent of the gross domestic product of Buenos Aires, Argentina. Most of this economic loss comes from the value of the time lost by drivers and passengers. Moreover, congestion worsens carbon emissions and air pollution, resulting in negative effects on health.

Car travel requires vast land for roads and parking areas. New sprawling suburbs have high infrastructure costs and cause the loss of productive agricultural land as well as the loss of urban land to asphalt. Due to their hard surfaces, roads also make the absorption of storm-water more difficult. While fossil-fuel powered vehicle travel is

increasingly becoming less sustainable, public transport is also facing the challenge of lack of interest. In particular, public transport projects that are undertaken without sufficient public consultation are likely to misinterpret local demand on transit routes.

At the same time, despite its drawbacks, car ownership is continuously increasing. The global private car fleet is expected to grow to 2 billion in 2022, mainly driven by motorization in Asia.

Mobility solutions should not only focus on supplying infrastructure but on answering the demand for infrastructure. They should be centred on the movement of people and goods instead of the movement of vehicles and deal with the causes of mobility issues rather than merely the symptoms. They are thus directly linked to spatial planning, as spatial plans dictate mobility options and whether or not cities may be walkable. Spatial planning that takes the different needs of urban and rural transport user groups into consideration from the beginning is a key factor in shaping the way in which we will travel in the future.

Each urban and rural setting faces different challenges and has different transport technology needs. In some cases, inexpensive and readily available technologies may be the best solution to problems. For example, intermodal transport services can be designed without necessarily requiring expensive high technology means of transport. Promoting bicycles (and walking), an affordable, healthy, clean and energy-efficient technology, may be the best option to improve mobility in many cities, for both young and old.

The Department of Science and Technology spearheads Innovation Priorities and Instruments with the aim of creating and sustaining an enabling environment for innovation, technology development, and the commercialisation of publicly funded R&D.

There is a greater need for the Department of Transport to work more closely with the Department of Science and Technology to lead the transport to 2050 and beyond.

The following technologies have recently emerged and the challenge is to find ways to respond to them in a constructive, inclusive and positive manner and incorporate them in the integrated transport system:

- Autonomous Vehicles
- Connected Vehicles
- Collaborative Consumption
- Electric Drivetrain
- Efficient Multimodal
- New Materials (including 3d printing)

11.11 Proposed Interventions

The following interventions are proposed to enable the achievement of the vision for and objectives of the NATMAP 2050 in the context of the strategic transport themes highlighted in this chapter:

11.11.1 Urban transport and smart cities

- Develop **national TOD guidelines** appropriate to urban and rural environments with respect to “how to plan”, “where to plan” and “how to implement”. Public transport provision and land redevelopment must be central to the formulation of any TOD initiative, whether it be relevant to minibus taxis, BRT/LRT, metro rail or the Gautrain
- Implement an OR Tambo **aerotropolis** and link it to wider regeneration development opportunities and duplicate of this theme in other cities, where relevant.

11.11.2 Transport Demand Management

- Develop **national road traffic demand management policy** considering the following principles:
 - Adopt the user pay principle
 - Reduce the need for travel by SOV
 - Diversify transportation options
 - Integrate land use and transport planning
 - Integrate non-motorised transport (NMT) philosophy in spatial development strategies
 - Encourage more efficient heavy goods vehicle (HGV) movements.
- Develop traffic congestion management plans in all metros.

11.11.3 Integrated transport and land use planning

- Develop an **integrated planning toolkit** (similar to the emerging NLTSP recommendations) that links policy

objectives to strategies/interventions, enabling the decision-maker to:

- choose an intervention that will deliver the objective and
 - review case studies that highlight examples of integrated planning
 - see <http://www.nzta.govt.nz/planning/process/trial-ip-toolkit/> for an example
- Enhance **efficient planning** to enable **better decision-making** and positive outcomes through **integrated horizontal and vertical decision-making**
 - Support the **National Transport Forum (NTF)** – the NTF should operate as a transport unit that coordinates all spheres of government in strategic transport and land use planning decision-making.
 - It should enhance decision-making by being the custodian of a central transport information bank and work with the Departments of Human Settlements, Rural Development & Land Reform, Planning, Monitoring and Evaluation, Cooperative Governance and Economic Development to share and disseminate information. It should support the establishment of local partnerships (described below) and provide technical assistance to provincial and local government.
 - It should provide all stakeholders involved in land use planning and transport decision-making with relevant land use and transport planning guidelines. It should define funding mechanisms and should indicate how these mechanisms will be distributed/allocated.
 - It should ensure consistent planning practice, providing skill transfer where needed across the country.
 - The role and wider technical requirements and operational make-up of the NTF should be gazetted

and communicated to all stakeholders, including provincial and local government.

- **Local partnerships** should be developed between planning, housing and transport departments to encourage more collaborative provincial and local government planning – facilitated by the DoT. The DoT and local governments share an interest in managing SOV demand, supplying infrastructure and building thriving liveable communities, and each has something to offer: the DoT has the necessary funding and expertise to address major transportation facilities, while local governments have the ability to realise compact development, mixed uses, and good local connections.
- Support the **devolution of transport management** to local government. This will help align the fragmented and conflicting interests of multiple transport authorities, each with separate funding sources and mandates. Handing responsibility for transport over to municipal authorities will only succeed if it is accompanied by the strengthening of institutions and the alignment of legislation, policy and practice.
- The DoT will develop adequate **staff expertise** and buy-in – transport departments cannot retrain all of their engineers to be land use planners, but it is important for staff involved in intervention development, selection, and design to understand how compact, well-connected land uses, with appropriately sized and designed transportation infrastructure, can reduce congestion and costs. Likewise, development planners must understand the consequences of spatial planning on transport provision. The DoT will, in collaboration with its partners and other national departments, provide technical assistance to provincial government and local staff to enable the development of multi-skilled resources in land use and transport planning.
- Reach out to the **private sector** – it has much to offer in skill and know-how transfer and best practice.

- The DoT will provide **technical assistance and develop analytical tools** to help local governments make better land use and transport decisions – for example, through scenario planning, business case development – and direct investments in ways that assist these governments. In developing expertise at local government level, sufficient interaction will be created to strengthen the outreach to local partners.
- Develop procedures to make sure **transport decision-making** takes land use planning principles into account and vice versa. Many transport departments have formal or informal yet important guidelines that bias decisions toward maximising highway LOS or operating speeds, at the expense of local access along or across sites. This bias may hinder compact infill development and reduce local connectivity. Planning guidelines must recognise traditional LOS measures as important but as only one consideration among many.
- Provide guidelines on the **flexible application of the rigid level of service** (LOS)-based mitigation requirements of road infrastructure planning that made desired infill and compact development harder in the past, pushing developers to greenfields fostering higher VMT.
- Invigorate district municipal **transport forums** and their coordination with the Provincial Transport Forum to align spending and strategic focus across departments, seeking to achieve common objectives and to ensure that investments from one authority support the planned investments of another.
- Provide **funding** for local priority projects that improves connectivity and multimodal options that link land use and transportation, lessening the pressure on provincial facilities infrastructure. Although the DoT and provincial government cannot control land use, they have a choice about where they want to invest their resources. The DoT can choose to spend resources in areas where local governments are focusing on effective land use planning. The DoT, along

with its partners, will consider land use at every corridor or project.

- **Develop guiding principles to clarify investment goals and guide DoT investment** (also see Chapter 14). To successfully coordinate investments across agencies and authorities, the DoT will establish a set of guiding principles that outlines its growth and development goals. The NTF will play a central role in this activity. Guiding principles serve a critical communications function both within state government and with the public, articulating the vision in a meaningful, easy-to-understand format. The principles will be concise and will apply to all relevant agencies, provinces and local authorities. The principles will be designed to help authorities prioritise investments and implement their policies so that they work together to further the national objectives. The process involved in developing these principles (or gateway approach) will also play an important role in transforming cross-governmental communication into cross-governmental coordination and action. A cross-governmental steering committee will be set up by the NTF to ensure that all members have a common understanding of the overarching objectives and solicit feedback from regional and local leaders to ensure that the principles accurately reflect needs and goals so as to foster buy-in for this new direction and to begin building a supportive constituency.
- Develop **national transport appraisal guidelines for transport projects** – develop a suitable set of assessment criteria to discriminate between/prioritise projects.

11.11.4 Accessible or universal transport

- Define regulations on **universally accessible public transport**

11.11.5 Road safety

- Implement the interventions associated with the 5 core pillars of road safety as described in the emerging National Road Safety Strategy 2016-2030, in relation to:
 - Road safety management
 - Safer roads and mobility
 - Safer vehicles
 - Safer road users
 - Post-crash response
- Prioritise the development of **safer road infrastructure** for all users particularly where infrastructure is known to contribute to accidents / incidents.
- Compulsory **road safety audits** should be undertaken, in collaboration with the Road Transport Management Corporation (RTMC) and reviewed every 5 years in accordance with the policy intent of the Draft NMT Policy.
- Department of Transport, via the RTMC, to educate appropriate personnel in undertaking **road safety audits**.
- Development of a **National Traffic Accident Databank**.
- DoT to create a **road safety forum** to facilitate an integrated approach to road safety management and traffic data collection, monitoring and reporting on road crashes via the RTMC – data to feed into National Traffic Accident Databank.
- The **Departments of Education, Health and Justice** should become involved in road safety management, as road safety is a co-responsibility and multi-disciplinary, multi-dimensional challenge.
- **Upskill and train personnel** at Provinces, Metros and other local authorities involved in road safety management to maintain a minimum level of skilled personnel.
- Completion of the roll out of the driver **de-merit system** by the RTMC.

- Develop and implement **Workplace Road Safety Management Systems** – employers will be required to develop such systems as parts of their Health and Safety and quality management systems. A suitable legal mechanism and lead agency (e.g. RTMC) is to be identified to ensure compliance of the intervention. The system should include the following elements:
 - Driver training to ensure competence
 - In vehicle monitoring systems
 - Mobile phone engagement
 - Journey management
 - Driver fitness and alertness
 - Vehicle specification (fit for purpose)
- Implement an **average (variable) speed limit strategy** in metropolitan areas and at known accident locations and or seasonal implementation. The intervention aims to balance the needs of traffic flow with the safety of all road users by applying consistent and coherent speed management.
- Implementation of **vehicle speed activated signs**.
- Enhancing road safety measures (e.g. traffic calming, education, infrastructure design engineering to reduce vehicle speeds etc) in areas of **previously disadvantage** – there is a strong correlation between accidents in such areas involving the vulnerable, pedestrians and children. Strengthen capacity and enhance funding in support of Community Road Safety Forums.
- Implement **rider improvement programme** – aimed at offenders to improve awareness of positive driving behaviour and a positive responsible approach to prevent unnecessary deaths and injuries to fellow road users. Investigate implementation via the provisions of AARTO.
- Encourage the use of **rail transport** through local level IRPTN's, ITP and LITP's in geographical areas where PRASA operates passenger rail services.

11.11.6 Rural transport

- Implement the **rural transport strategy** by:
 - Prioritising funding and technical and managerial support from the DoT to oversee the roll-out of projects at district level
 - Establishing a national strategic rural transport network that connects major nodes (e.g. 18 cities) and that focuses investment and unlocks economies of scale
 - Continuing to support the 18 nodes identified in the integrated sustainable rural development strategy and define how spatial, land use planning and transport infrastructure are to play a supporting role
 - Developing a strategic off-road infrastructure network implementation plan with dedicated and prioritised funding to enable paths and tracks for non-motorised transport modes to provide better access to mainstream infrastructure (e.g. Shova Kalula, cycle schemes, dial-a-ride with local community partnership). The strategy must define a hierarchy of appropriate modes associated with off-road infrastructure. Work needs to be done to consider what mode of transport or means is best suited to provide access for a variety of reasons, e.g. scholar transport and rural communities without access to the formal road network.
 - Introducing a more comprehensive non-motorised transport and intermediate means of transport programme that incorporates cycling, animal-drawn carts, NMT infrastructure, safety issues and the promotion of these initiatives
 - Considering the strategies defined in Chapter 8 of the synopsis update regarding scholar transport proposals.
- **Beneficiation (industrialisation)** around the primary sector in rural areas – to support and build population numbers and support local people secure jobs in rural areas, which, in turn, will increase the contribution to the fiscus and strengthen the affordability of rural transport provision and, in the long term, enhance access.

This strategy can only work with support from other departments, especially the Department of Trade and Industry, and the implementation of the initiatives described in the NDP 2030, selected SIPs, the Special Economic Zones Neighbourhood Development Programme and the Integrated Urban Development Framework 2014 (Draft) referred to in Chapter 5 of this report.

An action plan must be developed to define the most appropriate rural locations to be targeted, the marketing strategy to support beneficiation, the stakeholders that need to be engaged, the markets that will be accessed, likely consumers, the incentives required to attract funding and investment and the long term roll-out of beneficiation.

11.11.7 Tourism and transport

- Ensure that the tourism sector plays a critical role in tourism planning.
- Enhance tourism through explicit consideration in IDP's and IRPTN's.
- Ensure that tourism coordination be included in all relevant government departments associated with planning, project development, traffic engineering, construction, maintenance and public relations.
- Ensure proactive involvement of tourism groups in the transportation planning process.
- Utilize tourist-related travel data in transportation planning, possibly including joint funding of data collection efforts.
- Recognize institutionally that traveller information services are an integral element in all transportation projects designed to enhance tourism, including providing up-to-date and relevant travel information to specific markets.
- Department of Transport encourages cooperation with the Department of Tourism.
- In further developing the land transportation service in South Africa, the following guidelines should apply:

- Consider training taxis and other disadvantaged transport operators in order to enhance their services and allow them to play an important role in the tourism industry.
- Encourage entrepreneurship in the provision of transportation services.
- Improve the linkages and coordination among different forms of transportation.
- Encourage more open competition.
- Encourage strategic alliances with other stakeholders in the industry.
- Expand the range and accessibility of different transportation options to visitors.
- Consider the safety and standards of land transportation services to satisfy the needs of tourists (domestic and international).
- Department of Tourism to work closely with the Department of Transport to improve land transportation services for both the domestic and international tourism industry and eliminate bottlenecks that may arise.
- Consider the formation of a Tourism Transportation working group to address and coordinate all issues of mutual interest (applicable both to air and land transportation).

11.11.8 Agri-parks

Relevant DOT champion to define actions for transport sector to support the Agri-parks concept in terms of :

- Including the Agri Park concept into the freight logistics value chain
- Linking Agri Parks to the urban environment in terms of appropriate road, rail and air infrastructure
- Linking Agri Parks to the urban environment in terms of public transport infrastructure and services
- Linking Agri Parks to the urban environment in terms of non-motorised transport.

11.11.9 Science, technology and innovation in transport

- The Department of Science and Technology will work more closely with the Department of Transport to investigate how to respond to impending disruptive technologies in the transport industry.
- The following emerging technologies will be investigated with a view to support transformation of the transport sector:
 - Autonomous Vehicles
 - Connected Vehicles
 - Collaborative Consumption
 - Electric Drivetrain
 - Efficient Multimodal Network
 - New Materials (including 3d printing)