

PERSPECTIVES ON THE FUTURE OF PERSONAL TRANSPORT IN SOUTH AFRICA

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ABSTRACT

Being a developing middle income country, South Africa has considerable transportation challenges. Car ownership and use are rising with improved economic conditions, but congestion on the road network is worsening all the time. Retaining public transport users is costing more in the form of operating and capital subsidies. The road safety situation is poor when compared to international benchmarks, and can be considered a national crisis. The purpose of this paper is to illustrate current trends and to provide some perspective on where South Africa could be heading with respect to these issues.

1. INTRODUCTION

Out of 190 recognised countries, South Africa had the 32nd largest economy in the world in 2015, according to the IMF¹ and the World Bank (refer to Table 1). On income per capita basis South Africa is rated 84th in the world. See Section 2 below. So, whilst the size of the economy is in the top quartile (justifying our inclusion in the G20 and in BRICS), average personal income is on a substantially lower level, illustrating why South Africa is rated a middle income country. Whilst there is motivation to aim for first world transport infrastructure, expectations should acknowledge that affordability can be an issue.

Motor vehicle (car) ownership in South Africa is currently around 210 vehicles/1000 population. If compared to developed nations, such as the USA, which might have reached a saturation level at around 800 vehicles/1000 population, it is clear that potential for higher vehicle ownership in South Africa exists. In addition, the population is constantly growing – the 2015 population is given as 55 million people (Department of Statistics) growing more than 1.4% per annum as shown in Graph 1.

In many of our cities the modal split of motorised trips is approximately 50/50 between private trips and public transport trips on a daily basis. For workers, the country wide modal split on a daily basis is 40/40/20 (public transport/private transport/walking) – 2013 National Household Travel Survey². Car ownership has increased with new car sales reaching record figures every year. Currently around 600 000 new cars are sold every year and the number of registered vehicles has increased at a relatively high rate since 2004 (see Graph 2 below).

The following questions can be asked:

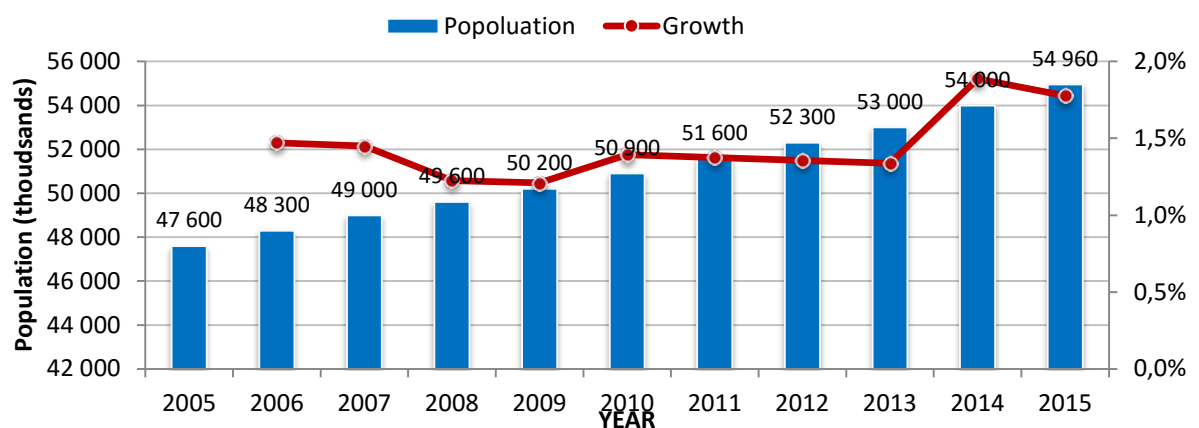
- What are the consequences of the relatively high growth in vehicle ownership?
- What can be expected of the provision (affordability) of new road capacity and the resultant congestion levels in our cities?
- What are the requirements for the provision of public transport to retain reasonable levels of mobility? Can it be afforded?
- Can land use patterns be changed to achieve higher densities in support of more effective public transport?
- Where are we going with transportation/road crashes (fatalities)?

The purpose of this paper is to illustrate current trends and to provide some perspective on future direction with respect to the above issues.

2. SA DEMOGRAPHICS AND TRANSPORT

2.1 Population

The South African population growth for the period 2005 to 2015 is depicted in the Graph 1 below (Source: Department of Statistics). The official number for 2015 is 54.96 million, representing a 1.8% growth during 2015, and an average growth of 1.5% per annum over the ten year period between 2005 and 2015. The trend during the past decade is clear but when and if a flattening off in the population number will occur, is difficult to say – the total population could easily grow to 65 to 70 million by 2030.



Graph 1: Growth of South African population (Department of Statistics)

2.2 Economy

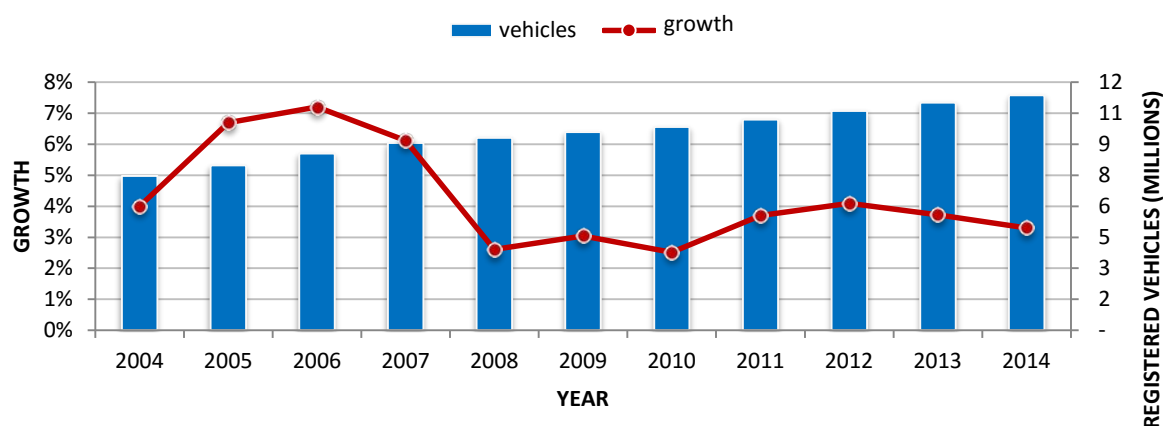
The size of the South African economy, as well as the average per capita income for 2015, according to the International Monetary Fund (IMF), are shown in Table 1 (in total approximately 190 countries are listed). Average income per capita is slightly lower than the neighbouring countries Botswana and Namibia.

TABLE 1: Extract of South African Economy versus Other Countries (2015), (IMF World Economic Outlook, October 2015)

RANK	TOTAL GDP (BILLION US \$)		RANK	AVERAGE GDP/CAPITA (US \$)	
	COUNTRY	GDP		COUNTRY	US \$/CAPITA
1	USA	17 968	1	Luxembourg	103 187
2	China	11 385	2	Switzerland	82 178
3	Japan	4 116	3	Qatar	78 829
4	Germany	3 371	4	Norway	76 266
5	UK	2 865	5	United States	55 904
28	Iran	397	80	Montenegro	6 373
29	Thailand	374	81	Botswana	6 150
30	Austria	373	82	Ecuador	6 077
31	UAE	339	83	Namibia	5 787
32	South Africa	317	84	South Africa	5 784
33	Malaysia	313	85	Columbia	5 687
34	Hong Kong SAR	308	86	Peru	5 638
35	Philippines	299	87	Jordan	5 600
36	Israel	299	88	Thailand	5 426

2.3 Vehicles

The growth in registered vehicles for South Africa between 2004 and 2014 is shown in Graph 2 below³.



Graph 2: Growth in registered vehicles per year (RTMC, 2014)

The number of registered vehicles has been growing at 4.0% per annum (on average) over the ten year period (11.37 million registered vehicles in 2014). This is much higher than the population growth and also higher than the real growth of the economy (average 2.7% per annum over this period – Department Statistics). It is accepted that these numbers include cars, trucks, tractors and trailers (most, but not all vehicles are necessarily motorised). The National Household Travel Survey confirmed that the households who owned or had access to cars, increased from 22.9% in 2003 to 28.5% in 2013 (actual numbers not provided).

Based on the population number for 2014, the vehicle ownership in SA in 2014 equalled 210 vehicles/1 000 of the population. Compared to developed countries which have corresponding numbers of 500 to 800 vehicles/1 000 population (latter number approximately represents the USA), significant growth in vehicle ownership is possible. The growth in registered vehicles followed the economic growth pattern of the country quite closely, with the boom years between 2005 and 2007 showing

approximately double the growth rates since 2008. New vehicle sales according to NAAMSA⁴ are shown in Table 2.

Table 2: Annual new vehicle sales in South Africa (NAAMSA, 2015)

New vehicles	2010	2011	2012	2013	2014	2015
Sales in SA*	492 907	572 249	630 629	649 216	644 259	617 927
Exported	239 465	272 457	277 992	276 404	276 936	337 748
Total*	732 372	844 706	908 611	925 620	921 195	955 675

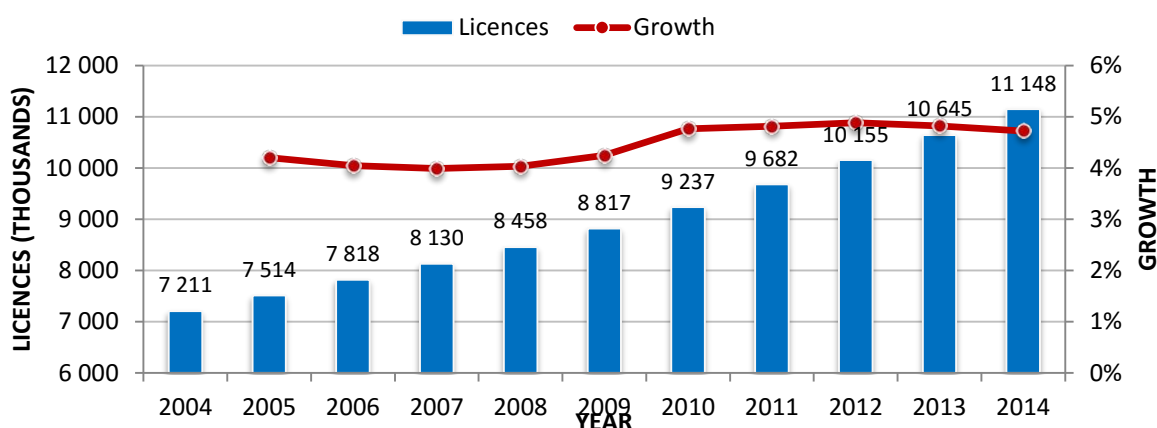
*Note these numbers include domestic production, as well as imported vehicles.

Annual new vehicle sales in SA show a decline since 2013 (e.g. 2015 shows a 4.1% decline when compared with 2014). However, due to the increase in vehicles being exported, the domestic production of motor vehicles in SA is expected to show an increase from 615 000 in 2015 to 660 000 in 2016. According to NAAMSA the official motor industry vision is to produce around 1 million new vehicles in SA by 2020. At least three conclusions can be made:

- Due to the improved personal economic conditions, the motor vehicle population (i.e. motorisation) of SA is growing at a relatively high rate. The vehicle ownership of 210 veh/1000 population can be expected to grow substantially in view of the situation in the developed countries;
- Older vehicles are not scrapped at the same rate as new vehicles enter the road network, thereby assisting in the reasonably high growth rate of vehicle numbers. The growth in vehicle numbers will undoubtedly add to congestion and the need for road space;
- Based on an estimated average selling price per new vehicle of R250 000, the new car industry in SA is worth around R240 billion per annum (2015), i.e. adding at least that amount to the Gross Domestic Product. This excludes servicing, maintenance, repairs, etc. In terms of the creation of work opportunities, and boosting exports, this industry is important for the economic well-being of the country.

2.4 Driver Licences

The total number of licences (“all licences issued”) is summarised in Graph 3 for the period 2004 to 2014³. It is concluded that this means that there were 11.1 million licenced drivers in South Africa at the end of 2014 (20% of population). This implies some discrepancy with the data from the NHTS², which indicates (p78) that 9.1 million persons were in the possession of a drivers licence in 2013.



Graph 3: Drivers licences issued (RTMC, 2014)

It follows from Graph 3 that there is a strong growth in the total number of persons with driver licences. Between 2004 and 2014, the average increase in the number of persons with driver licences has been 4.45% per annum, which is even higher than the growth in registered vehicles. This confirms the relative high growth in motorisation which is taking place (with the resultant impact on road needs and capacity). The total number of licences issued³ approximately equals the number of vehicles registered.

The high growth in motorisation is expected to eventually be influenced by a shift from car ownership to what is referred to as “mobility as a service” (MAAS)¹⁵. This basically is the reduction of individual vehicle ownership due to car/ride-sharing, public transport and fleets of self-driving cars blended together as a single service. The introduction of Uber services is a step in this direction. Exactly when the impact of MAAS on vehicle ownership will be visible in South Africa is difficult to say. Also due to new energy sources, the so-called “peak oil demand” is predicted by some to occur as soon as 2020¹⁵.

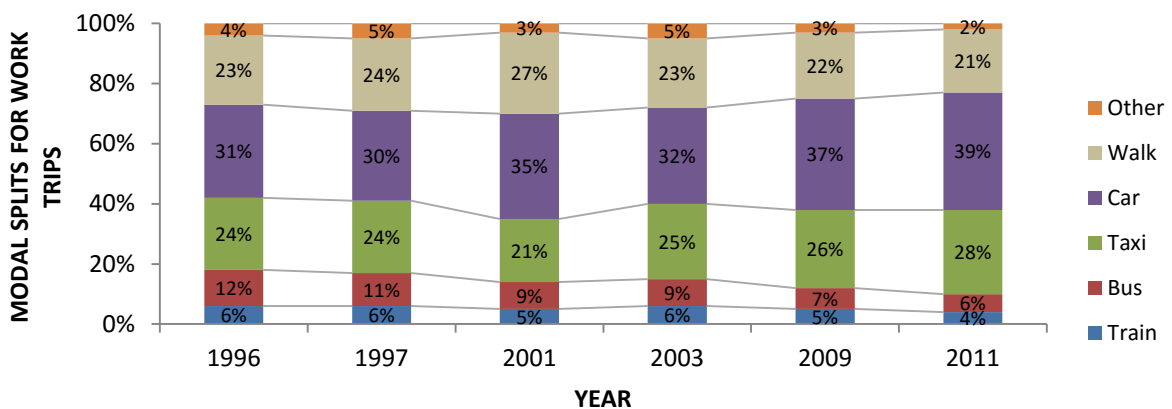
2.5 Revenue from road users and transport expenditure

Private road users have through the years contributed substantially to government revenue through the payment of tolls, licence fees, fuel levies, carbon taxes, import duties, fines and other taxes. The revenue from the fuel levy alone currently forms about 5% of total tax revenues. It has recently been shown⁵ that the fuel levy (Road Accident Fund (RAF) excluded) has grown from R14.8 billion in 2003 to a budgeted value of R48 billion for 2015/16. This represents a growth (in nominal terms) of more than 10% per annum or in real terms of almost 5% per annum. This is higher than the economic growth, vehicle population growth, fuel sales growth and kilometres travelled over this period, and illustrates the notion of road users being a tax milking cow. The general fuel levy was increased by 30.5 cents (13.6%) to 255 cents/litre on 1 April 2015 and the RAF levy was increased by 50 cents (48%) to 154 cents/litre on that date. With just more than 20 billion litres of (taxable) fuel sold annually, it is clear that every 5 cents/litre increase, results in R1 billion of extra revenue. For the 2015/16 financial year an additional R16 billion has therefore been collected from road users (RAF plus fuel levy). The astonishing fact is that the April 2015 increases did not lead to a national outcry or drastic reduction in car travel. This shows that drivers are relatively inelastic to change in fuel price increases. The Minister of Finance has increased the general fuel levy by another 30 cents/litre (to 285 cents/litre) in February 2016 (i.e. by 12%) and expects a revenue of R64.5 billion for 2016/17 from this source. For reference purposes, the annual revenue from licence fees is approximately R8 billion (2015/16).

It has been shown before⁶ that the taxes collected from private road users exceed the amounts spent on the road network (for private users), so the road users are good business for government. In fact during the eighties of the previous century, when fuel levies were still dedicated to the National Road Fund (NRF), the issue of dedicated revenues (outside the budget - authors' interpretation) led to this levy being declared a general income and the NRF was terminated. Public transport (road and rail) is currently (2015/16 financial year) being subsidised to the extent of $R(11.5 + 18.3) = 29.8$ billion⁷ (capital and operating expenditure).

It is agreed that a balance between the provision of private and public transport is required – where the balance for SA should be difficult to define, but disturbing the current balance will have financial consequences. A major shift to public transport will result in less fuel levy revenue and more public transport subsidies, as is illustrated in Illustration 1 below. A modal shift to public transport may reduce congestion unlike suggested in Illustration 1, but this can only realise if the shift to public transport is higher than the growth in private travel demand, which has not occurred to date – see Graph 4 below¹⁶. Also, the introduction of high standard BRT services can present financial challenges. This has been illustrated for the City of Cape Town¹², where the fare box recovery of operating costs for the BRT service in 2014/15 has only been 40%, versus the target of 85%. It has also been shown¹² that every passenger trip on Gautrain requires an operating subsidy of R60.

The Financial and Fiscal Commission¹⁶ concluded in 2014 that current public transport subsidies “are based on the historic practice of providing financial relief to households” and due to the lack of policy implementation, led to “unsustainable practices”.



Graph 4: Modal split trends in South Africa for work trips¹⁶

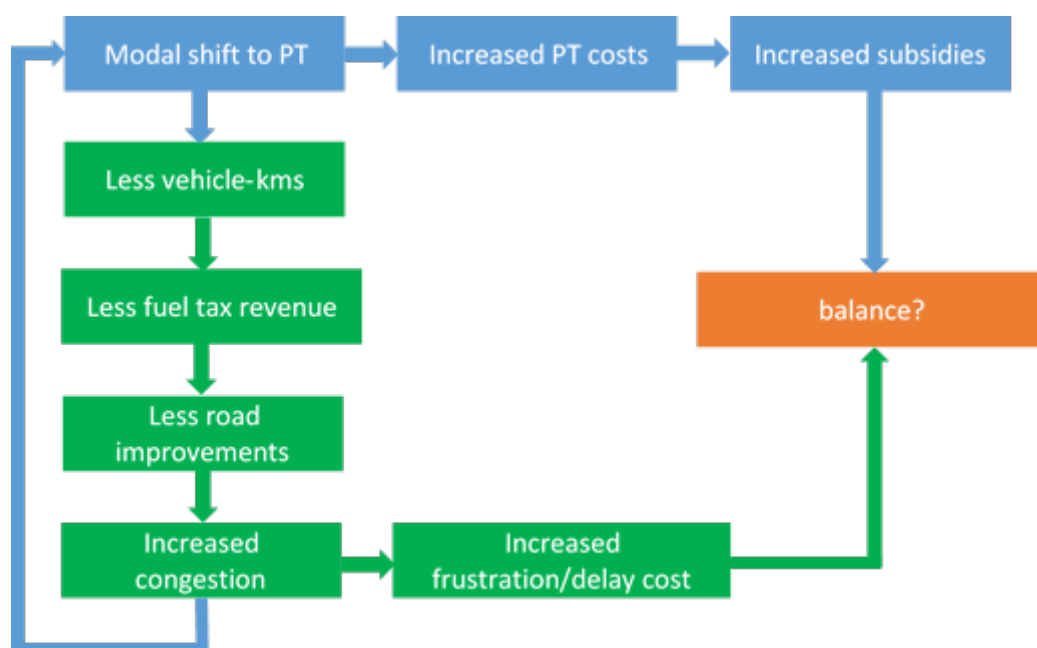


Illustration 1: Effect of modal shift on private and public transport

It is concluded that the taxation of private road users is an important revenue source for Treasury (estimated to be at least 7.5% of total tax revenue) and it is expected to remain for the foreseeable future.

The expenditure on public transport (capital and operational) has been increasing steadily over the years and if current drives for improving services are maintained, will require ever increasing allocations. Purely from a financial viewpoint, the already heavy demands on government revenue, and therefore borrowing to make ends meet, will grow.

3. MODAL SPLIT

The National Household Travel Survey² indicates that the main modes of transport for workers in SA are as follows:

Public transport 39.1% Private transport 38.4% Walk 21.1%

The public transport trips/weekday have been estimated to be 5.4 million (slightly higher than the 5 million estimated in 2003), implying that the total number of work trips/weekday is around 13.8 million – roughly 7 million workers making two trips per weekday (to and from work). The minibus-taxi trips are estimated to be 3.7 million, implying that minibuses are responsible for 70% of all public transport trips of workers. The NHTS is not clear on what portion of total trips (which include education, business, shopping, recreational, etc.) on a weekday is work trips – if it is assumed to be around 40%, then it implies that around 35 million total person trips (17.5 million persons each making two trips at least) are made on a weekday. This sounds low in view of the population size of 55 million and is dependent on the definition of “total trips”.

It has to be concluded that the minibus taxi industry is in fact the most important element of public transport services in SA, and by transporting 70% of workers, is saving government huge amounts of subsidies. In applying the results of the NHTS, there appears to be a need for bringing the numbers together to make sense with other data - see vehicle licences in Section 2 above.

4. LAND USE

Being a relatively young country, i.e. no old compact cities such as in Europe, urban sprawl has occurred to a serious extent and efforts for densification have limited success. In addition, being relatively poor (per capita basis) makes high rise residential living (such as in some Chinese cities), unaffordable. Mostly medium density housing (40 to 50 dwellings/ha) on ground level, located remotely from work opportunities can be afforded for the urbanising poor.

A relatively large portion of the population is dependent on walking as their major mode of transport, and this leads to many people having to cross busy roads on foot. As an example, surveys¹³ have shown that approximately 18 000 pedestrians cross the N2 freeway (at grade) between Cape Town and Somerset West on a daily basis – the road is carrying between 60 000 and 100 000 vehicles/day. This action is illegal, barriers to prevent it have been erected and pedestrian bridges have been

provided at places, but it still happens. It is the author's opinion that South Africa must be one of a few countries in the world with this enormous extent of conflict between pedestrians and high speed traffic.

Based on city developments in South Africa over the past 40 years, the authors conclude that even though many SA cities have densification policies, real densification is taking place slowly and limited success can be expected (at least when compared with other high density cities in the world – South America, China, etc). The shortening of trip lengths for most is likely to happen very slowly. To turn around the current severe conflict between pedestrians and motor vehicles will not be easy and remains a huge challenge for both the affected communities and the roads authorities responsible for the management of major roads.

5. TRANSPORTATION INFRASTRUCTURE

The state of transportation infrastructure in SA is considered good when compared with developing countries, but fair when compared with developed nations. SANRAL indicated in 2014⁸ that the maintenance backlog of the 750 000 km SA road network was R197 billion at that time. No plan of how to address this backlog has ever been developed (as far as is known), which implies that SA, similar to most other countries, will not be in a position to maintain all of its roads to ideal standards. Even the rail commuter network, for a number of years now being the focus of upgrading and “increased” investment, shows little improvement in practice. As an example, the daily number of passengers boarding the suburban rail service in Cape Town has decreased from 675 000 in 2000 to 621 000 in 2012¹⁴.

Tom Tom^{9,10} has been collecting real time (anonymous) travel time information wherever their GPS equipment is being used. It is providing real-life driving patterns by time of day, day of the week, time of year and around special events. It covers a huge sample size and can undoubtedly be considered as representative of the real situation. Some of the salient information¹⁰ that is provided for 2013 is shown in Table 3 below - note congestion is defined as the increase in total travel time when compared to free flow situation – so 12% congestion means 12% longer travel times when compared to free flow situation.

Table 3: Congestion indicators for South African Cities (TomTom, 2013)

INDICATOR	CAPE TOWN	JOHANNESBURG	DURBAN	PRETORIA
Daily (%)	26	30	18	24
Morning peak (%)	78	79	47	57
Afternoon peak (%)	58	66	40	50
Delay/hour (peak - min)	39	26	43	32
Delay/year (30 min commute)(hours)	90	96	69	80

It is concluded that the delay in minutes during the peak periods is mostly higher than the free flow travel time during that period. Also, the annual amount of delay is generally higher than two working weeks. If the value of this time is estimated, the annual cost of this delay is around R21.6 billion (80 hours/worker/year, 2.7 million workers affected (Section 3 above), value of this time = R100/hour). This excludes the fuel consumption due to the additional idling in congestion, which could add a

further R1 billion, as well as additional air pollution, which is impacting on all residents and the environment. It is clear that current congestion is costing road users a substantial amount. What is more, traffic patterns on major routes, such as the N2 in Cape Town, show a relatively flat demand curve during daylight hours, implying that congestion on some major routes will soon extend even into off peak hours, thereby affecting not only commuter traffic but also business traffic.

Information from Tom Tom’s website indicates that the most congested city in the world (in 2014) was Istanbul, with 58% congestion on a daily basis. Out of 140 cities listed, Cape Town appears at number 55 and Johannesburg at number 77 – Cape Town therefore under the worst half of cities and Johannesburg approximately in the middle. The City of Cape Town recently announced that it intends to spend R750 million over 5 years to relieve congestion in the city – this amount appears small in relation to congestion costs.

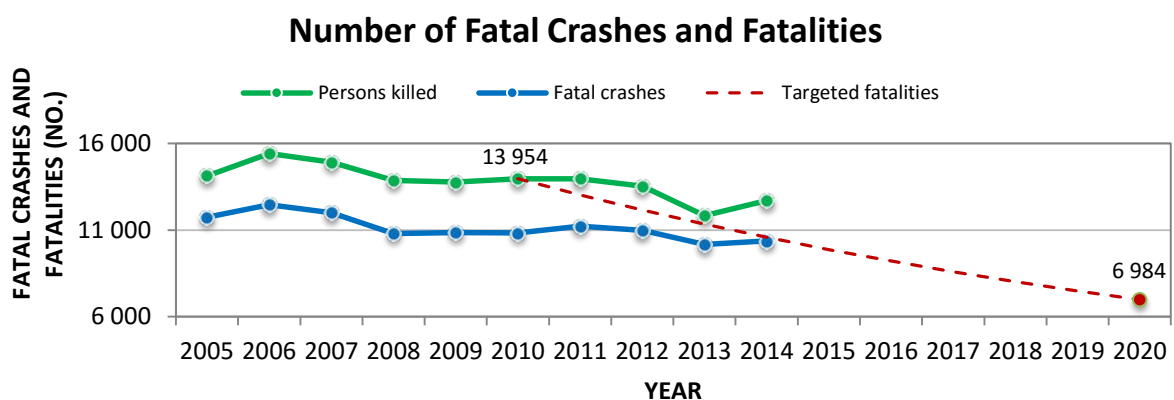
It is concluded that congestion is costing road users dearly in terms of time lost in traffic. The monies available to attend to this, appear to be small and this situation can be expected to worsen substantially, unless more funds are available for creating road and public transport capacity. The impact of congestion on business traffic during off peak periods could soon be more severe than at present.

6. ROAD SAFETY

South Africa has one of the poorest road safety records in the world and the improvement of the present situation is vital not only for the authorities, but for every citizen of the country. The Department of Transport is currently busy with the development of a new road safety strategy which has to deliver improvements to the current situation.

6.1 Current situation

There are currently differing opinions regarding the actual annual number of fatalities on SA’s roads, mostly due to perceived problems with the data collection. The official number of fatal crashes and the resulting fatalities for South Africa is provided in the Graph 5 below³.



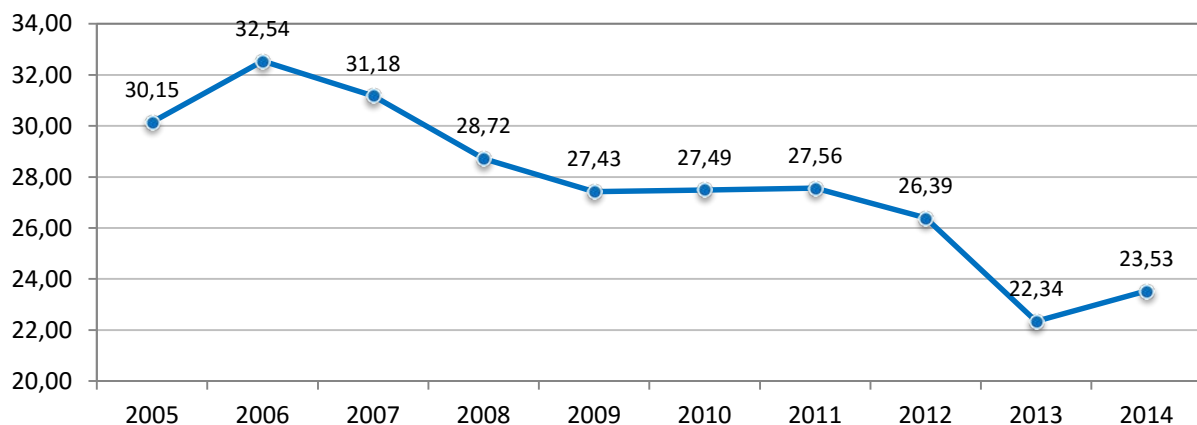
Graph 5: Number of fatal crashes and fatalities (RTMC, 2014)

This information shows a decreasing trend of both annual fatal crashes and persons killed between 2005 and 2014 (the latter from 14 135 to 12 702). This can be put in perspective if compared to Australia, where the population is less than half that of

SA, the vehicle population is approximately the same, and the fatalities is ten times less (± 1200 per annum).

The red dotted line above shows the target that was committed to by the Department of Transport (in 2010) as part of the United Nations Decade of Action (UNDA). The fatality rate for SA in 2014 was 23.5 per 100 000 of the population, which is substantially lower than the 28 which was quoted for 2009 in the World Health Organisation’s Global Status Report (2013). Should SA be achieving the set UNDA goal for fatality reduction, then the number of fatalities in 2014 should have been approximately 10 600.

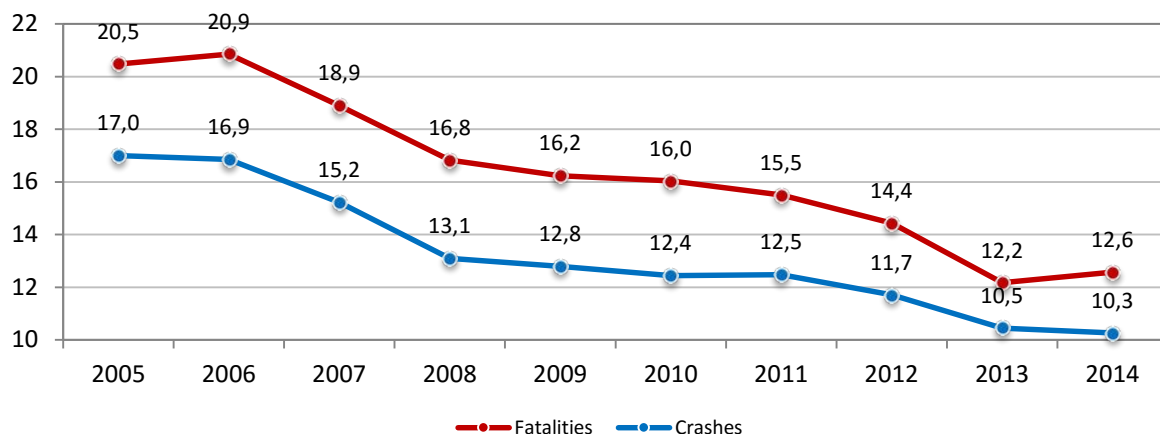
The contributory factors to fatal crashes are given as human factors (72%), vehicle factors (16%) and roads and the environment (12%) by the RTMC. The number of road fatalities per 100 000 human population from 2005 to 2014 are shown in the Graph 6 below.



Graph 6: Fatalities per 100 000 population (RTMC, 2014)

Middle income countries are reported to have 20.1 fatalities per 100 000 of the population. It is evident that despite the notable reduction in this indicator from 2004 through to 2014, South Africa is still above average of the middle income group.

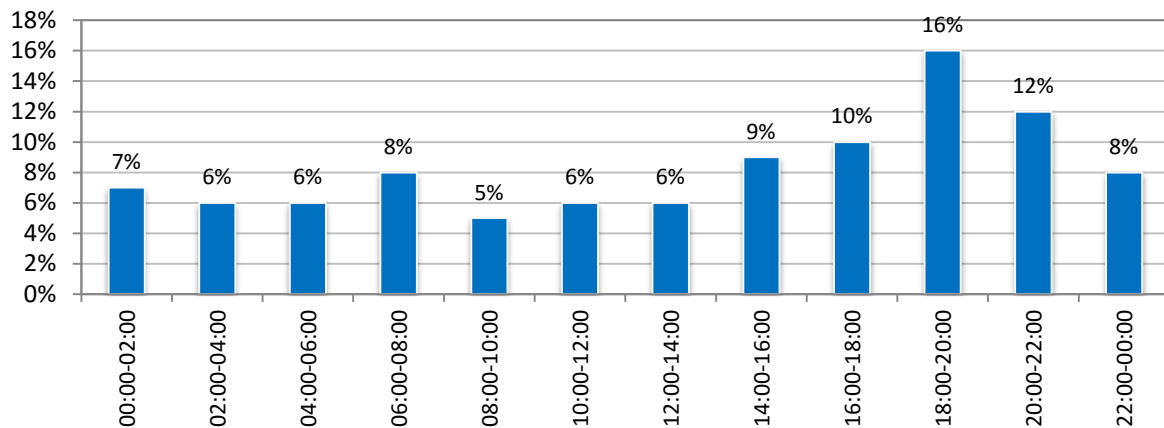
A further indicator of road safety performance, is the number of fatalities per 10 000 motorised vehicles, which is shown in Graph 7 below.



Graph 7: Fatal crashes and fatalities per 10 000 vehicles (RTMC, 2014)

The growth in the number of registered vehicles, together with the reported decline in fatalities, cause this indicator to show a steady reduction in fatalities per 10 000 motorised vehicles between 2005 and 2014. The distribution of fatalities between drivers, passengers and pedestrians has been fairly consistent year on year, with around 33% of fatalities involving pedestrians, 30% drivers and 37% passengers. However, there are differences provincially – in the Western Cape, for example, the pedestrian percentage is closer to 40%. These figures indicate how vulnerable South African pedestrians are in the traffic context.

Statistical evidence from the Road Traffic Management Corporation road safety reports has shown that most road crashes resulting in road traffic injuries occur during weekends, with 43% of fatal crashes on Saturdays and Sundays. According to the RTMC traffic report for 2011, 51.73% of fatal road crashes occurred during hours of darkness. The histogram¹¹ (Graph 8) indicates that some 55% of fatal crashes in South Africa occurred between 18:00 and 06:00. Approximately 20% to 25% of the daily traffic volumes occur during those hours on most roads. The majority of crashes therefore occur when roads are less busy, or during the hours of darkness.



Graph 8: Distribution of fatal crashes per time of day (DOT mid-term country report, 2015)

6.2 Major road safety issues

It has to be concluded that the road safety situation in SA is a national crisis. Addressing the problem is complex. The major road safety issues in SA are considered to include the following (authors' opinion):

- I. Reasonably good legislation exists, but the enforcement of such legislation in South Africa is inconsistent and partial. Only some laws are enforced, while others are ignored, adding to a general public confusion as to which laws are important and which are not. The collection of fines is at such a low level that it is ignored by many and cannot be considered a deterrent.
- II. Respect for the rule of law has been and still is a major issue. Lawlessness is a major challenge. Levels of crime are prohibitively high and in fact South Africa experiences some of the highest levels of violent crime in the world. Why people do not obey the law has long been a concern in social psychological research on trust. The issue of disrespect for the law takes successful road safety strategies partly outside the realms of transportation.

- III. Corruption and incompetence in the traffic enforcement and licensing agencies has damaged the respect for the law by members of the public. Further, traffic officials who are intentionally or through ignorance, turning a blind eye to infringements, are directly undermining road safety.

Based on the road safety data above, it is concluded that some improvement in the road safety situation has occurred in the past decade. When compared to other countries, it has to be said that the SA road safety situation is totally unacceptable and drastic measures are required now to achieve a turnaround. Political will is one of the fundamental departure points that is required.

7. CONCLUSIONS AND RECOMMENDATIONS

- a. Due to the improved personal economic conditions, the motor vehicle population (i.e. motorisation) of SA is growing at a relatively high rate. The vehicle ownership of 210 veh/1000 population can be expected to grow substantially in view of the situation reached in the developed countries.

- b. Older vehicles are not scrapped at the same rate as new vehicles enter the road network, thereby assisting in the reasonably high growth rate of vehicle numbers. The growth in vehicle numbers will undoubtedly add to congestion and the need for road space, even in non-peak periods.

- c. Based on an estimated average selling price per new vehicle of R250 000, the new car industry in SA is worth around R240 billion per annum (2015), i.e. adding at least that amount to the Gross Domestic Product. This excludes servicing, maintenance, repairs, etc. In terms of the creation of work opportunities, and boosting exports, this industry is important for the economic well-being of the country.

- d. Between 2004 and 2014, the average increase in the number of persons with driver licences has been 4.45% per annum, which is even higher than the growth in registered vehicles. This confirms the relative high growth in motorisation which is taking place (with the resultant impact on road needs and capacity). The total number of persons with driver licences approximately equals the number of vehicles registered.

- e. The taxation of private road users is an important revenue source for Treasury (estimated to be at least 7.5% of tax revenue) and it is expected to remain for the foreseeable future. The promotion of modal shift towards public transport, and the introduction of high standard services (e.g. BRT, Gautrain) do introduce challenges with respect to financial sustainability, and the current subsidy situation is considered not sustainable by some.

- f. The minibus taxi industry is in fact the most important element of public transport services in SA, and by transporting 70% of workers, is saving government huge amounts of subsidies.

- g. In applying the results of the NHTS, there appears to be a need for bringing the numbers together to make sense with other data - see vehicle licences in Section 2.

h. Even though many SA cities have densification policies, real densification is taking place slowly and limited success can be expected (at least when compared with other high density cities in the world – South America, China, etc).

i. To turn around the current severe conflict between pedestrians and motor vehicles will not be easy and remains a huge challenge for both the affected communities and the roads authorities responsible for the management of major roads.

j. Congestion is costing road users dearly in terms of time lost in traffic. The monies available to attend to this, appear to be limited and this situation can be expected to worsen substantially, unless more funds are available for creating road capacity.

k. Based on the road safety data above, it is concluded that some improvement in the road safety situation has occurred in the past decade. When compared to other countries, it has to be said that the SA road safety situation is still totally unacceptable and drastic measures are required now to achieve a turnaround. Political will is one of the fundamental departure points that is required.

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