

# **STRATEGIES TO REDUCE ROAD CASUALTIES IN PUBLIC PASSENGER TRANSPORT VEHICLES IN SOUTH AFRICA**

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## **SUMMARY**

The spate of bus crashes in South Africa in September/October 1999 led to a ministerial inquiry into the causes of these crashes and also to the formulation of recommendations to prevent similar disasters. Annually, about 9 000 buses (about one-third of the total bus fleet) are involved in road accidents. The frequent occurrence of minibus taxi crashes is also a matter of grave concern due to the large number of vehicle occupants killed or injured. Minibus taxis is the vehicle category in South Africa with the highest accident and fatality rate per 100 million vehicle kilometers traveled.

The paper covers a number of aspects to highlight the problems but also provides short and medium term solutions. *Firstly*, the road traffic safety record of the public passenger transport sector is scrutinised. The collision and casualty figures for buses and minibuses for 1998 (the latest available statistics) by urban and rural areas are highlighted. An analysis is done of trends in bus and minibus road accident and collision rates since the early nineties. The trends are also compared to those of freight vehicles (heavy vehicles and LDV's). *Secondly*, factors are identified contributing to road traffic crashes and casualties in the public passenger transport sector. The impact of the human, vehicle and road environment factors are discussed and contributing factors based on specific case studies are pinpointed. *Thirdly*, short and medium term solutions are offered to reduce road casualties in the public passenger transport sector. Measures covered are related to operators, drivers, vehicles and other more general issues impacting on all road users. These solutions are based on the results of deliberations between government and the various stakeholders involved.

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### **1 BACKGROUND**

The recent spate of bus crashes in South Africa led to a ministerial inquiry into the causes of these crashes and also to the formulation of recommendations to prevent similar disasters. Apart from these more dramatic events, about 9 000 buses (about one-third of the total bus fleet) are annually involved in road accidents.

The frequent occurrence of minibus taxi road accidents throughout South Africa is also a matter of grave concern due to the large number of vehicle occupants killed or injured. Currently, there are about 285 000 minibuses registered in South Africa of which about 126 000 (NDoT estimate) are minibus taxis. Minibus taxis is the vehicle category in South Africa with the highest accident and fatality rate per 100 million vehicle kilometers traveled.

## 2 SCOPE OF THE PAPER

The paper covers the following topics:

- The road traffic safety record of the public passenger transport sector:
  - The collision and casualty figures for buses and minibuses for 1998 (the latest available statistics) by urban and rural areas are highlighted.
  - Trends in the bus and minibus road accident and collision rates since the early nineties are discussed. The trends are also compared to those of freight vehicles (heavy vehicles and LDV's).
- Factors contributing to road traffic crashes and casualties in the public passenger transport sector are identified.
- Short and medium term solutions are offered to reduce the road casualties in the public passenger transport sector.

## 3 ROAD SAFETY RECORD OF THE PUBLIC PASSENGER TRANSPORT SECTOR

### 3.1 Collision and casualty figures for buses and minibuses in 1998

In 1998, 27 000 buses were in use in South Africa and over the last decade buses covered about 1,5 billion vehicle kilometers per annum. Similarly, during 1998, 285 000 minibuses were registered of which an estimated 126 000 were minibus taxis (NDoT estimate). On average, over the last decade minibuses covered about 7 billion vehicle kilometers per annum.

The distribution of bus and minibus taxi accidents and casualties in 1998 by urban/rural area and severity is given in Table 1 and is also illustrated in Figures 1 and 2. The main features were:

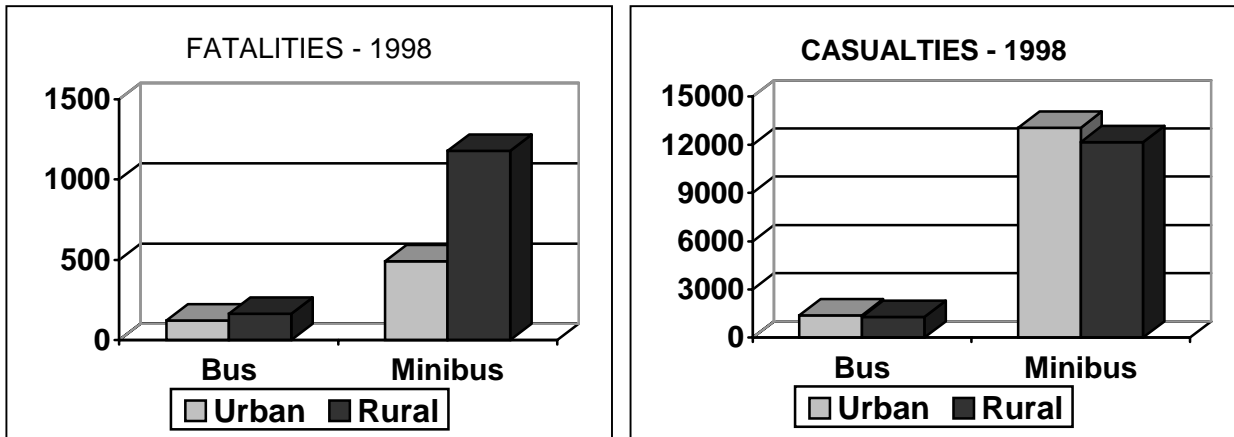
- About one-third (9 000 buses out of a total fleet of 27 000 buses) were involved in road accidents and 65 000 minibuses out of a total of 285 000 minibuses.
- Almost 2 700 casualties (fatalities and injuries) were recorded in crashes involving buses. This figure includes the casualties sustained by the occupants of the other vehicles or pedestrians. The equivalent figure for minibuses was 25 000 casualties.
- More rural than urban fatalities were recorded for both buses and minibuses involved in accidents (also see Figure 3).
- Serious and slight injuries sustained on rural and urban roads occurred in about equal numbers, however, the extent of the minibus injuries was much greater.

**Table 1: Distribution of bus and minibus accidents and casualties: 1998**

<b>Accidents/Casualties</b>		<b>Buses</b>	<b>Minibuses</b>
<b>Accidents</b>	<b>Urban</b>	7 095	48 696
	<b>Rural</b>	1 910	15 471
<b>Deaths*</b>	<b>Urban</b>	122	492
	<b>Rural</b>	164	1 178
<b>Serious injuries</b>	<b>Urban</b>	423	3 854
	<b>Rural</b>	415	4 563
<b>Slight injuries</b>	<b>Urban</b>	843	8 707
	<b>Rural</b>	710	6 415
<b>Total injuries</b>	<b>Urban</b>	1 388	13 053
	<b>Rural</b>	1 289	12 156

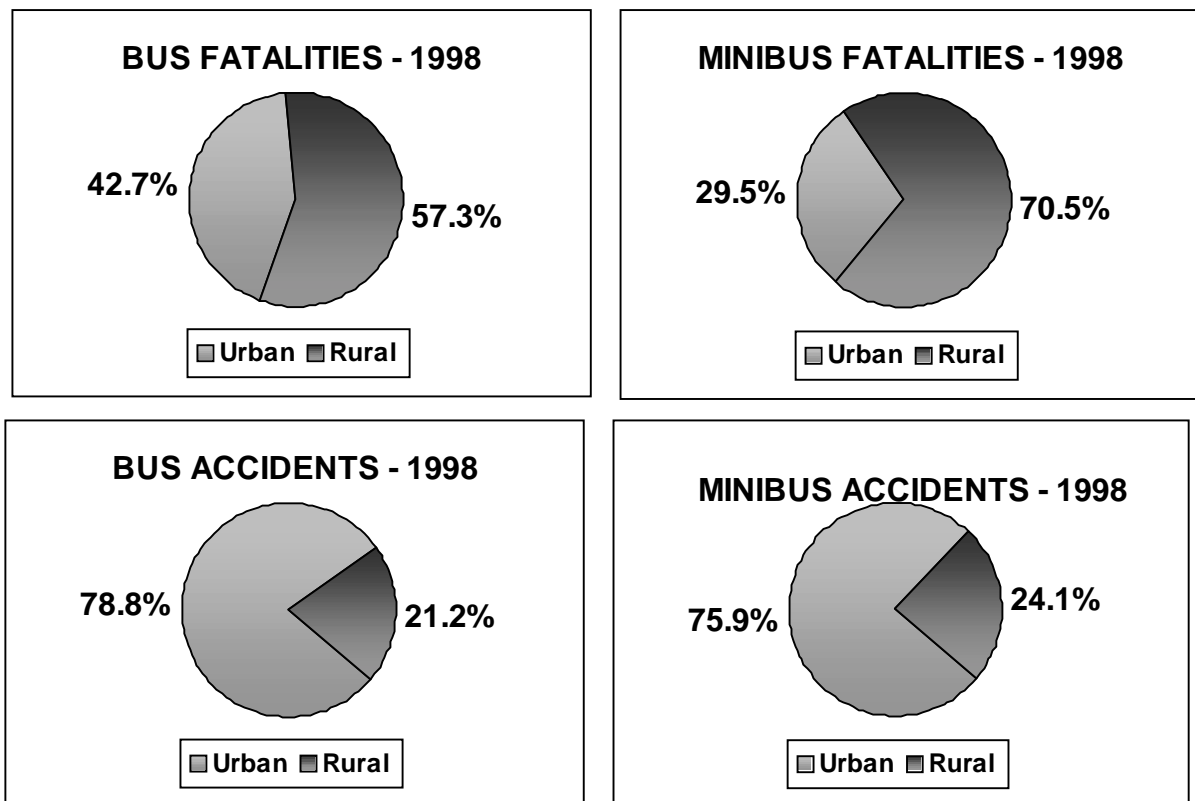
\*The deaths recorded with regards to buses above also cover the fatalities of occupants of the other vehicles involved. Only 112 bus occupants were killed in 1998.

**Figures 1 and 2: Number of fatalities and casualties for buses and minibuses: 1998**



The number of urban and rural bus and minibus fatalities expressed as a percentage of urban and rural bus and minibus accidents respectively, is shown in Figure 3. These figures suggest that although only about one-quarter of all bus and minibus accidents (21% for buses and 24% for minibuses) occur on rural roads, the major proportion of the fatalities occur on rural roads (57% for buses and 70% for minibuses). The higher velocity at which vehicles travel on rural roads has a direct influence on the higher fatality rate, as well as insufficient emergency services.

**Figure 3: Urban and rural bus and minibus fatalities expressed as a percentage of urban and rural bus and minibus accidents: 1998**



### 3.2 Accident trend analysis for public passenger transport and freight vehicles

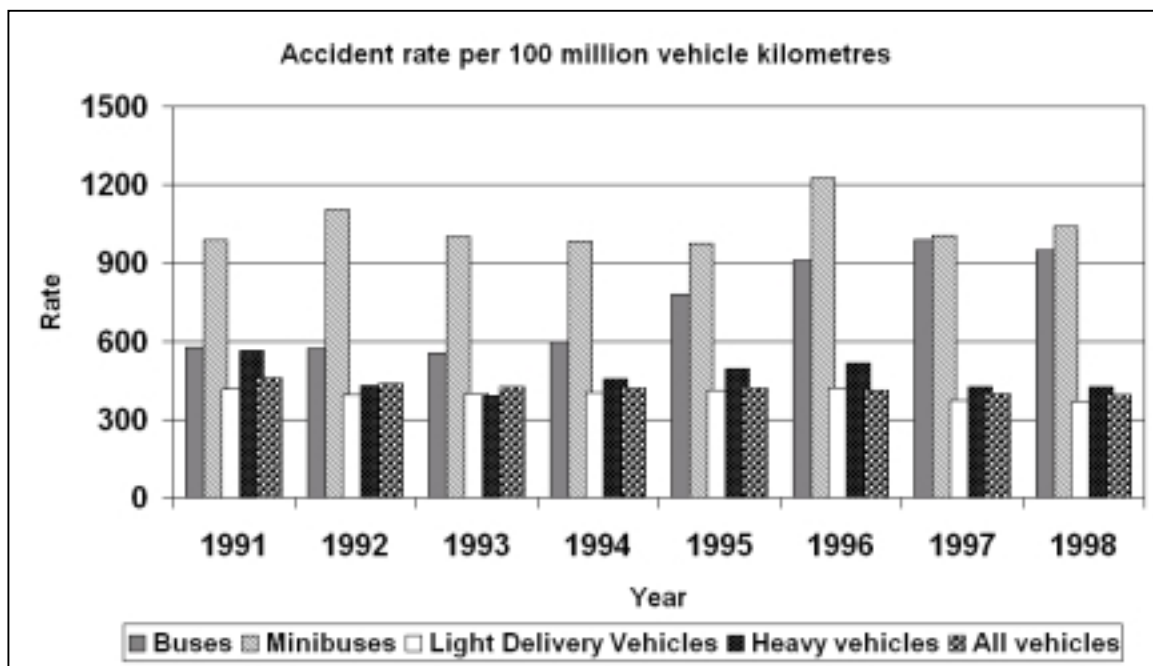
A detailed analysis was conducted for the period 1991 to 1998 of the accident statistics and trends for the following categories of vehicles:

- Public passenger transport vehicles (buses and minibuses)
- Freight carrying vehicles (LDV's and heavy vehicles)
- All vehicles

#### 3.2.1 Road accident trends for public passenger transport and freight vehicles

Figure 4 shows the accident rates for public passenger transport (buses and minibuses), freight vehicles (LDV's and heavy vehicles) and "All Vehicles", expressed per 100 million vehicle kilometers traveled for the period 1991 to 1998.

**Figure 4: Road accident rates for public passenger transport vehicles (buses and minibuses) and freight vehicles (LDV's and heavy vehicles): 1998**



The main trends in the accident rates over the period 1991 to 1998 were as follows:

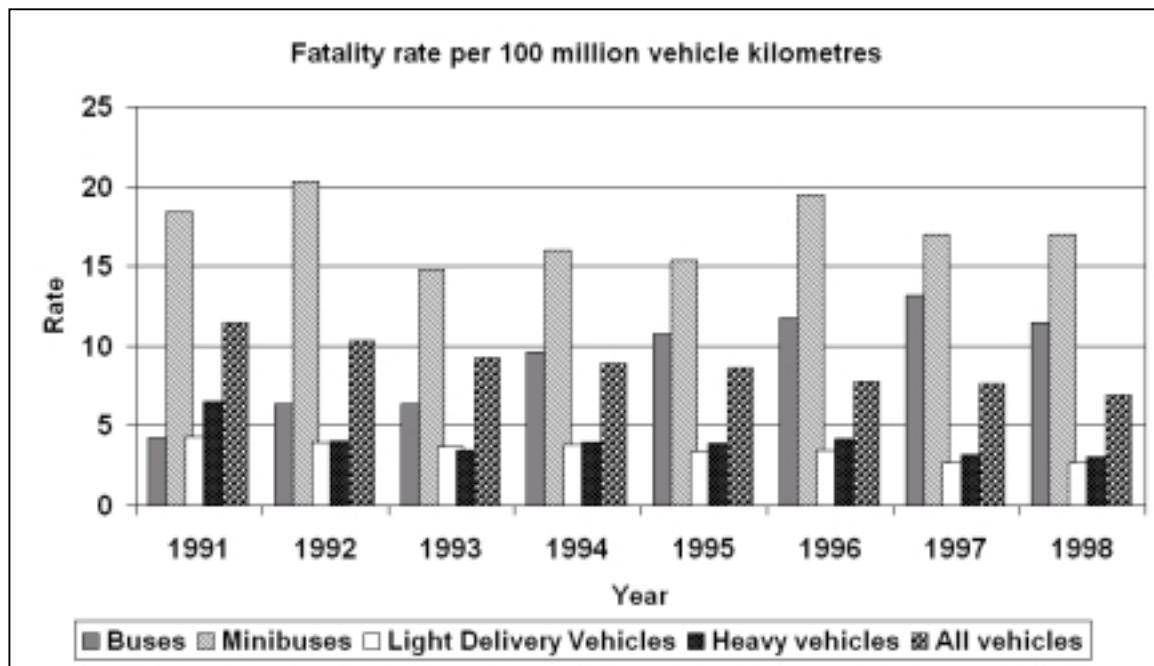
- The accident rate for crashes involving buses increased since 1994. Since 1996, the accident rate for crashes involving buses exceeded the level of 900 accidents per 100 million vehicle kilometers traveled.
- The accident rate for minibuses was very high throughout the period at above 900 accidents per 100 million kilometers traveled.
- Accidents involving LDV's had been fairly constant at a rate of 400 accidents per 100 million kilometers traveled.
- Accidents involving heavy vehicles fluctuated between 400 and 450 accidents per 100 million vehicle kilometers over this period.

- The category “All vehicles” has shown a slight, very gradual downward trend (461 in 1991 and 393 in 1998).

### 3.2.2 Road fatality trends for public passenger transport and freight vehicles

Figure 5 shows the fatality rates for public transport (buses and minibuses), freight vehicles (LDV’s and heavy vehicles) and “All vehicles”, expressed per 100 million vehicle kilometers traveled for the period 1991 to 1998.

**Figure 5: Road fatality rates for public passenger transport vehicles (buses and minibuses), freight vehicles (LDV’s and heavy vehicles) and “All vehicles”: 1998**



The main trends in road fatality rates over the period 1991 to 1998 were as follows:

- The fatality rate for crashes involving buses increased since 1991 with a slight decrease in 1993 and 1998. Since 1995, the fatality rate for crashes involving buses had exceeded the level of 10 fatalities per 100 million vehicle kilometers traveled.
- Throughout the period, crashes involving minibuses featured at a very high fatality rate of above 15 fatalities per 100 million kilometers traveled. In 1992 and 1996 the fatality rates were in the order of 20 fatalities per 100 million vehicle kilometers traveled.
- The fatality rate for accidents involving LDV’s showed a downward trend from about 4 fatalities (1991) to under 3 fatalities (1998) per 100 million kilometers traveled over the period.
- The fatality rate for accidents involving heavy vehicles came down from above 6 in 1991 to about 3 fatalities per 100 million vehicle kilometers in 1998.
- Between 1991 and 1998, the fatality rate for the category “All vehicles” came down from 11,5 (1991) to 7 (1998) fatalities per 100 million vehicle kilometers traveled. This has been a significant downward trend.

## **4 AN ANALYSIS OF FACTORS CONTRIBUTING TO ROAD TRAFFIC CRASHES AND CASUALTIES IN THE PUBLIC PASSENGER TRANSPORT SECTOR.**

### **4.1 Introduction**

Although contributory factors are usually categorised under human, vehicle and road environment issues, for this purpose it would be appropriate to expand these issues into more sub-categories to also take cognisance of, amongst others, the current economic situation; as well as an increase in fraud and corruption in many functional areas within the road transport sector. Although such issues do not necessarily contribute directly to crashes, it can be accepted they do play a major role.

### **4.2 Human issues**

The human factor, be it drivers, pedestrians, vehicle owners, operators, officials at vehicle testing stations and driver testing centers, or those responsible for maintaining the road network, remain the single most significant contributory factor of between 80 and 90 per cent, if not higher.

In this regard operators of public passenger carrying vehicles, buses and minibus taxi's play a major role. They, firstly do not always ensure that the drivers they employ do have non-fraudulent driving licences; the necessary driving skills and are truly professional drivers. It is a well known fact that driving licences can be bought or obtained in a fraudulent manner at many driving license centers from corrupt officials which further contribute to the poor safety record. Operators also have a tendency to exploit drivers by not entering into acceptable, formal employment and remuneration agreements with them, but rather impose agreement conditions that force drivers to exceed acceptable driving hours; load as many passengers as possible, in order to increase theirs as well as the operators' income; and to undertake as many trips as possible in the shortest possible time. These issues encourage and contribute to an increase in negligent and reckless driving behaviour; increased speed; ignoring of traffic signs and signals; fatigue and disregard for the safety of passengers and other road users.

### **4.3 Vehicle issues**

Because of vehicles having to be utilised as extensively as possible, there remains very little time to service them properly. The overall economic situation and optimisation of income for owners and operators also contribute to the fact that vehicles are not maintained to an acceptable standard. This result in, amongst other, the poor quality of tyres, either smooth or of the wrong type; worn brakes, or the use of sub-standard spare parts; the non-functioning of lights, etc which are all factors which directly influence the control over and safety aspects of vehicles and contribute to crashes. The un-roadworthiness of vehicles is further promoted by corrupt officials at vehicle testing stations at which roadworthiness certificates can be bought without even seeing or inspecting the vehicle.

### **4.4 Road environment issues**

Although the quality of maintenance of the road network has declined over the last few years, resulting in an increase in potholes, fences removed or stolen which result in more cattle and other animals straying onto the road; poor maintenance of road signs and insufficient provision of warning signs at hazardous locations, these should not be identified as the sole contributory factors to accidents. The onus is still on the drivers of vehicles to drive alert and at speeds which are safe for the prevailing circumstances, whether it be the roadway itself, the road environment or weather conditions. However, considering the issues of fatigue; the general decrease in the standard of vehicles; an increase in overloading; driver inabilities and an increase in contempt for the law, together with poor road

conditions could serve as an explanation for the unacceptably high fatality rates of buses and minibus taxi's.

#### **4.5 Analysis of contributing factors based on recent case studies**

Detailed investigations into a number of bus crashes that happened during September and October 1999 and in which 424 people were killed and injured, indicated that:

- in 40 per cent of the cases the crashes happened only because of one or more human factors or errors;
- in a further 50 per cent of the crashes it was a combination of human and vehicle factors;
- human, vehicle and road factors combined played a role in 10 per cent of the crashes;
- inconsiderate driver behaviour, including unsafe overtaking, played a role in 60 per cent of the crashes and speed too fast for prevailing circumstances or exceeding the limit in 50 per cent of the cases.

Analysis of crash statistics over the last few years indicated that the chance of buses getting involved in an accident is in the order of 30 per cent, the highest of all vehicle types. The chances for all vehicles is about 10 per cent and for minibus taxi's in the order of 25 per cent. The fatality rates per number of vehicles registered and distance traveled for both buses and minibus taxi's are almost 3,5 times higher than for other vehicles.

When comparing fatal crash information of December 1999 with December 1998 the following increases / decreases were noted:

- driver and pedestrian fatalities decreased with 3 per cent and 8 per cent respectively, while an increase of 36 per cent was experienced in passenger fatalities;
- the highest increase in the number of vehicles involved in crashes per type were recorded for minibus taxi's, namely 18 per cent;
- the highest increase in fatalities per vehicle class was also recorded for minibus taxi's, namely 93 per cent.

Analysis of the December 1999 crashes also revealed the following contributing factors playing a major role:

- speed
- poor tyres and tyre bursts
- pedestrians jaywalking
- drivers and pedestrians under the influence of alcohol, and fatigue

It was also noticed, with concern that although there was a slight decrease in the total number of crashes, more vehicles were involved and the number of fatalities per crash increased by 10 per cent from 1,3 to 1,43. This increase could be as a result of crashes happening at higher impacts, possibly as a result of an increase in speed, and/or more passengers per vehicle.

With regard to law-enforcement actions undertaken during December 1999, most notices were issued for the following offences:

- speed
- un-roadworthiness of vehicles (brakes, tyres and lights)
- no or false driving licenses
- overloading, and
- unsafe overtaking

which are, of course all factors directly contributing to crashes.

## **5 SHORT AND MEDIUM TERM SOLUTIONS TO IMPROVE PUBLIC PASSENGER TRANSPORT SAFETY**

### **5.1 Introduction**

Based on the discussion in section 4 above it is regarded as essential that, amongst others, the following issues be addressed in order to combat the ever increasing carnage on our roads:

- resource management systems for operators regarding drivers and vehicles
- acceptable and standardised operator/ driver employment conditions and agreements
- increased control of operators and the imposing of fines and penalties for unacceptable road traffic and transport related matters
- the combating of fraud and corruption
- increased law-enforcement on driver and vehicle fitness aspects, and
- increased law-enforcement on critical traffic offences

### **5.2 Recommended short and medium term solutions**

#### **5.2.1 Specific measures aimed at the public passenger transport sector**

Various countermeasures are currently being developed by the National Department of Transport through the Government Task Force on Improved Bus Safety, involving all relevant stakeholders. Some of these measures are specifically directed at the public passenger transport sector and others indirectly through the general upgrading of road safety measures for all road users. The specific issues that are impacting on the public passenger transport sector are aimed at operator efficiency as well as driver and vehicle fitness.

##### **5.2.1.1 Operator issues**

###### ***Short Term Recommendations***

- Investigate the introduction of a compulsory general and passenger liability insurance scheme for all passenger transport operators.
- Investigate current employment and working conditions, including agreements, compensation, remuneration and incentive schemes for Commercial Professional Drivers in both the freight and passenger transport industries with the view to identify conditions that may be contributory to unsafe driving behaviour. Based on the outcome of the study, consideration should be given to the development of a standard Employer/Employee Agreement in this regard, together with all stakeholders, with the view to provide for the introduction of a compulsory Standard Agreement in legislation.



### ***Short to Medium Term Recommendations***

- Introduce mandatory registration and obtaining of Commercial Operators Licences (COL's) for all operators of commercial freight and passenger transport vehicles.
- Introduce the mandatory implementation and adequate operation of a Code of Practice on Fleet Quality and Safety Management Systems for all Commercial Operators. Such systems must provide, amongst others, adequately for training and skills development; time management of drivers; vehicle maintenance and safety management plans.
- Introduce the mandatory development and efficient operation of Incident Management Systems for hazardous and dangerous goods operators.

#### 5.2.1.2 Driver issues

### ***Short Term Recommendations***

- Investigate the introduction, operation and monitoring and control of maximum driving and working hours for Commercial Professional Drivers.
- Review the requirements for obtaining a Professional Driving Permit with the view to introduce revised driver training and testing procedures in this regard.
- Investigate the need for the development and introduction of compulsory advanced driver training programmes for learner Professional Drivers.

### ***Short to Medium Term Recommendations***

- Introduce regular, prescribed relevant medical examinations for all Commercial Professional Drivers.
- Introduce compulsory re-testing of driving skills of commercial drivers every 2 years.

#### 5.2.1.3 Vehicle issues

### ***Short Term Recommendations***

- Conduct research into the feasibility of compulsory fitting of speed limiting devices to all freight and public passenger transport vehicles (trucks, buses and minibus as well as metered taxi's)
- Investigate the feasibility of a compulsory requirement for the fitting of only new tyres to wheels on the steering axles of all commercial freight and public passenger transport vehicles.
- Develop legislation for the introduction of compulsory 6-monthly (or maximum distance travelled) roadworthiness testing of all commercial freight and public passenger transport vehicles.
- Conduct research in to the feasibility of introducing legislation on the compulsory fitting of devices to wheels or other parts of vehicles which will assist drivers to retain better control over vehicles in case of tyre blowouts.
- Conduct research into the feasibility for the compulsory fitting of multi-functional devices to vehicles with the purpose to undertake remote real time monitoring and possibly control of both the vehicle and the driver .

### ***Medium Term Recommendations***

- Review the safety standards for trucks, buses and minibus taxi's
- Prohibit and control the importation of inferior quality replacement vehicle parts
- Research the fitting of roll bars and/or rollover protection and seat belts on buses and minibusses

### 5.2.2 Other issues impacting indirectly on public passenger transport vehicles

Other more general countermeasures focussing on the upgrading of road safety for all road users includes:

- Increased law enforcement to address vehicle and driver fitness.
- Improved infrastructure such as arrestor beds and compulsory vehicle stops at steep declines.
- Enhancement of awareness and communication strategies directed towards improved vehicle safety in the public passenger transport industry.
- Improved education and training through the development of a special compulsory road safety education course for all professional drivers.
- More involved public participation by providing commuters easy access to complaint desks.
- Better monitoring and control to eliminate fraud and corruption at driver license testing centres and vehicle testing stations.
- Better equipped driving licence testing centres and vehicle testing stations.
- Road traffic information management through the deployment and effective operation of Trafman.

## **6 ACKNOWLEDGEMENT**

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