AN ANALYSIS OF THE EXTENT TO WHICH THE NEEDS OF VULNERABLE ROAD USERS ARE ADDRESSED AND PRIORITISED IN LAND USE, TRANSPORT AND INFRASTRUCTURE PROVISION DECISIONS IN SOUTH AFRICA

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ABSTRACT

Trends across the world show that pedestrians, motor cyclists and cyclists account for a disproportionate share of road fatalities. For instance The World Health Organization (WHO) (2009) highlighted that pedestrians, motor cyclists and cyclists constitute the Vulnerable Road User (VRU) group and account for nearly half of global road traffic deaths. The Road Traffic Management Corporation (2007) also indicated that pedestrians, cyclists and motorcyclists account for about 43 percent of road the deaths in South Africa. The WHO (ibid) explained that the situation in South Africa is more desperate than that of other countries. This situation requires transportation practitioners to seriously consider the needs of non-motorised road users when making decisions on land use and transport planning, infrastructure design and traffic management. This paper highlights the fact that most of accidents are caused by, among other things, land use-transport policies, strategies and plans, which do not adequately take into consideration the needs of VRUs. The paper also analyses the existing infrastructure, transport policies and road safety strategies and plans that have been implemented in South Africa to reduce road crashes and the extent to which they address the needs of different user groups. International best practices are also highlighted.

1. INTRODUCTION

The WHO (2009) recently published the Global Status Report on Road Safety, and highlighted that pedestrians, motor cyclist and cyclists account for nearly half of global road traffic deaths. These trends in road traffic deaths vary between developed and developing countries. For instance the WHO (ibid) explained that, while road fatalities in many developed countries have stabilised or declined over the past few decades, the situation is actually deteriorating in many developing countries. On average road fatality rates in developed countries are about 10 per 100,000 people, as compared to 20 and 22 per 100,000 people, in the middle and low income countries, respectively. The WHO (ibid) attributed these trend variations to the rapid increase in motorisation rates, which have not been adequately complemented by well planned strategies to reduce the levels of exposure, particularly among the VRUs. In South Africa, Nyarirangwe (2009) noted that, until the 2008-09 festive season, there has been a sustained upward trend in road crashes.

A road user is vulnerable when there is limited or no physical protection to reduce the consequences associated with an accident. The WHO (ibid) pointed out that VRUs include pedestrians, motor cyclist and cyclists. Consequently, a safe road traffic system is one that accommodates and compensate for human vulnerability and fallibility. Transport systems must therefore be designed and provided in such a way that VRUs and other users are adequately protected. Traditionally, road infrastructure designs have, more often that not, been tailor-made to meet the needs of motorists. In South Africa, for instance, most of the road network lacks non motorised facilities such as cycle tracks, pedestrian walkways, pedestrian bridges, etc. As a result, VRUs have over the years accounted for a disproportionate share of road fatalities. It was only until recently that the government, through the National Department of Transport (NDoT) as well as provincial and city authorities, have begun to consider the needs of VRUs seriously. This paper analyses the existing situation in South Africa in terms of trends in road fatalities by user category, intervention measures that have been implemented to date as well as international best practices.

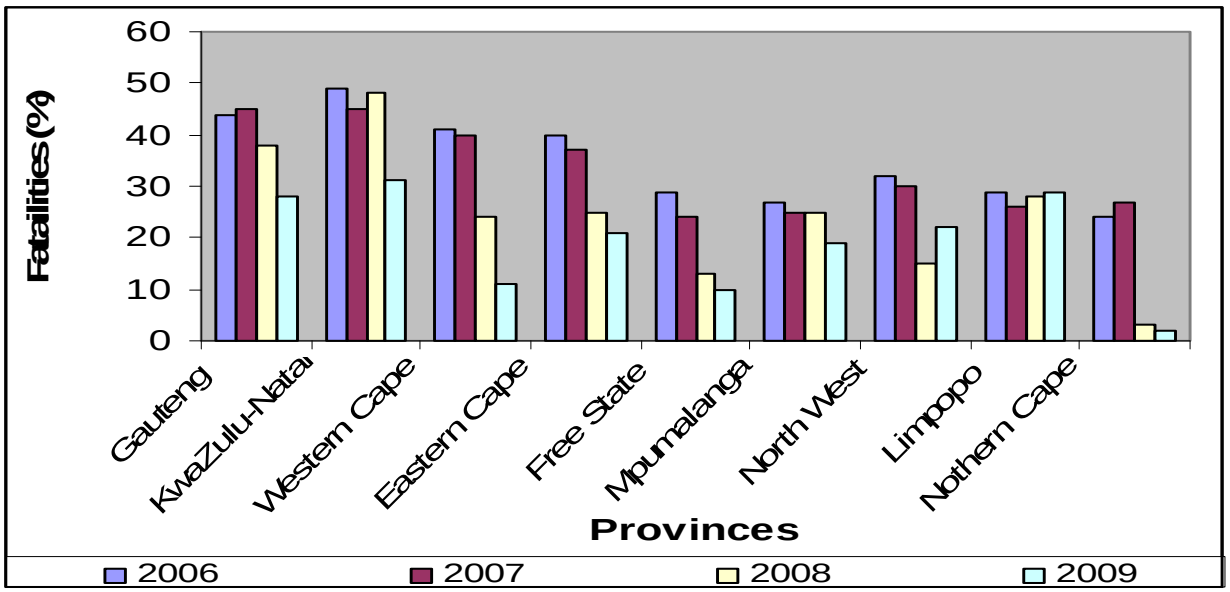
2. ROAD SAFETY CRISIS FOR VULNERABLE ROAD USERS

In South Africa pedestrians, cyclists and other VRUs travel along roads together with fast moving vehicles, daily. As a consequence, they are exposed to high crash risks. Joubert et. al (2006) pointed out that South Africa's road safety ranks fourth worst in the world. The same sentiments were echoed by Rooyen (2004) who noted that close to 90 percent of these accidents can be attributed to human factors. Ribbens (1996) pointed out that pedestrians constitute a disproportionate share of people killed and injured in road crashes in South Africa. He attributed this to the fact that walking and public transport constitutes about 80 percent of the modal share of household trips. He also reported that, although the elderly (over 60 years) and young children are the most vulnerable groups, accident statistics show that adults of between 20 and 45 years constitute the highest number of those killed in crashes. This could be due to the fact that they constitute the biggest and most mobile population segment. The highest incidences also occur during the late afternoon to evening periods, on Saturdays (20 percent), Fridays (18 percent) and Sundays (14 percent), suggesting the influence of alcohol on driving behaviour.

The same sentiments, as above, were echoed in the City of Cape Town's Policy on Calming Residential Streets (2003). It was noted that statistics provided by the National Injury Mortality Surveillance place pedestrians as the most VRUs. The main reason was the inadequate separation and or integration of appropriate pedestrian support infrastructure in road designs. The policy also noted that residents of low income suburbs actively use the road for their daily activities. With no proper protective mechanisms in place, they are exposed to accidents. The other reason that was cited has to do with alcohol intake by pedestrians and drivers, and the resultant non-compliance to road rules. The highest number of people killed was found among children (1-14 years) and adults (30-34 years).

The Road Traffic Management Corporation (RMTC) (2007) noted that during the period 2007-08 pedestrians, cyclists and motor cyclists accounted for about 43 percent of all road traffic deaths in South Africa. Nyarirangwe (ibid) also pointed out that statistical trends also show a disproportionate share of road fatalities among VRUs, across all the country's provinces. For instance on average, pedestrians accounted for about 35.69 percent of all road fatalities during the 2008-09 festive season. Ribbens. et al (2002) pointed out that the same trends were observed in the past decade. For instance, in 1998, 3452 pedestrians were killed in road crashes, which was about 38 percent of all road fatalities recorded. They also noted that over and above those killed, about 10,000 pedestrians were seriously

injured, while over 20,000 others sustained slight injuries, during the same period. The Road Traffic Management Corporation (RMTC) (2009) reported that between 2004 and 2009, there was a decline in pedestrian fatalities, nationally. It was noted that pedestrian fatalities ranged between about 49.27 and 30.46 percent. Provincially, high incidences of VRU fatalities and injuries were recorded in Gauteng, KwaZulu-Natal, Western Cape and Eastern Cape. These provinces accounted for over 72 percent of the total number of VRU fatalities in 1998. The trends in VRU fatalities from 2006 to 2009 are provided in **Figure 1** below.



Source: (Road Traffic Management Cooperation (2008), Arrive Alive (2009))

Figure 1: Trends in VRU fatalities from 2006 to 2009

From **Figure 1**, there was a general fall in pedestrian fatalities across all the provinces between 2006 and 2009, except for KwaZulu-Natal, and Limpopo, which experienced an increase in 2008. Generally, KwaZulu-Natal, Gauteng, Western Cape and Eastern Cape provinces had relatively high incidences of VRU fatalities during the period under review.

3. APPROACHES TO IMPROVE THE SAFETY OF VRUS IN SOUTH AFRICA

This section analyses some of the policies, programmes and strategies that have been implemented to promote road safety for VRUs in South Africa. Reference is given to existing national policies and programs, as well as cities of Johannesburg, Cape Town and Tshwane regarding their metropolitan level planning strategies and policies. The aim is to evaluate their effectiveness in addressing the road crash problems and meeting the needs of the VRUs.

3.1 National Policies and Programs

3.1.1 The White Paper on National Transport Policy (1996)

The policy devotes a specific section on road traffic and safety, focusing specifically on the need to protect pedestrians. Broadly, the policy focused on improving road safety, promoting road discipline, protect road capital investments, as well as enhancing the administrative and economic order of the road transport sector. With regards to protecting VRUs, the policy, through a number of relevant statements, highlighted some intervention measures. These include the need to ensure proper traffic law enforcement, regarding undisciplined pedestrian behaviour, expediting the adjudication process, improving pedestrian knowledge, skills and attitudes regarding safe road usage, identification and treatment of pedestrian hazardous locations, etc. (Ribbens et. al, 2002)

3.1.2 Road Traffic Management Strategy (RTMS)

The RTMS covered, among other things the need for consultation and coordination of provincial and local authorities, responsibilities over traffic control and policing, adjudication of traffic offenses, road traffic legislation, etc. Although there was no specific focus on protection of VRUs, the RMTS highlighted the need for safety education. Some of the recommended strategies include the Safety in Traffic Education Program (STEP), introduction of scholar patrols, Child in Traffic and BRIDGE traffic safety programs in schools, as well as strategies focused on developing suitable safety programs and training manuals on safe use of transport infrastructure by adult pedestrians. (Ribbens et. al, 2002)

3.1.3 Road to Safety 2001 – 2005 Strategy

The focus of this strategy was to reduce crashes, deaths and injuries by 5 percent annually between 2001 and 2005. According to Ribbens et. al (2002), the strategy focused on four broad action plans which included law enforcement and compliance, operator, vehicle and driver fitness, infrastructure, management and information systems, and communication, public education and participation. Deductively, any measure meant to reduce road carnages goes a long way to saving the lives of the VRUs as well. The strategy focused on the safety of VRUs through promoting lower average speed to reduce the severity of injuries in case of a crash, promoting good driving behaviour such as giving way to pedestrians, as well as educating pedestrians about the dangers associated with unsafe road use practices such as jay-walking.

3.1.4 Arrive-Alive Road Safety Campaign (1997)

The main focus of the campaign was to promote increased enforcement and communication activities in order to reduce road traffic fatalities by 5 percent of the preceding year figures. The various phases of the campaign focused on different traffic safety aspects. In all aspects the safety of VRUs was taken into account. For instance, phases 1 to 4 focused on enhancing law enforcement and communication. Under phase 5 and 6, focus was more on the identification and improvement of pedestrian hazardous locations. Phase 6 devoted a specific theme on Pedestrian and Cycle Safety and Pedestrian, Cyclist and Motor Vehicle Visibility. The campaign also resulted in the allocation of about R13,5 million to all provinces, which was dedicated to the identification and improvement of hazardous pedestrian locations. The Minister of Transport (2009) attributed the major reduction in road carnages during the 2008/09 festive season to the more streamlined approach which was adopted under the Arrive Alive Campaign (Ribbens et. al, 2002; Nyarirangwe, 2009).

3.1.5 National Pedestrian Action Plan

This plan was a product of the National Pedestrian Workshop which was jointly organized by the NDoT and the Centre for Scientific and Industrial Research (CSIR) in January 2001. The main focus of the plan was to train government and local authority officials as well as community members on pedestrian safety. The Pedestrian Facility Guideline Manual and the Bicycle Design Manual for Urban Areas were also revised, updated and combined into one user-friendly one. The plan also focused on enhancing community needs assessment, planning, implementation and evaluation in order to identify the most effective strategies to promote road safety at community level. It also focused on promoting community driven safety programs, educational methods and techniques as well as forging partnerships with the private sector and different spheres of government. (Ribbens et. al, 2002).

3.1.6 Shova Kalula Project

The Shova Kalula (Ride Easy) Program was first implemented in 2001. Its main objective was to promote the use of Non-Motorised Transport (NMT), focusing more on cycling. This was meant to enable communities to access social and economic opportunities at a low cost. The project also aims at creating an enabling environment that mainstreams cycling

into the public transport system. Apart from providing bicycles to communities, the program also focuses on the provision of institutional support mechanisms. The main focus of this project is to promote cycling as a low cost mobility solution to low-income households, targeting mainly scholars, women and farm workers.

3.1.7 Draft National Non-Motorised Transport (NMT) Policy (2008)

The primary objectives of this policy are, among others, to increase the role of NMT as a key transport mode, integrate it into the public transport sector and allocate adequate and sustainable funding for the development of the requisite infrastructure. The policy, therefore, requires all municipalities to produce NMT plans and integrate them into the Provincial Land Transport Framework and Integrated Transport Plans.

3.2 Metropolitan Road Safety Programs

3.1.1 City of Johannesburg (CoJ) Traffic Calming Policy

The Traffic Calming Policy for CoJ was formulated in 2002, to address complaints from residents and provide a framework for the evaluation of traffic problems. The objective of the policy is to, among other things, moderate traffic behaviour, reduce traffic speeds and/ or volumes, influence travel patterns and improve the traffic safety and quality of urban life. This would be achieved through physical and legislative measures. The policy proposed an evaluation procedure, which highlights whether engineering, enforcement, education or a "*combination course"* is required to address identified traffic safety problems. The decision on calming measures will depend on road hierarchy and whether it is a public transport route or not. The policy utilizes a holistic analysis of the environment in terms of land uses, traffic volumes and speeds, pedestrian and cyclist volumes, etc. The road network is classified so that the most appropriate measures are implemented. Some of the recommended measures include vertical shifts (e.g. humps, plateau, raised intersections, etc) and lateral shifts (e.g. islands and medians) to force directional changes and limit in drivers' view of the road network ahead, in the carriageway. Others include road closures and introduction of one-way streets.

3.1.2 City of Tshwane (CoT)

The City of Tshwane has since 2004 been developing Pedestrian Safety Master Plans for most of its existing townships. The aim of the plans is to provide a comprehensive framework for improving pedestrian safety and mobility in the townships. This would, in turn, improve the efficiency of the overall transportation system, the health of citizens, and the attractiveness of the area. These plans are constantly being reviewed in line with transformations in the land use mix and character.

As a pilot study, CoT also came up with a Traffic Calming Plan for the Menlo Park to reduce traffic speeds and protect VRUs. It was noted that traffic was being diverted from the busy and congested roads onto residential local collectors, resulting in major crash hazards in the area. The objective of the plan was to identify the affected streets, classify them and implement traffic calming measures on an area-wide basis. Interventions that were recommended included mini-circles, raised four-way stops, realignment of selected intersections, pedestrian walkways, road closures, single lane chicanes and traffic signals.

3.1.2 City of Cape Town Non Motorised Transport (NMT) Policy and Strategy

The NMT Strategy for the City of Cape Town consists of a policy and a set of objectives and strategies to create an improved NMT environment and culture. It focuses on the development of a Strategic NMT Plan that would identify key NMT routes and places. The plan would then ensure that users receive a certain degree of consideration and priority. The main aim of the policy is to increase cycling and encourage walking through the

creation of a safe and pleasant bicycle and pedestrian network of paths that would serve all the citizens in the Cape Town Area.

3.3 Effectiveness of the Policies and Programs in Addressing the Needs of VRUs

Most of the existing traffic safety measures at national level place more emphasis on the needs of the motorists. The needs of VRUs normally come as more of an *"after thought".* The response measures, save for the Shova Kalula Draft Policy, are much broader and not specific to VRUs needs. It is however encouraging that at a more local level, metropolitan municipalities are streamlining pedestrian and cyclist safety in their traffic plans. The traffic calming policies and plans for Cities of Tshwane, Johannesburg, and Cape Town emphasize the creation of a sustainable transport environment, which places a lot of importance on balancing the needs of all road users. However, the main weakness of the current approaches is they are more reactionary than proactive. For instance in the case of Cities of Tshwane and Johannesburg, the strategies focus more on identification and addressing accident hazard areas. There is no evidence of a deliberate effort to plan the land use and traffic environment in such a way that influences household travel patterns and promote harmony among all road users. In Cape Town, although a more participatory and proactive approach is recommended in the NMT Policy, more still needs to be done to influence travel patterns and pedestrian exposure through land use-transport planning. Worldwide, city environments that promote non-motorised modes are being promoted.

4 INTERNATIONAL BEST PRACTICES

This section will provide some recommendations on how to improve safety for VRUs based on international best practices. It focuses more on land use planning, the design and ranking of roads, as well as the general organization of travel and town planning. This is critical in order to minimise the traffic impacts on VRUs. Although solutions for developing countries often differ from those in the developed world, some basic principles can be applicable across the board. The paper therefore acknowledges the fact that the actions that could be taken will also vary, depending on the size and age of the city, type of urban development, as well as existing socio-economic activities.

4.1 Land Use Planning Measures

Land use planning has a potentially powerful influence on household travel behaviour and patterns, as well as the extent to which an area can be friendly and attractive to pedestrians and cyclists. Generally, dispersed low density developments promote car dependence and, therefore, impact negatively on the attractiveness of NMT as a transport option. Conversely, higher density, mixed use developments often promote shorter trips and, consequently, an environment conducive to walking and cycling.

4.1.1 Mixed use planning

Many safety problems on roadways today are a result of the way communities were, and are still being, structured. The perfect panacea for the disjuncture between planning and safety is an appropriate land use mix complemented by '*smart'* growth planning. Transportation practitioners need to work with town planners, and urban developers to ensure the incorporation of mixed land use principles into local and regional plans.

Figure 2 compares a traditional and conventional land use planning.

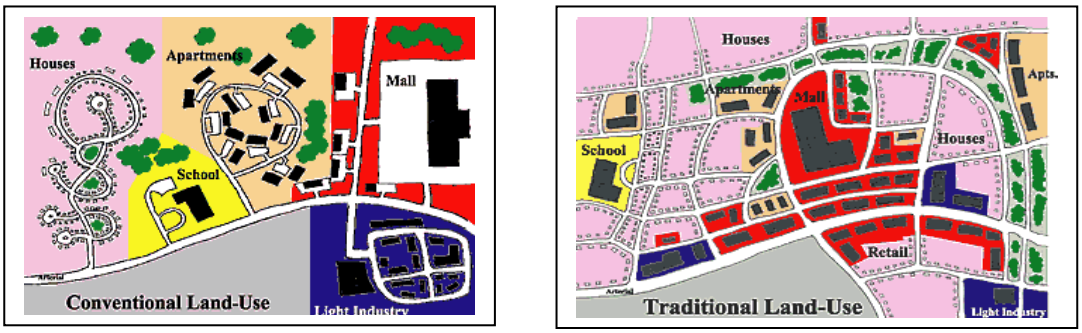


Figure 2: Conventional versus traditional land use planning
(Source: Berkovitz, 2001).

Several distinctions are noticeable among roadway systems of the traditional and conventional development patterns. Traditional land use plans consist of a grid-iron pattern of streets, with total street lengths, many blocks, intersections and access points which result in more route choices. Travel distances, times as well as dependency on cars may be significantly reduced. This can lead to a safer and more secure environment, which, in turn, encourages more people to walk, ride bicycles, and use of public transport. On the other hand, conventional land-use patterns result in more of a "hub and spoke" or "human circulatory system" roadway pattern which is ideal for the car user (Berkovitz, 2001).

4. 2 Infrastructure Measures

This paper recommends that municipalities must endeavour to create a safe environment for pedestrians whenever infrastructure is created or improved. The following international best practices are recommended.

4.2.1 Road user hierarchy versus road hierarchy

Most cities typically use a road hierarchy to manage their roads. However, this approach only takes into account the number of vehicles on the road and do not normally accommodates other road users. A balance must be struck in the level of service provided for each user group and the allocation of limited space to each. To achieve an integrated approach, cities internationally are increasingly using a different type of hierarchy called a ‘road user hierarchy’ which endeavours to bring non-motorised road users to the heart of the planning process. This ensures that the most vulnerable road users are appropriately considered, and also streamline into each travel mode. Resultant policies will, therefore, positively impact on the various components of the road hierarchy and highlight the importance of each travel mode in localised situations, based on local needs. The system should be flexible enough to accommodate any potential changes in the user hierarchy, at different times of the day, such as before and after school. The first stage in a new or road upgrade development would, therefore, be to identify the importance of different road user groups, and their relative positions in the hierarchy. As designs are developed they can then be assessed in terms for their costs and benefits for different road user groups, particularly those who would have been identified as higher in road user hierarchy. (New Zealand Transport Agency, 2007). **Figure 3** shows a potential road user hierarchy, which was applied in New York and the United Kingdom, to promote walking.

Figure 3: Potential road user hierarchy
Source (New Zealand Transport Agency, 2007)

4.2.2 Area-Wide Traffic Calming Master Plans

The actual speed in urban areas, where car traffic and pedestrians co-exist, is of vital importance when it comes to road safety for pedestrians. Firstly the speed at which a car is travelling car influences the capacity of the driver to observe pedestrians and safely stop without causing a crash. Secondly, the car speed also determines the severity of injuries sustained by a pedestrian in a crash. Most countries apply area-wide traffic calming measures as opposed to isolated streets. This diverts fast through traffic from collector to arterial routes that are appropriately designed to handle it. Master planning addresses traffic challenges holistically, as compared to calming isolated streets, specific suburbs or wards. The benefit of master planning is that it is pro-active and can be used in motivating for capital funds. Ad hoc implementation of traffic calming has widespread implications and can at times cause more problems.

4.2.3 Design for all principle

This approach proposes that all elements in the traffic and transport system be designed in manner that makes them manageable for everyone. This applies to the spatial environment, means of transport, as well as education, legislation, regulations, etc. The approach emphasizes focus on generic measures, unless where they are not sufficient to solve a problem. Only then will specific measures be required for small groups. This minimizes the stigmatization of certain road users. (Merthosrts, 2003).

4.2.4 Integrated Walking and Cycling Networks

The creation of networks of connected and convenient pedestrian and cyclist routes can lead to greater safety for VRUs. Safer routes, typically, consist of footpaths, sidewalks and cycle tracks separate from the mainstream roadway. For instance, in Poland, Warsaw has more than 150km of cycle lanes, while in Belgium almost all one way streets allow cyclist to go in the opposite direction. In Hungary, about 30km of bicycle lanes were constructed annually. (Avenoso et, al, 2005).

4.2.5 Pedestrian Crossings

Pedestrian crossings, such as bridges, are very often poorly located and designed. In South Africa, this is evident in most urban areas, where pedestrian bridges largely shunned by targeted users. In Latvia, Ventspils a register of all pedestrian crossings was developed in order to acknowledge the unsafe ones and those in need of supplemental measures, such as barriers, lighting, refuges etc. The register is also used for the identification of areas where new crossings should be built (Avenoso et, al, 2005).

5 CONCLUSION

This paper concludes that VRUs remain exposed to crash risks in South Africa. They constitute a disproportionate proportion of road fatalities. The current measures need to be more proactive and participatory, rather than reactive. The situation can be improved through more holistic approaches such as land use plans that reduce the demand for car travel and promote use of NMTs through appropriately integrated and designed infrastructure and measures that promote safety. Experiences across the world have shown how traffic calming master planning, the “road user hierarchy” approach, and other best practices can achieve safe and attractive urban environments. For these different strategies to be effective they should be customized to suit the local South African urban environment and applied as packages as opposed to isolated reactionary measures. Therefore, the plight of VRUs should not only be addressed by reducing the number of fatalities and injuries, but also through increasing and improving mobility options for VRUs.

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