THE DEVELOPMENT OF AN IMPLEMENTATION AND MANAGEMENT PLAN FOR THE TRAFFIC MANAGEMENT SYSTEM IN ADVANCING THE DECADE OF ACTION FOR ROAD SAFETY IN SA, 2030 VERSUS 2020

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ABSTRACT

In South Africa, road traffic models that can assist to reduce road traffic casualty rates by 50% in line with United Nations Decade of Action for Road Safety from 2011 to 2020, are implemented under the Traffic Management System (TMS) as the sub-system of the Transport System (TS). The TMS is a concept where different role-players work together as a team in a holistic and integrated manner with the common aim to promote orderly traffic and road traffic safety. The United Nations Decade of Action for Road Safety is an international road safety programme initiated by the UN by which countries around the world, including South Africa as signatory, to reduce road traffic casualties by 50% between 2011 to 2020. The UN initiated this programme after identified the serious challenge of the increment of road traffic casualties globally. The current rate at which road traffic fatalities are increasing in South Africa, suggests that South Africa will not be able to reduce these casualties by 50% by 2020. The DoT developed the National Road Safety Strategy (NRSS) 2016 and extended its timeframe to 2030 in line with the National Development Plan **(**NDP**)**. This paper is focused on the implementation of the developed and new road traffic management models that can assist in reducing the contributory factors to road traffic casualties. New models that can be implemented, include management models such as non-wearing of seatbelt, risk assessment, data collection and analyzing, children training, accident management, assessment and monitoring, taxi star rating to reduce traffic casualties and to promote road safety in South Africa.

1. INTRODUCTION

It is generally accepted that road traffic safety is a multi-disciplinary science and as such needs to be managed by a team of experts from different institutions in a holistic, integrated and coordinated manner (Pretorius and Mulder, 1991**).** In this regard such teams should be comprised of experts from different fields as discussed below.

This paper is focusing on the following subjects:

- Implementation of a management plan of some of the 90% road traffic developed models, under the TMS as the sub-system of the Transport System (TS).

- Formation of an Implementation Group (IG).

- Involvement of teams of experts, based on a scientific and multi-disciplinary approach and a law enforcement based on QCMs, to assist in the reduction of road traffic casualty rates by 50% in line with UN DOA for Road Safety, 2011 to 2020.

There is an old saying that says take the best from the past and use that as a foundation to build the future. This paper is also using what was good in the past to promote traffic safety in the future. This means that we cannot just get rid of what was done by the previous authorities. We don't need to reinvent the wheel. One of the challenges identified by this paper is the poor implementation of the TMS as part of the road traffic safety solution as identified by the CSIR in the 1990s.

The road safety issue in the transportation system, globally and in South Africa, has become one of the problems facing modern society today. South Africa has one of the worst road death rates in the world. In South Africa about 15 000 people are killed annually while many get injured or disabled. The economic impact of these road traffic casualties and including accidents are estimated to be between R334 and R487 billion, while the actual cash cost is estimated at approximately R199 billion annually. This money could be better used to alleviate poverty and to aid the country development (DoT, Strategy Manual, 2015). These road traffic casualties and accidents can be reduced to the acceptable level if the and policy direction suggested by this paper, in line with policies and strategies developed by the RTMC and DoT, can be properly followed.

1.1 Historical Background

The origin of road traffic problem can be traced back to 1891 when Daimler and Benz built the first usable motor car in Germany. In South Africa, a Benz was imported by Hess in 1897 (Anon, 1975), (Johnston, 1975). Since the inception in Germany it is about 126 years and in SA it is about 120 years. Daimler, Benz and Henry Ford (1908) by building motor vehicles, were not aware that they started a revolution in the transport needs of mankind. The vehicle would not only provide mobility to millions of people all over the world for many decades, but also become one of biggest manmade killers at the end of the 20th century (Road Traffic Management II, 2014). Since the invention of the motor vehicle over a century ago, it is estimated that about 30 million people have been killed in road crashes worldwide (RTMC, 2005).The first recorded accident in SA happened in 1903. Today, about 15 000 people are killed in South Africa and many get injured or disabled annually (Traffic Systems Management (TSM) II, 2004). Today's road safety problems are no longer an individual but a societal problem because every person who is dying on the South African roads is a member of the society or a community and is a loss to the society

and to families. The challenge for South Africa is that everyone is affected but is not everyone who is involved.

A retired researcher, interviewed in the beginning of 2016, indicated that there are a couple issues that are important, e.g. since 1910 when the Union of South Africa was formed, many organizations were established that tried to promote road safety, however, it seems as if they did not succeed. In 1960, the National Road Safety Council (NRSC) was established, the aim was to promote road safety, but it was not successful in improving road safety. At a later stage a committee was established to determine why road safety was not focused on a centralized approach but also did not provide the required results.

A need to promote road traffic safety in a systematic and scientific manner was identified by the NRSC and Steyn Commission after 1972. It concluded that there was a lack of qualified systems management researchers in the field of traffic safety. The Traffic Safety Management System (TMS) was developed between 1990 and 1991. The TMS is conceptualized in the next section. However, in addition the TMS was supported by the need to formulate a centralized policy viewpoint that was done in 1992 and followed by the 1996 policy. Since 1996, it is about 21 years that South Africa is using the same policy that should have been reviewed, three or four times.

The NRSC formulated and produced a document called National Policy on Traffic Safety but also like other predecessors it didn't succeed. After these, many committees and strategies were formed but failed. The Road to Safety Strategy 2001 to 2005 was formed and aimed to reduce traffic casualties but it didn't succeed either and it was revised in 2009. Arrive Alive 1 to 10, implemented between1997 to 2010 to reduce traffic casualties also didn't not deliver the necessary results. In 1998, the Road Traffic Management Corporation (RTMC) was formed. Presently it is still struggling to reduce road traffic casualties to the acceptable standard.

1.2 Problem statement

There is a lack of an implementation strategy, a management plan, involvement of teams of experts, and a scientific and multi-disciplinary approach of the developed road traffic management models under the TMS in order to advance the UN DoA Road Safety Strategy in South Africa, to reduce road traffic violations and road traffic casualties. Another challenge identified by this is paper is that many institutions, especially government institutions, in the RSA do not pay enough attention to the management and implementation of plans and it appears that the steps that have been taken so far to ensure the promotion of road safety have not been adequate, **(**System IV, 2004)**.** The real issue is that the implementation of the TMS, as developed during the eighties and early nineties, was terminated without any clear reasons.

The aim of the paper is to show how road users' lives can be saved and road traffic violations be reduced through the implementation of the developed road traffic management models and management plans in line with UN DoA for Road Safety, 2011 to 2020.

2. IMPLEMENTATION PROCESS AND MANAGEMENT PLAN

The implementation process is composed of various phases. In this paper it is focused on the institutionalisation, evaluation and operational aspects. Figure 1 demonstrates the role of the DoT and RTMC in the implementation process. The RTMC needs to deal with the implementation process from the national level to the local, as briefly discussed below. Implementation is the most neglected phase and it is very difficult to do, but it is an essential action that need also to focus at provincial and local levels.

2.1 Formation of an Implementation Group (IG) and the roles of the DoT and RTMC

The paper suggests the formation of an Implementation Group (IG**)** by the RTMC. The RTMC is to lead the IG or appoint a person nationally who will take the ownership and be the champion of the implementation process of the Implementation Group. The IG is to be consisting by 5 persons nationally (including the appointed person) and must be trained as experts or specialists. The IG is to have one representative from each Province, metro and local municipalities. The appointed manager need to possess special knowledge and skill on road traffic management strategies, the scientific and multi-disciplinary approach, scientific research and analyses approach, modelling development, the implementation process, activities or functions and stakeholders coordination, program monitoring and evaluation in relation to the management plan. The task of the IG is to conduct traffic research, develop, implement, coordinate, monitor and evaluate the management plan. All the administrative functions of the IG are to be managed by the RTMC as the custodian of the project on road safety and traffic safety in South Africa.

The role of the DoT is the provision of safe road infrastructure through the RTMC, SANRAL, the provincial Departments of Transport, the metros and local municipalities. The RTMC was established in 1998 in accordance with the RTMC Act (Act No.20 of 1998), to ensure that there is orderly road usage and traffic safety through:

- Promoting traffic safety on a country-wide basis.
- Supporting and coordinating provinces, metros and local municipalities.
- Keeping of records of all accidents in the country.
- Training of traffic personnel.
- Collecting road traffic information.
- Dealing with accident investigation and recording, communication and education, infrastructure safety audits and etc.

This paper identified that there is a problem in co-ordination, implementation, monitoring and evaluation of these road traffic issues in South Africa and that there is a need to address it. The implementation strategy, management plan and operationalization as suggested in this paper need to be in line with the UN DoA for Road Safety to reduce traffic fatalities by 50% by the year 2020. When the UN DoA started in 2011 there was a need to save 27 000 lives over the next 5 years.

Figure 1 demonstrates the role of the DoT and RTMC in the implementation process and the management plan as set out in this paper.

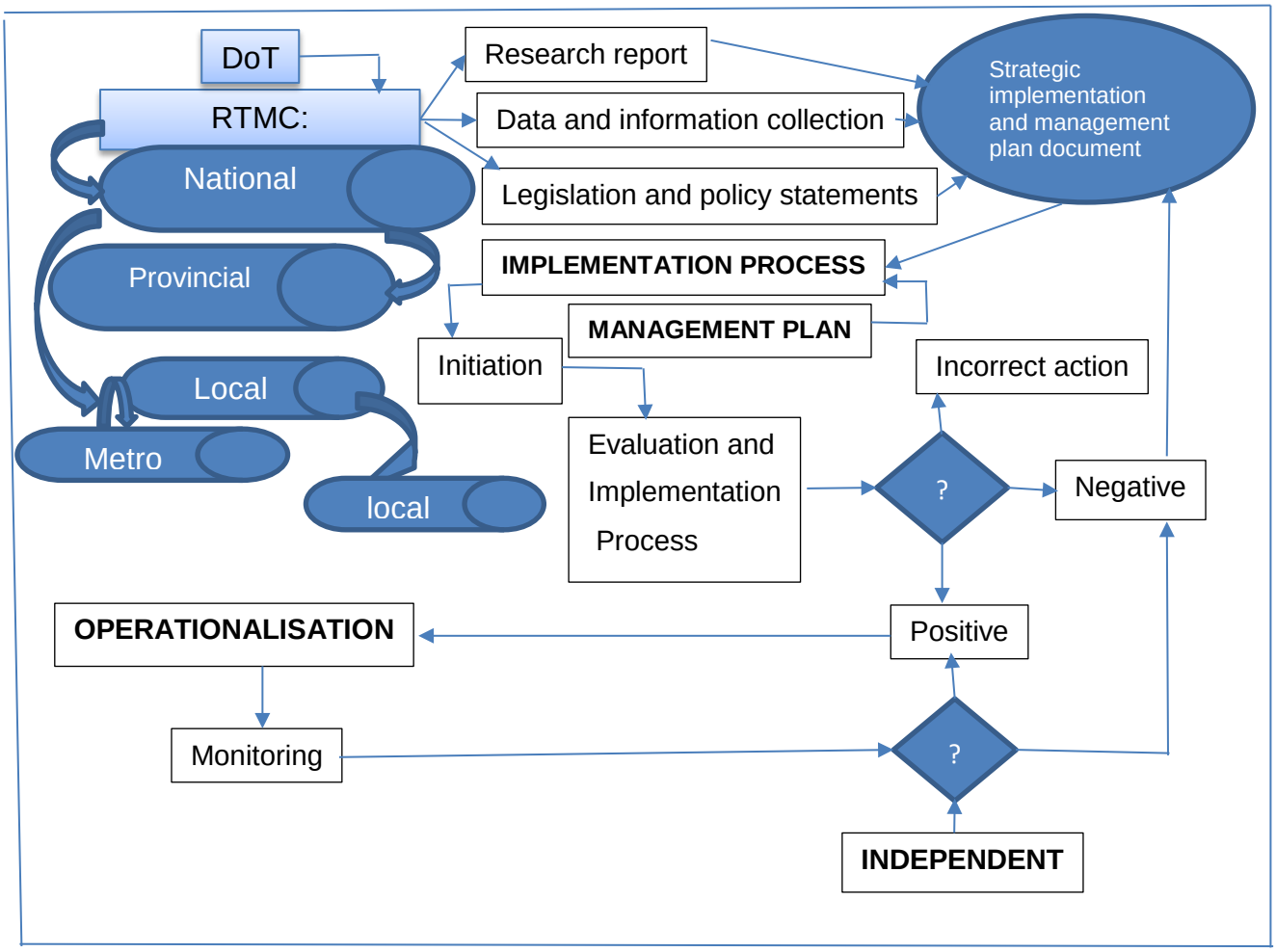


Figure 1: Conceptualizing of the implementation process and management plan

Figure 1 demonstrate the RTMC as the agency of the DoT. In this regard, the role of DoT is to provide safe road infrastructure through SANRAL and to develop a National Road Safety Strategy (NRSS) to provide road safety policy and strategy direction to the RTMC (Mohlala, 2015). The role of the RTMC is to coordinate road traffic issues at national level, provincial and local levels (metro and local municipalities). It also has the duty to develop a strategic implementation and management plan. In relation to this, in 2015 the RTMC developed the Strategic Plan 2015 - 2020 and Annual Performance Plan 2016 – 2017. The DoT develop the National Road Safety Strategy, 2016 – 2030 (NRSS) in line with the National Development Plan (NDP) that is to direct the RTMC strategy**.** The DoT realised

that without a special effort, it will not achieve the 50% reduction of road traffic fatalities in the year 2020, in line with the UN DoA.

In relation to this paper the RTMC has the duty to take ownership or appoint a person who will take the ownership of the strategic document (implementation strategy) and initiate the implementation process as demonstrated in Figure 1. The strategic document contains a summary of all the work done and that needs to be done. In this regard it covers a management plan, an implementation process, initiation, monitoring and evaluation. It will include how the correct (positive) and incorrect (negative) implementation will be managed. It will contain the research report, data and information collection, legislation and policy statements, independent and how the implementation strategy will be operated (operationalization), as all demonstrated in Figure 1. This paper suggest that the IG must be responsible for the following tasks in the management plan and implementation process:

1. Collect road traffic fatality data or information from the nine Provinces, the Metros and the local municipalities as demonstrated in Figure 1.

2. Analyse and evaluate collected data to determine how South Africa performed as from 2011 to 2017 in line with UN DoA.

3. Ensure that the success and the failures are been properly recorded.

4. Maintain the success and introduce new strategies to address the failures.

2.2 Evaluation

The developed models must be implemented and evaluated timeously. If it cannot yield satisfactory results, other alternative means of research need to be taken as demonstrated in Figure 1.

2.3 Putting into operation and monitoring of the implementation process

The IG or implementer need to be satisfied with the initiated implementation process. The IG needs to place the functional personnel in the operations of strategic planning processes and ensures that all functional staff have a copy of the strategic document. The monitoring method need to be clearly indicated or explained. There will be a need to monitor the operation on a continuous basis through the application of a Quality Control Model (QCM) as discussed below. During the implementation process, the research unit will train the functional personnel. The IG will ensure that the implementation process (strategy) and the management plan are in line with the policy document direction and ensures that research become a continuous functional area of the implementation process

2.4 The implementation of the developed Road Traffic Models

Under the TMS as the sub-system of the Transport System (TS), the proper implementation of the developed 11 road traffic models, coupled with the 4 disciplines and the 11 functional areas as demonstrate in Figure 2, can minimize the traffic violation risks that are contributing to traffic fatalities in South Africa. Figure 2 also demonstrates two categories of the 11 developed road traffic models in South Africa that need to be implemented. Category 1 covers those models that are implemented and are in operation and Category 2 covers developed models that are not yet implemented. The Category 1 and 2 models have been developed to reduce high risk offences that are contributory factors to traffic causalities.

2.5 Involvement of teams of experts

To implement the strategy properly traffic authorities have to supply management and operational services on a continuous basis to ensure holistic integrated and effective road traffic service. Road traffic managers and operators are accountable and responsible to ensuring that the road environment is used correctly by the road users. Road engineers and technical staff should be involved to ensure quality of the road environment, while the traffic police and traffic law enforcers should be involved to maintain law and order, Research Methodology and Development (RMD, 2004). If South Africa wants to reduce road traffic fatalities in line with the UN DoA for the year 2020, the RTMC need to consider the suggestions contained in this paper as a possible solution. This paper suggest that the RTMC should initiate the involvement of the teams of experts that should be comprised of experts from the following professions:

- SAPS and traffic police for orderly road usage and traffic safety.

- Educationists to equip road users with knowledge and skills to ensure quality road usage and to improve poor road use behaviour, in line with international best practice standard.

- Traffic engineers designing of new road network, incorporation of safety features in the design of new roads, improvement of safety aspects of existing roads to avoid future problems and improvement of known hazardous locations on the road network.

- The courts, judiciary officers (prosecutors and magistrates) for the adjudication of traffic cases.

- Qualified traffic practitioners or road traffic managers or traffic safety managers who are professionally trained as experts or specialists. They have specialised knowledge and skills for the implementation process and management planning as discussed above under paragraph 2.1.

- Road traffic researchers who can apply a multi-disciplinary scientific, holistic, integrated and coordinated approach manner and who can apply law enforcement

based on QCM to manage traffic violation (offences) rates in line with the UN decade of action (Mohlala, 2015). The aim of law enforcement is to support and assist the implementation strategy.

2.6 The role of the TMS

The TMS can be instrumental in facilitating the implementation of the following aspects

- *The components of the TMS*: the TMS in detail is discussed by (Pretorius, 1999) it is composed of a Physical Component, a Unit Component and a Management Component as demonstrated in Figure 2. The *Physical Component* covers road users, vehicles, road sections. The *Unit Component* is formed from two or more elements from the collection/sub collection of the physical component, such as road environment units, pedestrian units, driver units and vehicle units. These units are operational and should be regulated, controlled and managed through road user conduct, applying self-regulation and/or self-control principles, and the authorities, which should establish measures to regulate and/or control traffic units. The *Management Component* has the function to enable role-players to manage orderly road traffic and traffic safety in a scientific, holistically, integrated and coordinated manner to reduce traffic casualties. Figure 2 demonstrates the Management Component, as supported by the 4 disciplines and 11 functional areas. It demonstrates the management models as the sub-management systems of the TMS that are used/implemented to promote road safety. The traffic practitioner, as shown in Figure 2, will provide the necessary skills and knowledge to carry out activities to promote order and safety in the traffic environment as discussed above. In this paper, the 4 disciplines and 11 functional areas of the TMS are aligned with the five pillars of the UN DoA, namely:

    1) Road Safety Management
    2) Safer Roads and Mobility
    3) Safe Vehicles
    4) Safe Road Users
    5) Post-crash Response.

- *Conceptualization of the TMS*: All developed road traffic models as demonstrated in Figure 2 are developed as sub-management systems of the TMS. This paper aims to ensure that traffic safety management is managed systematic and in a scientific manner by applying a specific statistical QCM as the monitoring tool of the developed models. The TMS is defined as a collection of distinctive elements such as drivers, vehicles, pedestrians, cyclist that are mutually exclusive, that are relevant to each other and are controlled/regulated to achieve a common purpose of promoting road safety and reducing road traffic casualties and/or is a concept where different role-players work together as team in a holistic and integrated manner with the common aim to promote orderly traffic and traffic safety, (Pretorius, 1999). The QCMs are defined as scientific statistical procedures to monitor

violation rates by road traffic units in such a manner that the quality of road usage by road users can be enhanced to an acceptable standard and quality road usage to ensure that such standards are maintained" (Pretorius,1993).

- The 4 disciplines and 11 functional areas of the TMS are listed and discussed as demonstrated in Figure 2 as part of the possible solution to reduce road traffic casualties and promote road safety. They are:

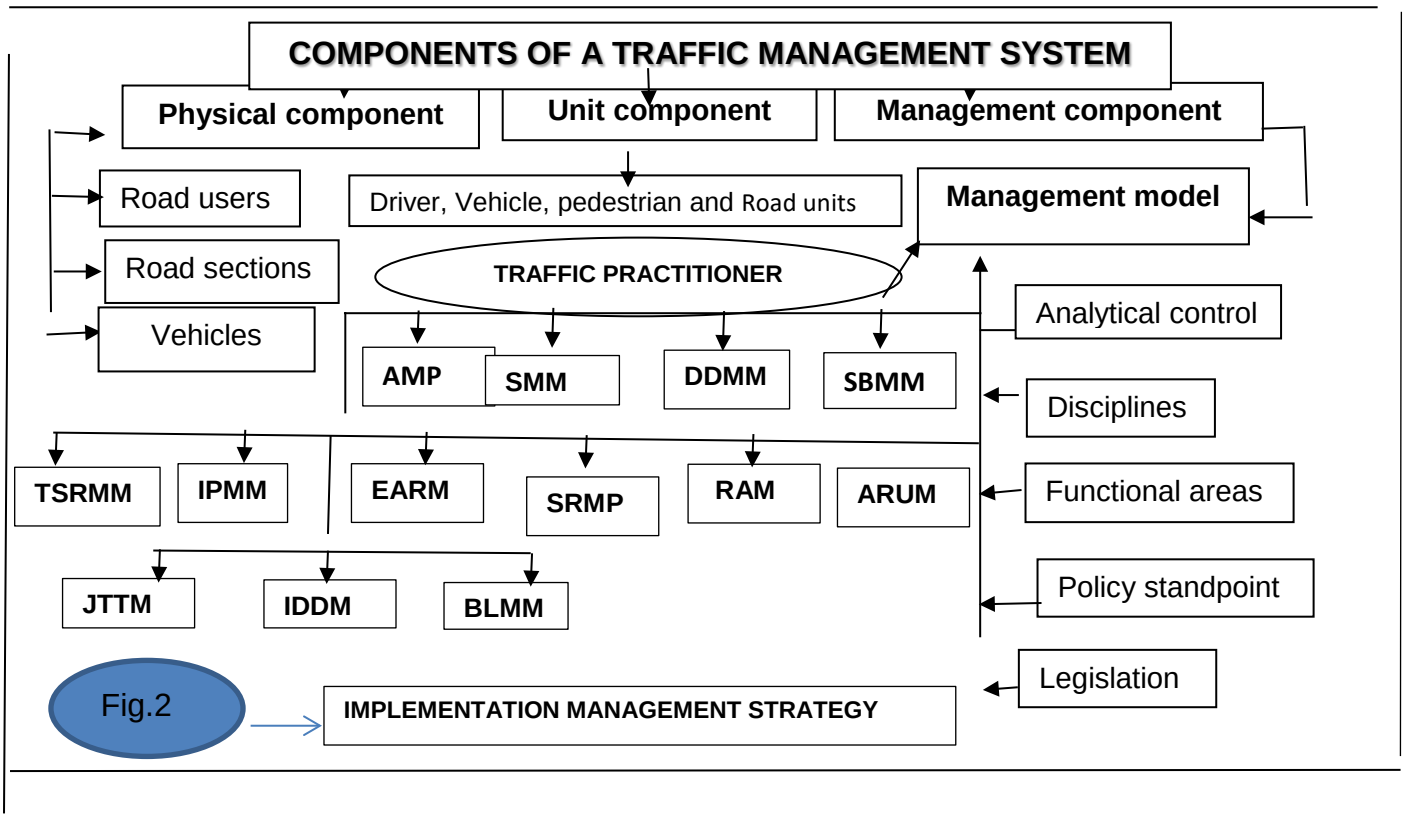
    1) Traffic Engineering for road design, vehicle design with the aim of improving road lay-out and road conditions and for geometric design issues.
    2) Traffic Education for heightened awareness, advertising and to improve the knowledge and skills of drivers.
    3) Enforcement including Traffic Law Enforcement for high visibility, to improve or implement traffic policing on the violation of traffic rules; and
    4) Logistics for the aim of research, development, resources and etc.

- Monitoring and Evaluation also are added to consider what works, why does it work, how many lives are saved and how much money? To reduce road traffic casualties, the following need to be considered:

    1) High level of political support and community involvement.
    2) Provide adequate resources such as personnel and finances.
    3) Deal with fraud and corruption.
    4) Provide an excellent administration, cooperation and co-ordination.

If all these can be properly implemented can improve the quality of road usage in South Africa. This paper will apply or use the policy direction or policy statements of the DoT and RTMC as part of the TMS in the implementation process.

Figure 2 demonstrates the three unit components of the TMS (TSM I, 2008). Aspects such as the traffic practitioner, management model, analytical control, legislation, disciplines, functional areas, policy viewpoint are parts of the implementation management strategy in the implementation process of traffic developed models under the TMS, as discussed above and below.



2.7. Examples of developed models or measures that can assist to reduce road traffic casualty rates by 50% in line with UN DoA in South Africa

The management and the implementation of the following developed Models or Procedure can assist to reduce traffic casualties:

1) Accident management, assessment and monitoring procedure. This paper suggest the implementation of the accident management, assessment and monitoring procedure as discussed by TSM 1 (TSM 1, 2008) to ensure proper management of accidents.

2) The Speed Management Model (SMM), based on the QCM was developed by the CSIR. It was not implemented because of the lack of qualified traffic practitioners. Its implementation can reduce the 60% of casualties that are contributed by speeding. This paper suggest the scientific implementation of speed management based on the QCM by the RTMC.

3) Drunken Driving or Alcohol Management Model (DDMM or AMM). Research indicates that more than 60% of fatal crashes, especially over weekends are as a result of abuse of alcohol, either by a driver or a pedestrian (DoT, 2011) and (Arrive Alive, 2004).

4) The Seatbelt Management Model (SBMM) or Non-Wearing of Seatbelts. Research has shown that an increase in the seatbelt wearing rate by 80% for both front and rear passengers, reduce fatalities by 25 - 30%. Every South African motorist need to wear seatbelts at all times. Seatbelts can save lives even if it cannot prevent a driver from involving in an accident, but it can reduce death or serious injury by 50% (DoT, 2011).

2.8 New models not yet implemented

A number of new models that can also assist in reducing road casualties have not yet been implemented. These are highlighted below.

1) Time Space Management Model (TSMM) (Kockott, 2005). To improve the safety of road user and minimize accident risks in the road environment.

2) Pedestrian Management Model (IPMM), (Mohlala, 2008). To improve and promote pedestrian safety and to reduce pedestrian casualties.

3) Enhancement of Accident Reporting Model (EARM), (Röthe, 2008). To enhance accident reporting in South Africa.

4) Star Rating Monitoring Procedure ((SRMP), Ratau (2008). To reduce lawlessness, negative attitude of taxi drivers and owners and high level of mini-buses conflicts and killing in South Africa.

5) The Risk Assessment Model (RAM), (Kockott, 2009). The main aim of this model is to ensure that all who are involved in the promotion of road safety in South Africa need to work together to reduce potential accident risks on South African roads.

6) Accident Response Unit Model (ARUM), Munwana (2009). It can improve the management of accident response units.

7) Junior Traffic Training Model) (JTTM) (Taumang, 2010). It can improve and promote road safety education and training for school children.

8) Integrated Databank and Database Model (IDDM), (Mynhardt, 2013). This model can assist in data collection of traffic and collision information and data analyses for the aim of scientific decision-making processes supported by QCMs and system-oriented programme.

9) Barrier Line Management Model (BLMM) or Violation Management Model (VMM), Mohlala, 2015). It is a law enforcement model that is based on quality control method or scientific approach method developed to monitor traffic offences violation rates and to reduce them. It can support traffic police to take decisions regarding law enforcement actions in a scientific and mathematical based manner.

3 CONCLUSIONS AND RECOMMENDATIONS

The main conclusions and recommendations as covered in this paper, are:

1. The implementation of the models as set out in the Traffic Management System, in order to provide the basic framework for the Decade of Action for Road Safety.

2. Strong political will and commitment of road authorities to reach all road users.

3. Utilizing a systems' based approach.

4. The utilization of road traffic teams of experts in addressing road safety issues.

5. To ensure that the implementation should be undertaken by traffic safety practitioners or technologists in collaboration with researchers.

6. To reduce underdevelopment and inadequate coordination of service delivery by all the role-players.

7. To ensure that the implementation is done in a holistic, coordinated and integrated approach to reduce traffic casualties.

8. To work towards compulsory driver training in SA.

9. To ensure high visibility deployment of traffic police to deal with lawlessness of violation on all serious offences as identified.

10. To ensure that all road traffic stakeholders are working together at national, provincial and local levels to reduce road traffic casualties.

11. Further research on road traffic violations is required.

12. To pursue the use and implementation of traffic law enforcement based on QCMs on the 90% developed road traffic management models in a scientific and multi-disciplinary approach in advancing the UN DoA for Road Safety in South Africa, with the aim of reducing road traffic violations and road traffic casualties.

13. To ensure that all institutions, especially government institutions in the South Africa, pay enough attention to the management plans and implementation strategies. The main thrust is the implementation of the TMS by an Implementation Group on all levels with the support of traffic practitioners.

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