# THE DEVELOPMENT OF A SCIENTIFIC BASED LAW ENFORCEMENT QUALITY CONTROL MODELTO MONITOR BARRIER LINE VIOLATIONS IN THE LIMPOPO PROVINCE

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## ABSTRACT

The development of a scientific based law enforcement quality control model to monitor barrier line violations in the Limpopo Province is being proposed to reduce road traffic casualties (fatalities and injuries) cause by illegal overtaking on barrier lines and to promote quality road usage by all road users in the Province. This Barrier Line Management Model (BLMM) can be applied provincially, nationally and internationally. Quality Control Models (QCM) are statistical tools that can be used to monitor violation rates in a scientific manner and are used to address the problem of barrier lines violation in the Limpopo Province. Quality control models for speeding and drunken driving were developed as part of the Traffic Management System (TMS) which is part of the Transport System, Pretorius (1999). The TMS's disciplines and functional areas will reduce illegal overtaking on barrier lines and casualties through the implementation of the BLMM in the Limpopo Province. The development of the model for barrier line violations is base on the same principles, however, with a different mathematical approach. This is for the first time being implemented in the Limpopo Province.

## 1 BACKGROUND

The use of quality control models and methods is used on a regular basis in the industry. Although researchers and road traffic managers are aware of how quality control models could assist traffic and engineering departments to monitor violation rates and traffic engineering operations, quality control models are still something that is orbiting around the globe. They are aware of it but don't use it. In short: quality control models are scientific tools that could be used by traffic related staff to monitor traffic violations and operations on a regular basis by gathering data by sampling plans. A series of quality control models were developed by the CSIR in 1981 and implemented at a number of traffic offices. Currently, these models are only used by the traffic Authorities in the Province of the Western Cape.

The barrier line problem is not relevant to the Limpopo Province, other Provinces are also affected by the problem. Driving around the provinces, barrier line violations can be observed daily.

Four pilot studies were undertaken in Limpopo Province. These pilot studies were undertaken at the following five (5) selected areas**:** R37 Polokwane Smelter, R37 Ga-Chune - Lebowakgomo, R 579 Phatudi Bridge, R579 Maserumule Park and R579 Tafelkop- Matetema Hill. The pilot studies were undertaken in December 2010 and January 2011 supplemented by a customised questionnaire.

## 2 PROBLEM STATEMENT

Road traffic casualties (fatalities and injuries) cause by illegal overtaking on barrier lines is a major contributory factor to road traffic accidents and is part of the road safety accident problems experienced in the Limpopo Province. The road traffic casualties caused by overtaking on barrier lines, speeding and drunken driving are major contributory factors for 70% to 80% of all road traffic casualties - Arrive Alive (2002-2003).

## 3 THE AIM OF THE PAPER

The Barrier Line Quality Control Management Model (BLQCMM) is being developed to reduce road traffic casualties (fatalities and injuries) cause by illegal overtaking on barrier lines and to promote quality road usage by all road users in the Limpopo Province.

## 4 THE BARRIER LINE QUALITY CONTROL MANAGEMENT MODEL (BLQCMM)

For law enforcement purposes, a quality control model is regarded as a scientific tool that is used to monitor violation rates. Data are sampled on a regular basis and the findings are recorded on a monthly or quarterly quality control chart. The aim is to make informed decisions. The decisions and actions will be taken on the results of the sampling surveys will are based on probability theory to minimise accident risks. Accident risk refers to the probability that an accident might occur owing to barrier line violations

### 4.1 Traffic Management System (TMS)

The BLQCMM uses the same principle as quality control models for speeding and drunken driving that were developed as part of the Traffic Management System (TMS) which is part of Transport System, Pretorius (1999). The purpose of the TMS is to demonstrate, practically, the application of system technology; and to explain the role that barrier lines play as road marking; as well as the role traffic law enforcers (traffic police), engineers, etc. play in relation to road and traffic elements in the traffic system.

The TMS consists of three components namely: *a psychical component* (road users with driver's licenses; road users without drivers' licenses, etc.), *a unit component* (road environment units, driver units and vehicle units); and *a management component (*road use, operational: disciplines including road safety management such as or the work of engineers, law enforcement, education functional areas) to do the research.

A brief summary of the above is that road traffic managers and operators are accountable and responsible for ensuring that the road environment is used correctly by road users. Road engineers and technical staff should be involved to ensure the quality of the road environment while traffic police and traffic law enforcers should be involved to maintain law and order. Educationalists should be involved to equip road users with knowledge and skills to ensure quality road usage, Research Methodology (2004:187)**.**

**Quality Control Models**: are regarded as a scientific statistical procedure 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 to ensure that such standard are maintained Research Methodology (2004: 187). Quality Control Model is a concept (model) that is being used to monitor the actions and operations of the road users in the view to ensure quality road usage to reduce road traffic casualties in the Limpopo Province. The brief discussion above indicate that Quality Control Models are used to monitor barrier lines violation rate in the

above five selected areas of the Limpopo Province to reduce fatalities or casualties causes by illegal overtaking on barrier lines.

Figures 1, 2 and 3 below give a schematic overview of quality control models.

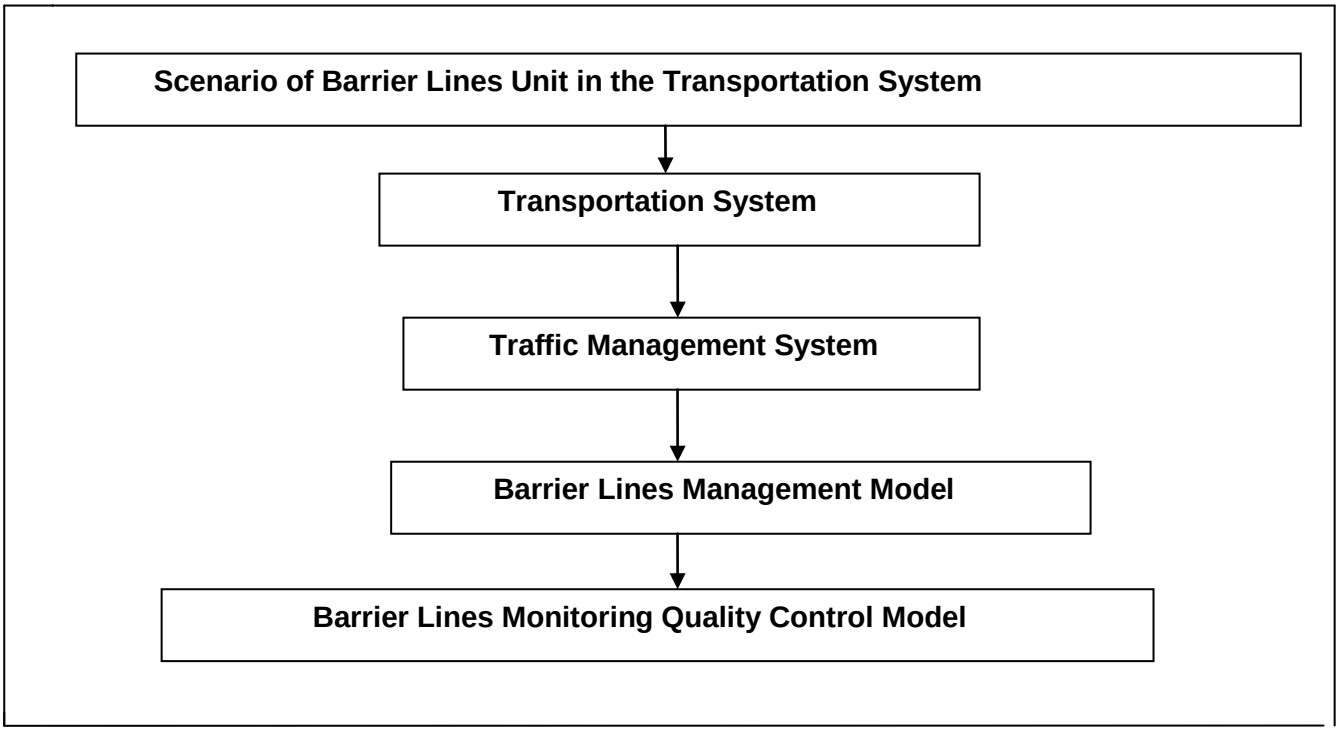


**Figure 1: Scenario of Barrier Lines Unit in the Transportation System**

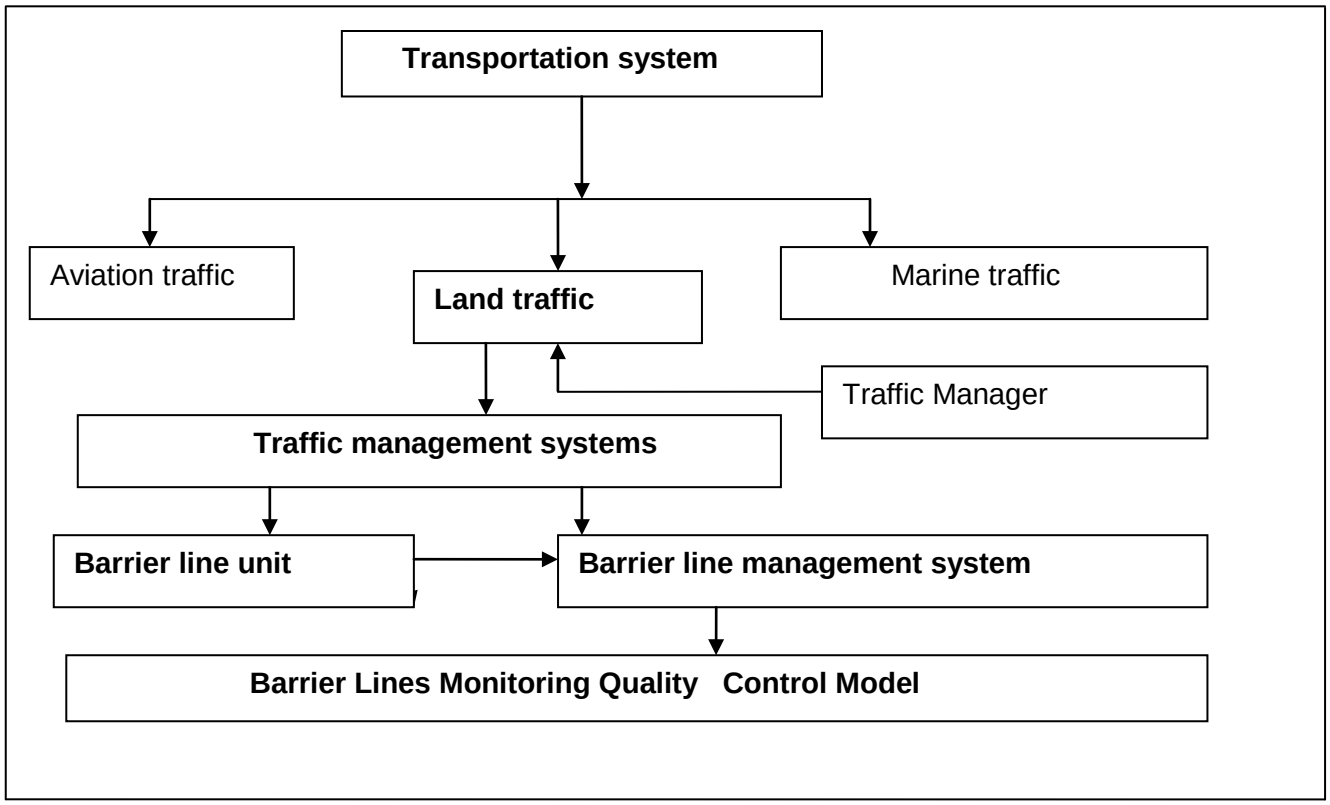


**Figure 2: Barrier line unit in the TMS as a subsystem of the transportation system**

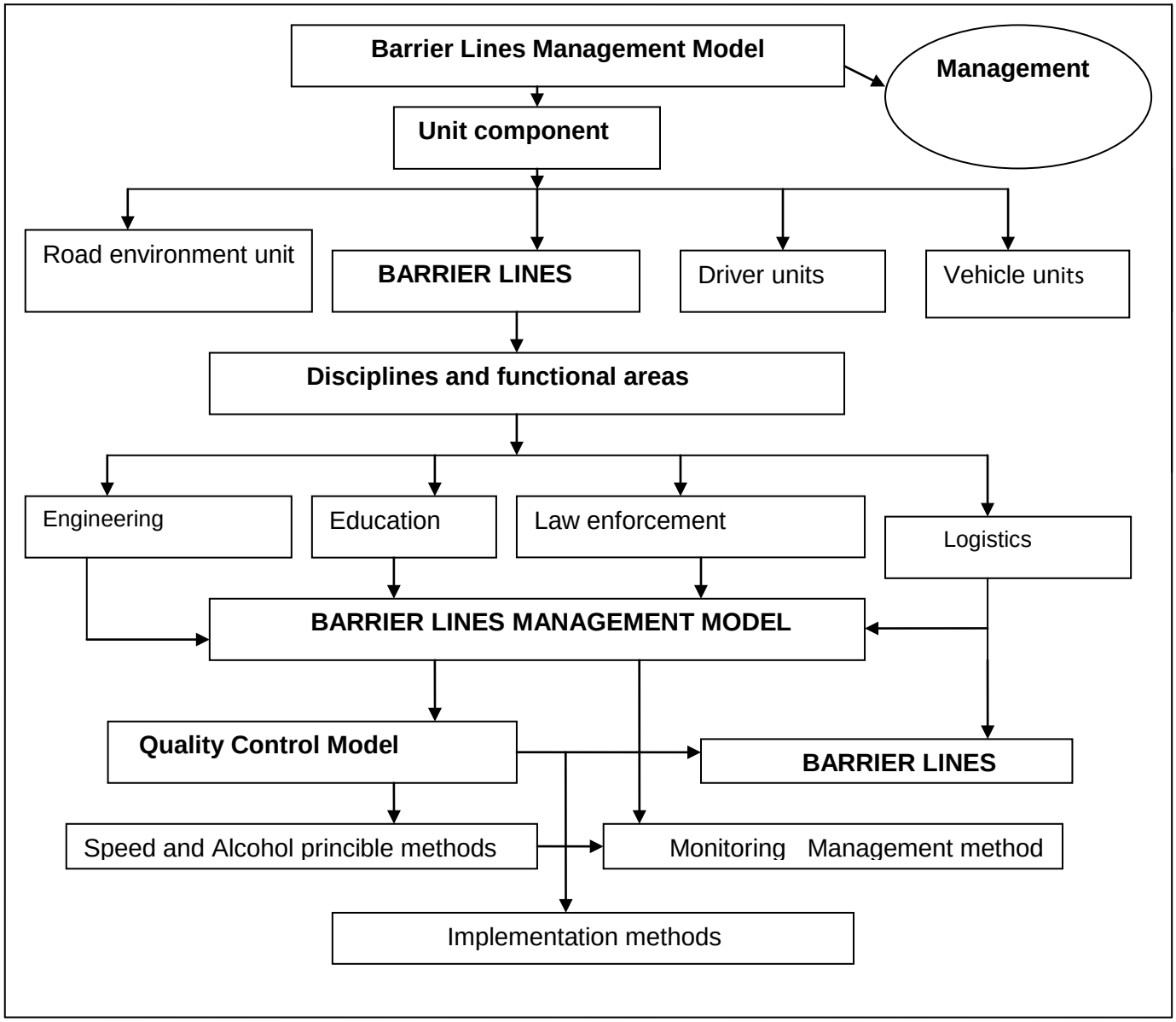


**Figure 3: Barrier Lines Management Model for Limpopo Province**

4.2 Pilot studies

A research project was undertaken to test the knowledge of overtaking on barrier lines in the Limpopo Province. The four pilot studies were undertaken at the five (5) selected areas as listed in paragraph 1 above.

**Pilot study 1:** An unstructured questionnaire was used to test the knowledge of overtaking on barrier lines in the Limpopo Province during February/March 2010. It was conducted on the above mentioned areas. In this pilot study, 100 motor vehicles drivers who overtook others on barrier lines were stopped and interviewed through questionnaires about knowledge of overtaking on barrier line and the potential risk and dangers involved.

**Pilot study 2**: On 9 April 2010, a one hour survey was done on the R579 between Tafelkop and Motetema by means of a questionnaire on barrier line violation in Limpopo Province.

**Pilot study 3:** On 9 April 201, a one day pilot study was done where twenty (20) drivers who overtook on barrier line were interviewed through a developed questionnaire.

**Pilot study 4:** During November/December 2010, fifty-three (53) questionnaires were completed.

During the above four pilot studies (three unstructured pilot studies and one structured pilot studies), a total of hundred and eighty (180) barrier offenders were interviewed through the use of questionnaires.

4.2.1 *Findings from the four pilot studies*

The main findings from the study are given below:

- From the drivers who tend to violate barrier lines, more than 50% denied that they did that it more than one time.
- 50% and more acknowledged that they violated barrier lines more than once.
- 70% and more said that they were in a hurry.
- 50% and less barrier violators did not know the meaning of the specific barrier lines related road signs shown to him or her.
- More than 50% of the violators knew the meaning of the signs.

From a law enforcement perspective, “slow moving vehicles” and “to be in a hurry” are no excuses and do not justify someone to violate barrier lines. However, the study may indicate that there is a need to improve the road environment.

To *Be In a Hurry, Slow moving vehicles, Shortage of Law enforcement, Knowledge, Lack of knowledge, Impatience Admission (regular offenders), Barrier line condition, Been Overtaken by Others,* were identified as some of the serious challenge or risks in the Limpopo Province. All the findings or discoveries and challenges will be address by the development of a BLQCMM for the Limpopo Province.

Some of the challenges identified from the above pilot studies are as follows:

- Lawlessness (non-compliance), bad driving, disrespecting road traffic signs and regulations of the road. Lack of self-respect by drivers.
- Invisible barrier lines or road markings. Many long barrier lines especially in mountainous areas which cause some slow moving vehicles to be illegally overtaken by fast moving motor vehicles. Impatience is a part of the problem.
- Bad roads. Some drivers indicated that the road conditions are poor. Most drivers do not revise rules of the road and road signs (the K53 manual).

4.3 The Model is different

**Geometric (measurements) design standard:** The places where there is no passing lane, a driver might decide to take a risk and overtake on a barrier line. That increases the risk of causing an accident and may result in fatalities and endangering other motorist’s lives. This is based on mathematical calculation that is used in the development of this model.

## 5 THE SOLUTION

The use of Quality Control Models is recommended to overcome the dangers and risks involved in illegal overtaking, applying the following disciplines:

**Engineering:** To improve the road condition, that is the passing lanes on the sides of long barrier lines (on barrier lines more space of overtaking need to be provided). To provide correctly designed barrier lines at the correct positions.

**Education:** To teach drivers to behave patiently at barrier lines, not to overtake on them; and teach them to wait the right time at right place where the road and road signs permit or allow the driver to overtake without any risk. The law does not permit drivers to overtake barrier lines even if there is a slow moving vehicle in front of your vehicle.

**Law enforcement:** To deploy traffic police officers or law enforcers at High Accident Locations or areas determined by the Model. To reduce lawlessness of stop signs; red traffic light and barrier lines (no-overtaking marking): the solution is to increase law enforcement/improve law enforcement and implementation of AARTO: to make drivers to adhere to road traffic rules and regulations.

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