

## The Quality Management System on Road Safety in Morocco

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### ABSTRACT

The essential aim of the present paper is to study, analyze and understand the phenomenon of accidentology. This phenomenon of road insecurity has often challenged the public authorities, politicians, associations, non-governmental organizations, researchers, etc. However, the conducted studies on road safety were generally satisfied with a simplified reading of statistical data. Since many parameters are involved in an accident on the road, our study aims to analyze the main data of the accidentology in Morocco and evaluate the road safety management system in order to enlighten the interested parties in the orientations to fight against the road insecurity and develop an action plan to deal with its serious consequences. The results show that the number of deaths in traffic accidents in 2017 decreased by 1.38%, compared to 2016. In contrast, the number of accidents increased by 9.95% at the same period. According to the General Secretary of the Equipment and Transport's Ministry (Khalid Cherkaoui); the number of serious injuries has also increased by 1.84% while the number of minor injuries amplified by 8.2%. The implementation of a quality management system on road safety (SMSR) called ISO 39001 is required and could reduce the number of accidents and fatalities in a considerable way as well as reduce the costs.

### INTRODUCTION

According to the World Health Organization, road accidents are a major public health problem worldwide, and traffic accidents are one of the leading causes of death. Every year, nearly 1.3 million people die and millions more are injured or disabled as a result of road accidents. Scientific investigations have shown that 90% of fatal accidents are caused by human behavior; in 50% of fatal accidents the infrastructure is at play and in 30% of fatal accidents vehicle factors are involved. The state of these data is not available due to the reduction in the number of deaths, of the order of 40% between 1993 and 2004 and 40% between 2005 and 2016, the causes of accidents remain multiple.

### MATERIALS & METHODS

For the most part, road accidents can be classified as preventable accidents, which we seek to be reduced by prevention, technical

**Table1.** Statistical Data for Minor and Serious Injuries

Variable	Minimum	Maximum	Average	Standard deviation
PEDESTRIAN	4,000	4955,000	350,968	697,835
BICYCL	2,000	624,000	86,371	113,857
MOTO	5,000	10955,000	754,774	1617,867

improvement of vehicles and infrastructure networks, and especially behavioral changes. Overall, traffic accidents cause an average of 3500 deaths and 12000 serious injuries, an average of 10 fatalities and 33 serious injuries per day. In reality, the statistics can be used to assess the echelon of road insecurity on the global and national level; however, the figures never really reveal the pain of families, fates and broken lives. In addition to causing human tragedies, these accidents weigh heavily on our health services and our economy.

### Descriptive Statistics

We will present in this portion of the article, the method to follow in order to present the statistical study of road accidents in Morocco in the urban area

The subsequent two tables illustrate the descriptive statistics (Type of users and Victims in our case) according to the XLSTAT software.

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<b>CAR</b>	27,000	5608,000	637,081	936,473
<b>TRUCK</b>	3,000	270,000	50,484	48,976
<b>BUS</b>	1,000	155,000	21,600	22,775
<b>TRAVEL BUS</b>	1,000	76,000	18,103	17,537
<b>AGRI</b>	1,000	33,000	4,867	4,561
<b>OTHER</b>	1,000	166,000	19,073	26,975

**Table 2.** Statistical data on the number of deaths

Variable	Minimum	Maximum	Average	Standard deviation
<b>PEDESTRIAN</b>	1,000	119,000	16,881	18,548
<b>BICYCL</b>	1,000	22,000	4,353	4,112
<b>MOTO</b>	1,000	104,000	18,117	21,955
<b>CAR</b>	1,000	65,000	19,361	15,602
<b>TRUCK</b>	1,000	18,000	4,413	2,967
<b>BUS</b>	1,000	2,000	1,500	0,091
<b>TRAVEL BUS</b>	1,000	9,000	2,667	1,116
<b>AGRI</b>	1,000	4,000	2,048	0,495
<b>OTHER</b>	1,000	5,000	1,857	0,539

This easy-to-use data analysis method integrates with Excel; it seeks to understand how a phenomenon evolves according to a set of variables, for our study "Road Safety", Pedestrian, Bicycle, Motorcycle, Car...

We note in Table 1, the highest average for the variable, the analysis of the parameters for serious injury, minor injury and killed, are shown in Table 3. The general average analysis noted that minor and serious injuries represent the highest value in terms of casualties with an overall average of 754,774 (Motorcycle), in contrast to the fatal accident parameter which averages 19,361 in urban areas. This is due to the vast majority of accidents involving pedestrians occurring in urban areas.

### Definition of the ISO 39001 Referential

The ISO 39001 certification is a third-party audit performed by a certification organization

**Table 3.** Advantage of ISO 39001

Type of organization	Advantages
<ul style="list-style-type: none"> <li>• <b>Road users</b></li> <li>• Any Organization with an automobile fleet</li> <li>• Organizations whose staff travel by road</li> <li>• Road transport companies</li> </ul>	<ul style="list-style-type: none"> <li>• Reduction of current or potential accidents</li> <li>• Reduction of sick leave</li> <li>• Reduced risk of legal action</li> <li>• Reduced vehicle repair costs.</li> </ul>
<ul style="list-style-type: none"> <li>• <b>Road construction workers/</b></li> <li>• Road maintenance companies Local authorities' design offices</li> </ul>	<ul style="list-style-type: none"> <li>• Reduction of actual or potential accidents</li> <li>• Reduction of insurance claims</li> <li>• Reduced risk of legal action</li> <li>• Reduced vehicle repair costs</li> </ul>
<ul style="list-style-type: none"> <li>• Organizations using the roads</li> <li>• <b>Public services, schools, hospitals Car parks</b></li> </ul>	<ul style="list-style-type: none"> <li>• Improved references in social responsibility</li> <li>• Planning Advantage</li> <li>• Customer confidence</li> </ul>

## RESULTS AND DISCUSSIONS

Faced with the growing number of road accidents, Morocco has put in place a pragmatic and ambitious national road safety strategy

such as PECB (Professional Evaluation and Certification Board), which conducts an audit to verify that the organization is in compliance with the requirements of ISO 39001 and publishes the ISO 39001 certificate.

### State of Play

Given the importance of the problem posed by road safety worldwide, the topmost concerns of the United Nations have led to support and encourage efforts in order to be able to provide responses to road safety [7].

Therefore a quality management system (QMS) has become essential and urgency in Morocco (signatory of several international conventions). In the interest of better managing road safety, systematic and planned interventions should be planned and the entire road safety management system should be strengthened as for the ISO road safety it should be certified.

2017-2026 to combat road accidents in all its forms. This new strategy defines a more demanding and long-term vision to develop "responsible behavior and safer roads in Morocco". It sets a complicated goal which

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translates into a 2026 reduction in road deaths by half compared to its current level (less than 1900 killed on the roads in 2026), with an

intermediate target of not exceeding 3000 killed in 2020.

### Victims' Distribution by User Category and by Province in 2016

#### Minor and Serious Injuries

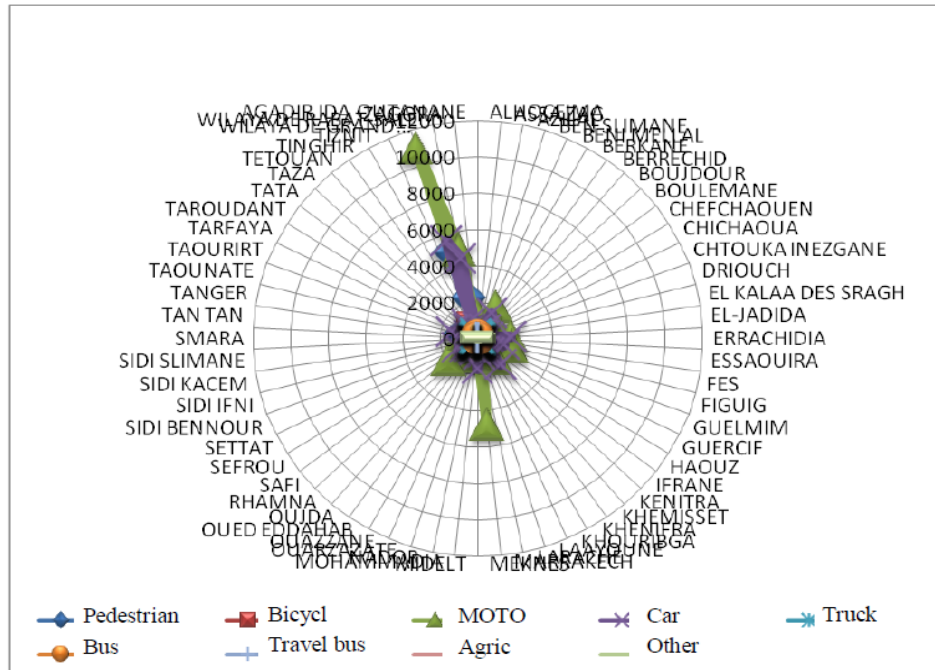


Figure 1. Geographic distribution of victims by category in Morocco in 2016

Figure 1 represents the geographical distribution of the victims in relation to different categories of users. Based on this figure we can easily notice that the most obvious affected category of user is that of two wheels (motorcycles) followed by cars. This is very apparent in the larger urban cities of Morocco, particularly the provinces of Marrakech, Casablanca and Meknes.

#### Killed

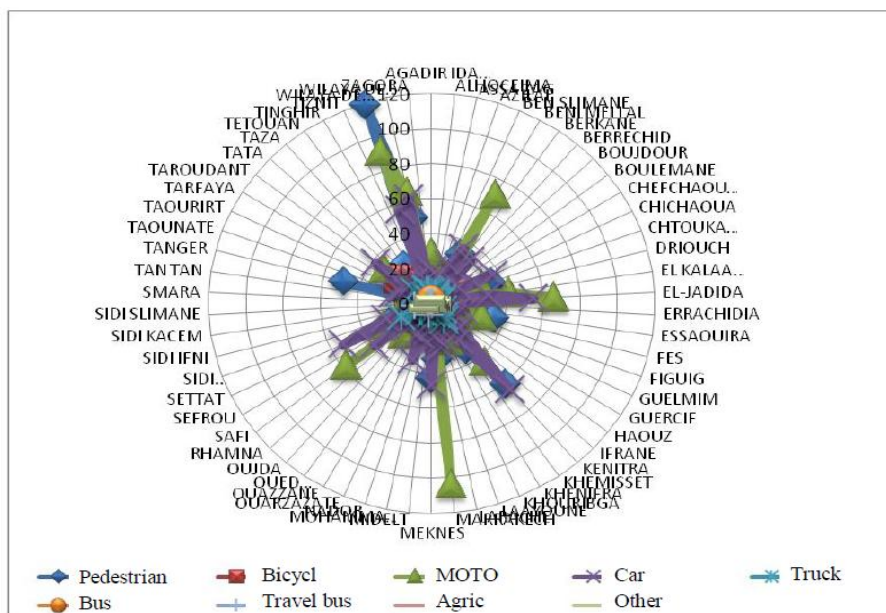


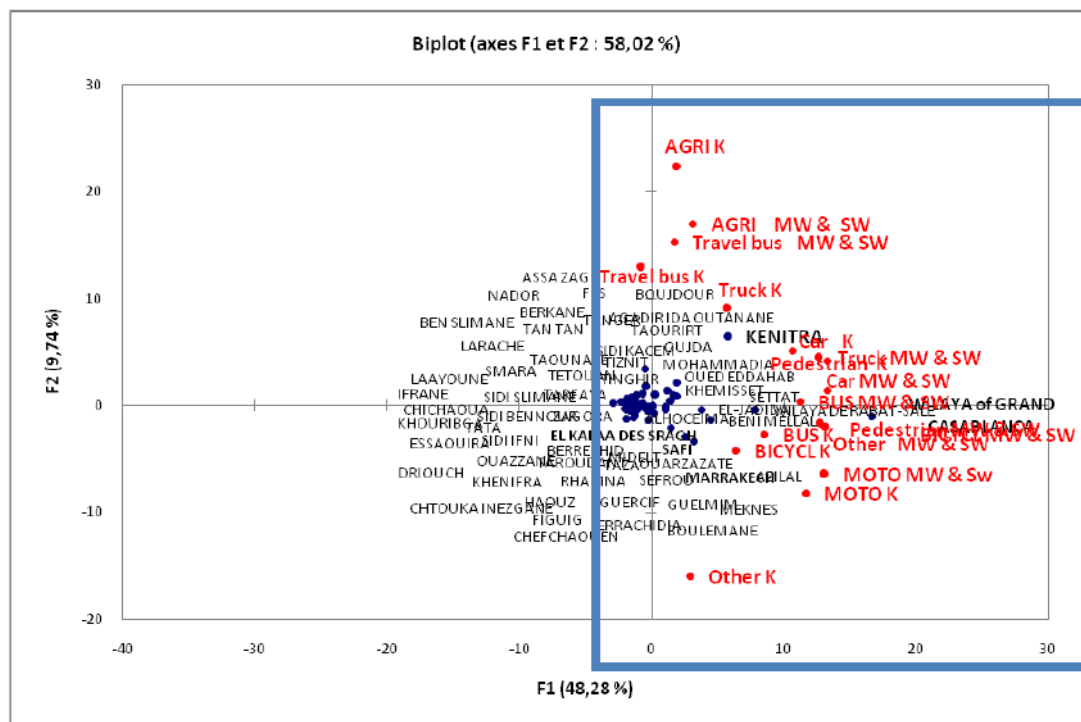
Figure 2. Geographic distribution of victims by category in Morocco in 2016

Figure 2 exposes the very prominent rate of pedestrian's accidents that are KILLED in the

city of kenitra, on top of the Car accidents resulting in killing in several cities of the

Moroccan kingdom including Casablanca, Kenitra, Settat ... and motorcycle accidents

concentrated in Marrakech from the excessive use of this mean of transport in this city.



K: Killed MW: Minor Wounds SI: Serious Injury

Figure 3. Representation of victims by category in Morocco on the factorial plan.

Correlations between Variables and Factors

In order to determine potential relationships between the different major elements and the geographical distribution, we used principal component analysis PCA. This analysis centered on three parameters: minor injuries, serious injuries and killing recorded during the year 2016. The projection of these parameters along axis1 and axis2 (figure 3) made it possible to distinguish the following:

- Compared to the F1 axis (48.28%) the correlation between the four parameters is very strong and positive.
- Concerning the F2 axis (9.74%), serious injuries are positively correlated, but fatal accidents and minor injuries are negatively correlated.

Figure 3 demonstrates a relationship between the different variables, including the existence of a close connection between the type of accident, the type of victim and the geographical location. This depiction shows that the variations of these parameters affected by the geographical change are highly significant.

The projection of these parameters allowed us to make out two divergent groups evolving in the opposite direction. The first group includes all

the studied parameters except the parameter "travel bus K" which is positively correlated to the axis 1 and a second group comprised of only "travel bus K" positively correlated to the axis 2.

The government has enlarged the efforts of the different participants to improve the road safety indicators and reduce the Killed / Serious injuries rate for all road users (pedestrians, cars, buses ...) [4] in the Kingdom of Morocco on top of adopting a national strategy aspiring to reverse the upward provision of traffic accidents, which will be activated according to integrated strategic plans.

This strategy is based on several axes involving added-value measures and a direct influence on road safety indicators, relating to coordination and management of road safety at the highest level, legislation, control and sanctions. , training of drivers, improvement of driving license examination, improvement of road infrastructure inside and outside the perimeter, development of care for traffic accidents victims, communication and awareness, road education, as well as scientific research and especially the establishment of QMSRS in Morocco with the following components. [10-11]

### *Policy and Objectives of ISO 39001 Norm*

Each organization decides to put in place a road safety policy and objectives. It formalizes its commitment in this area, involving the commitment of the entire management towards all employees. [1], [5]. The organization sets objectives for road safety: Documented; consistent with road safety policy; in relation to the conclusions of the documentary analysis kept up-to-date and presented at the different levels and concerned functions.

### *Implémentation of the Quality Management System on Road Safety*

This phase consists of setting up the structure and the responsibilities, the procedures permitting the control of the documentation and the operational proficiency, aside from the management and the control of the recordings with the intention of recounting the statistics of the traffic accidents and to well act. The coordination structure is set up according to the rules defined by the management. [2]

The actions of the Quality Management System relate to the organization (procedures, operating modes, structures and working methods), the policy towards drivers (training, information, communication), the road environment (plans traffic, routes), the fleet of vehicles (choice and acquisition, maintenance).

The actions on the organization: The organization establishes or adjusts procedures: Hiring drivers; (The driver is a determining factor for statistical results of accidents, choice and allocation of vehicles, maintenance, vehicle control: (the quality of vehicles plays a vital role to road accidents) and Treatment and analysis of traffic accidents and emergencies

Documentation, operational control: The organization implements the procedures intended to control and manage the documentation relating to its Road Safety Management System.

### *Action Plan*

The analysis of statistics has brought to light the rate of road accidents' victims and the mechanisms likely to reduce them in the urban environment, the efforts of all parties involved in the fight against road safety are shown through awareness raising, training and control campaigns (Action Plan Guide).

Currently, the main idea, that of "sustainable security is based on the principle that man is the

standard reference, which implies in particular that infrastructures and vehicles are adapted to the limits of human capacities [8]. By adopting the practice management framework established in ISO 39001, we can actively contribute to reducing the risk of death and serious injury on roads in the spheres of influence. It can help save lives, support a social responsibility agenda and improve your road safety outcomes beyond compliance.

### *Government*

Ensure institutional development and make road safety a political priority.

### *Public Health*

It can set targets for the elimination of unacceptable health losses due to traffic accidents.

### *Vehicle Construction Workers*

They can start building vehicles with safer front end to reduce the number of road user injuries.

### *Communities, Civil Society Groups and Individuals*

Who can help plan efficient and safe transportation networks that include vulnerable drivers and road users such as cyclists and pedestrians?

## CONCLUSION

The need for effective response has become more and more urgent, A QMS with a new Standard named ISO 39001 "Road Safety Management Systems" with Requirements and recommendations for good practice, is widely considered as a major contribution to the Decade of Action for road safety launched by the United Nations (UN) in 2011. Of which the main objective is to minimize the number of road deaths as well as serious and minor injuries.

The statistical study of accidents involving fatalities, serious and minor wounds also includes the location and analysis of accidents for the definition of priority interventions, the implementation of this management system, which is presented as a set of integrated and continuous activities, include: accident data management, development, road safety policy, objectives and execution of the structure, accountability and mastery.

This system is currently being put into practice across the country and needs to be evaluated.

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