

Road Safety

Road Safety:

*From Global to Local
and Vice Versa*

By

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This book is dedicated to all road users,
in order to do everything to protect their own safety and
the safety of others, and to everyone from a global to a local level
who participates in the design of road transport systems,
in order to do everything to make the systems respond to
the limitations of road users.

The approach “Think Global, Act Local”
could be expanded to “Think Locally, Act Globally”,
which, connected in a single iterative cycle,
could be a future paradigm for new improved safety in road traffic.

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PREFACE

Modern road traffic, seen as a whole, has two sides: the first is a useful side and can be seen as a global phenomenon of the modern age and the basis for the development of civilization, and the other is a harmful side which can be seen as one of the greatest threats endangering human life and health.

Accidents in road traffic are random, sudden and rare events, which are repeated during periods of observation, so there is a certain probability of occurrence of road traffic accidents with injuries to participants.

On the other hand, the safety of road traffic is not accidental. Road transport safety is achieved through the development of a transport environment and its surroundings. Control of the management system of road traffic safety interventions promotes action regarding the causes of accidents, with the aim of improving road traffic safety.

After the publication of the first World Report on Road Traffic Injury Prevention in 2004, which said that injuries in traffic accidents could be reduced on a global scale, scientific research on traffic safety focused on describing the existing traffic safety situation. Over the following years, interventions were put in place to improve the current situation, and in recent years, assessments of the results of the interventions have been carried out, and predictions have been made regarding the future state of the safety of road transport.

This book about road traffic safety is being created in the period when the decade of the Global Road Traffic Safety Action (2011–2020) is entering its final phase. In this context, the evaluation of road traffic safety management system becomes an increasingly important topic of research. On a global level, there was a decline in the period 2007–2010 and a stabilization of the situation in the period 2010–2013; however, there was a new increase in road deaths in 2016, and in the most developed countries, we should have seen the mortality rate in road traffic accidents halve over the period 2010–2020. At this moment in time, this book is needed to affirm the role and importance of coordination and sharing of responsibilities at all levels of road traffic safety management, from global, regional, national, to local levels. Its key finding is that vertical coordination should be two-way: from global to local and vice versa, from local to global, in both reflection and action. By thinking and acting in both directions, a continuous cycle is generated, which in its iterative

repetition forms a chain of changes, as a paradigm for translating the existing non-hazardous state into future improvements in road traffic safety.

Research for this book is based on observation of phenomena, measurements, intuition, evaluation, modelling and conclusions, and have empirical, theoretical, and applied characteristics. The research relates to the period 2007–2016, except for Great Britain (1950–2016) and Montenegro (2000–2016). The research is conducted at several levels: at a global level—the whole world; at a regional level—the WHO regions, the European Union and the Western Balkans; at a national level—Montenegro and Great Britain; and at a local level—municipalities in Montenegro. The research limitations are, on the one hand, coincidences of individual traffic accidents and the different factors that cause them, and on the other hand, the legality in terms of the different characteristics of the results of these individual accidents, which can be predicted with a certain amount of probability, and finally, there is the limitation of the selection of a local area of a country.

In future road transport systems across the world, whose concepts will be based on smart vehicles and smart roads, the role of road users will be reduced. There will therefore be less inclination for the individual to make mistakes in road traffic, so safety on the national roads will be even more connected with the development of national road transport and overall socio-economic national development.

ACKNOWLEDGMENTS

I would like to thank everyone who has helped me to create this book, which gives a new impulse to the idea that improvements in the safety of road transport are possible.

LIST OF ABBREVIATIONS

[CADaS]	Common Accident Data Set
[CARE]	Community database on Accidents on the Roads in Europe
[CGRS]	Commission for Global Road Safety
[DARS 2011–2020]	Decade of Action for Road Safety 2011–2020
[EC]	European Commission
[ETSC]	European Transport Safety Council
[EU]	European Union
[GBDfT]	Great Britain Department for Transport
[GDP]	Gross Domestic Product
[GMN]	Government of Montenegro
[GPDARS 2011–2020]	Global Plan for the Decade of Action for Road Safety 2011–2020
[GUK]	Government of United Kingdom
[iRAP]	International Road Assessment Programme
[IRTAD]	International Traffic Safety Data and Analysis Group
[ISO]	International Organization for Standardization
[ITF]	International Transport Forum
[LD_MN]	Level Developments at the municipal level in Montenegro
[LTSA]	Land Transport Safety Authority
[MNMIA]	Montenegro Ministry of Internal Affairs
[MNMIAPA]	Montenegro Ministry of Internal Affairs and Public Administration
[MNMTMA]	Montenegro Ministry of Transport and Maritime Affairs
[MNMTMT]	Montenegro Ministry of Traffic, Maritime and Telecommunications
[MONSTAT]	Statistical Office of Montenegro
[MTSL]	Measuring Traffic Safety Levels
[MVR]	Motor Vehicles Registered
[OECD]	Organization for Economic Cooperation and Development
[P]	Population
[RTA]	Road Traffic Accident

[RTAD]	Road Traffic Accident with Damage
[RTAHR]	Road Traffic Accident Health Risk
[RTAI]	Road Traffic Accident with Injuries
[RTF]	Road Traffic Fatalities
[RTHR]	Road Traffic Health Risk
[RTI]	Road Traffic Injuries
[RTIHR]	Road Traffic Injuries Health Risk
[RTML]	Road Traffic Motorization Level
[RTR]	Road Traffic Risk
[RTS]	Road Traffic Safety
[RTSI]	Road Traffic Serious Injuries
[RTSII]	Road Traffic Slight Injuries
[SDMSRMN]	Strategy for Development and Maintenance of State Roads in Montenegro
[SEETO]	South East Europe Transport Observatory
[SPI]	Safety Performance Indicators
[SRTSIMN]	Strategy for Road Traffic Safety Improvement in Montenegro 2010–2019
[SRTSM]	Strategic Road Traffic Safety Management
[STA]	Swedish Transport Administration
[STDMN]	Strategy for Traffic Development in Montenegro
[TEN-T]	Trans-European Transport Networks
[TRC]	Transport Research Centre
[UKNS]	United Kingdom National Statistics
[UN]	United Nations
[UNECE]	United Nations Economic Commission for Europe
[UNGA]	United Nations General Assembly
[WB]	World Bank
[WBTC]	Western Balkans Transport Community
[WHO]	World Health Organization
[VRU]	Vulnerable Road Users

CHAPTER ONE

PROBLEM AND CONTEXT

1.1 Problem

Traffic has contributed a lot to the overall development of civilization. Road traffic, as part of a comprehensive transport system, is a significant factor in the development of a modern society and the most common form of mass and individual transport (World Health Organization [WHO] 2000; Eurostat 2015), thanks to Door-to-Door Mobility and other benefits of other types of traffic (Kolarić 2007; Jusuffranić 2007; Vešović 2008). On the other hand, road transport is the most disparate mode of transport (WHO 2000; Eurostat 2011, 2015; Savage 2013), with a three times higher mortality rate per 1 billion passenger kilometres in relation to rail traffic and about 28 times the rate of mortality in relation to air traffic (Eurostat 1997, 1999), (Figure 1-1).

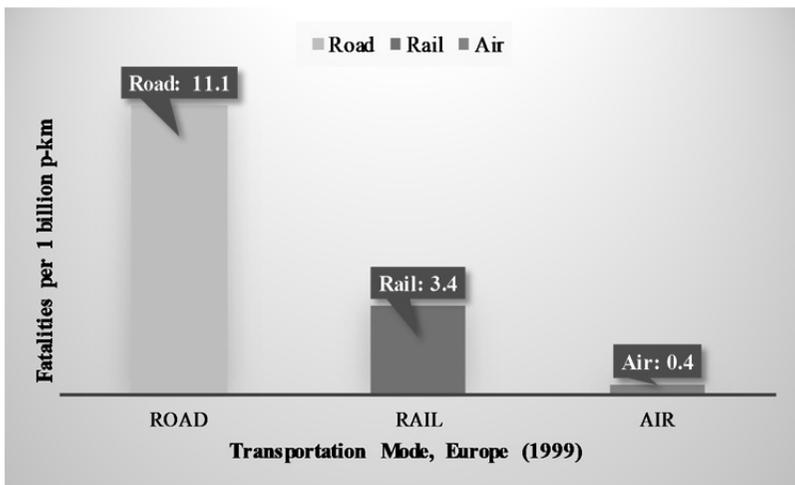


Figure 1-1 Mortality rates by mode of transport, Europe (1999)

In traffic on the road, there is a certain probability of an accident occurring and a road user being injured. On the other hand, by increasing the mobility of people, the exposure to the risk of a traffic accident increases. Furthermore, the era of cars, caused by an increase in the Road Traffic Motorization Level [RTML], has not been accompanied by the proper development of a national road network. Additionally, traffic users have been asked to adapt to the traffic system. To sum up, this system of road traffic, which was primarily based on development, with protection being of secondary significance, meant that road traffic injuries became a global problem (WHO 2004).

The main indicators of road traffic safety in a certain area are traffic accidents and injured persons in traffic accidents. In the period 2000–2016, in the specific years 2000, 2007, 2010, 2013 and 2016, the amounts of annual Road Traffic Fatalities [RTF] in the world were 1.15, 1.3, 1.24, 1.25 and 1.35 million people, respectively (WHO 2004, 2009, 2013, 2015, 2018), which is 3,150, 3,560, 3,400, 3,425 and 3,700 RTF per day, respectively.

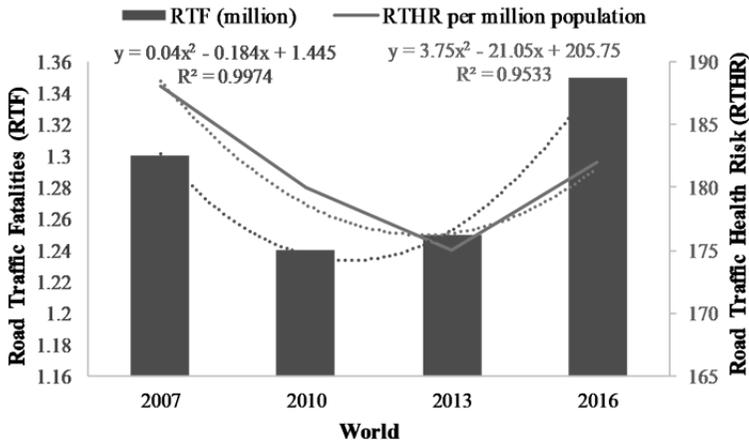


Figure 1-2 Changes in RTF and RTHR, World (2007–2016)

After the increase in the number of RTF in the period 2000–2007 and the decrease in the period 2007–2010, the situation stabilized in the period 2010–2013, however, instead of the expected new decrease (WHO 2011), there was a new increase in road deaths in 2016 (WHO 2018), as seen in

Figure 1-2. These changes in the number of RTF, in the period 2007–2016, can be described by an excellent direct square function (correlation coefficient of 0.999; determination coefficient of 0.997), but this result is limited by a small sample. On the other hand, in the same period, 2007–2016, the Road Traffic Health Risk [RTHR], which is a relative indicator of national road safety and calculated as the number of fatalities per million inhabitants, was 188, 180, 175, and 182, respectively (WHO 2009, 2013, 2015, 2018), as seen in Figure 1-2. And the allocation of RTHR can be described by an excellent direct square function (correlation coefficient of 0.976; determination coefficient of 0.953) as seen in Figure 1-2, but this result is limited by a small sample. Every year, 20–50 million people are seriously injured in traffic accidents (Road Traffic Seriously Injured [RTSI]), which is a significant cause of disability in the world.

Injuries in road traffic were the tenth cause of death in the world in 2007; in the period 2010–2013 they were the ninth cause of death in the world; and in 2016 they reached the level of the eighth cause of death in the world (Figure 1-3). At the same time, in the period 2007–2016, road traffic injuries were the first cause of death in the world at the age of 15–29 (Figure 1-3), which is a particular problem, since it refers to the most vital age group of people, so there are direct and indirect consequences on the human population. In 2010, about 60% of RTF affected people aged 15–44 (WHO 2013). Participants in off-road traffic: pedestrians, cyclists and motorcyclists (Vulnerable Road Users [VRU]), in 2010, constituted half of the world's RTF (WHO 2013) and their number continued to grow, so in 2016 it was 54% of RTF in the world (WHO 2018).

The economic costs of traffic accidents equate to 1–3% of the Gross Domestic Product [GDP] of the countries of the world and reach a figure of 500 billion dollars (WHO 2015), and in Europe €158 billion a year, or 2.5–3.0% of GDP in 17 Member States (United Nations Economic Commission for Europe [UNECE] 2018b).

In 2010, it was estimated that, in the case of the continuing trend of the rising number of RTF by 2020, the number of RTF will reach 1.9 million (WHO 2011) and that by 2030, road traffic injuries would be seventh on the list of “The top 10 global causes of death” (WHO 2000–2018).

If the trend in the distribution of RTF in the period 2007–2016 continued until 2030, it is estimated that 1.3–1.5 million people would be killed in traffic on the roads to 2030 (Figure 1-4).



Figure 1-3 Road Traffic Death Causes Rank, World (2007–2016)

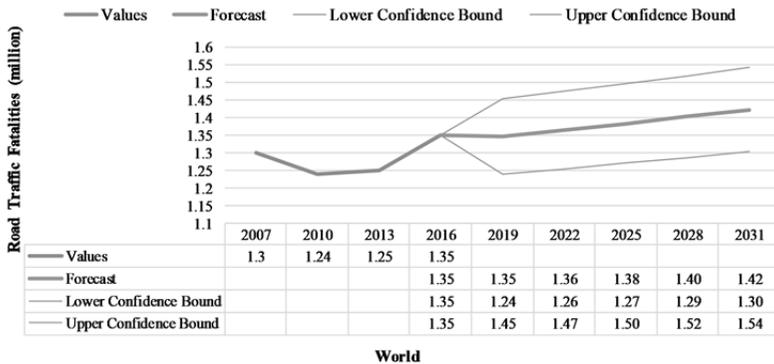


Figure 1-4 Estimated number of RTF, World (2016–2031)

This assessment issues a significant warning to road safety system creators, from a global to a local level, that the period of stabilization in global road safety will last much longer than was estimated by the declaration of the global road safety decade, 2011–2020, (WHO 2011) and that in order to achieve improvements in the reduction of RTF, new efforts are needed, greater than the current ones, both in terms of new methods and innovation in research, as well as in the creation of new policies and their implementation.

1.2 Context of the Problem

Road traffic safety is a crisis with a high health, social and economic impact (WHO 2004), which jeopardizes the level of health care of the population and the development of countries in the world (WHO 2009), especially in underdeveloped and developing countries (WHO 2009, 2013, 2015), where in 2016, 93% of RTF occurred (WHO 2018). That is why safety on the roads has become a new topic, which, apart from health, also has philosophical, social, political, normative, technical and practical aspects.

The “Sustainable Safety” approach in the Netherlands was promoted in 1997 (Wegman and Elsenaar 1997; Wegman et al. 2005; Morsink and Wegman 2006; Wegman and Aarts 2006; Wegman, Aarts and Bax 2008; Weijermars and Wegman 2011), which starts from accepting human error and the vulnerability of the human body, and accordingly understanding that traffic accidents and injuries cannot be completely avoided, but the number of traffic accidents can be reduced, or at least the severity of human injury can be reduced. The traffic safety system on the roads should be developed so that it can adapt to human limitations, in other words, the tendency towards errors and susceptibility to injuries.

The vision is a world with safe mobility for all road users. It is not acceptable for human life and health to be compromised due to other benefits for the transport system, as seen in Sweden’s “Vision Zero” approach from 1997 (Tingvall 1997; Belin et al. 1997; Swedish Parliament 1997; Tingvall 1998; Tingvall and Haworth 1999; Organization for Economic Cooperation and Development [OECD] 2008; European Commission [EC] 2010, 2011).

“Safe System”, Australia’s approach from 2004 (International Transport Forum [ITF] and Transport Research Centre [TRC] 2008; Bliss and Breen 2009; Langford 2009; Bliss and Breen 2013) accepts human error as inevitable and recognizes the need for the responsible behaviour of road users. The road safety system should be developed with the addition of reducing human error and reducing the consequences of an accident, in particular reducing the risks for RTF and RTSI. The aim of “Safe System” is to ensure that a traffic accident does not lead to RTF and RTSI. The basis of this approach is the view that human constraints—the kinetic energy strength that the human body can bear—is important for the design of the road transport system, and that other aspects, such as the development of the immediate road environment and the vehicles

themselves, must comply with the set limits. Road users, vehicles, the road network and the environment are accessed in a comprehensive way through a wide range of interventions, with greater attention to speed control and design of the roads. This approach involves shifting most of the responsibility from road users to those who design road traffic systems. System creators, and legislative and executive authorities, are primarily those responsible for roads, automotive regulations, the police, health, and education. However, there are many other institutions that also have responsibility for road safety, such as the judiciary system, scientific organizations and non-governmental organizations. In this way, individual road users are obliged to comply with regulations.

Over the past decade, road safety activities at international level have reached the highest level so far. A large number of documents have been produced that show and analyse the current situation regarding traffic injuries, their social, health and economic impact, specific risk factors, as well as effective interventions and measures that are being taken or can be undertaken.

In March 2010, the United Nations General Assembly [UNGA], by resolution, proclaimed the Decade of Action for Road Safety 2011–2020 [DARS 2011–2020] (UNGA 2010) with the aim of stabilizing, and then reducing the number of RTF across the world by implementing various actions at national, regional and global levels. The resolution calls for all member states to pursue activities aimed at increasing safety on the roads, in particular in the area of road traffic safety management, road infrastructure, the safety of vehicles themselves, the behaviour of road users, road safety education, direct care of injuries, incident reporting, and so on. In addition to participating in the achievement and monitoring of the global objectives of the DARS 2011–2020, each member state should individually set national targets for these areas of action.

The Global Plan for the Decade of Action for Road Safety 2011–2020 [GPDARS 2011–2020], which was promoted in May 2011 (WHO 2011), provides a general framework for activities that can be undertaken in DARS 2011–2020. At national level, governments are encouraged to implement five core groups or pillars based on recommendations of the World Report on the Prevention of Injuries on Roads (WHO 2004) and proposed by the Commission for Global Road Safety [CGRS] (2009). “Pillars” of activities at national level are: traffic safety management on roads, safer roads and movements, safer vehicles, safer traffic and post-accident activities. It was estimated that the implementation of GPDARS

2011–2020 could save about 5 million lives and prevent about 50 million more serious injuries (WHO 2011). The reduction of RTF and RTSI would reduce the negative consequences of road transport and allow the growth and more productive use of existing national resources.

The decrease in RTHR in the world for the period 2007–2013 shows that improvements in traffic safety are possible as the result of traffic safety management systems, taking into account a change in approach from the view that the driver must adjust to the traffic system, to the attitude that the traffic system must adjust to the participant in the traffic, together with the tendency for errors and susceptibility to injuries. In order to meet the further set of goals of reducing RTF and RTSI in the world, the problem of road traffic safety should be addressed in the overall developmental national policy of countries, supported by the development of theory and practice on road safety and accompanied by the monitoring and evaluation of national traffic safety management systems.

CHAPTER TWO

METHOD

2.1 Description of the research

The subject of the research is the evaluation of traffic safety management systems, with a focus on coordination and sharing of responsibilities at all levels of traffic safety management, from global, regional, national to local.

In terms of scientific knowledge, the subject of research is in the domain of scientific control and prediction.

Thematic research includes traffic accidents and the consequences of traffic accidents.

The research relates to the period 2007–2016, except for Great Britain (1950–2016) and Montenegro (2000–2016). The research is conducted at several levels: at a global level—the whole world; at a regional level—the WHO regions, the European Union and the Western Balkans; at a national level—Montenegro and Great Britain; and at a local level—municipalities in Montenegro.

In terms of the discipline of the research, the subject belongs to the socio-humanistic and natural sciences, primarily scientific disciplines: Traffic safety, Road transport, Traffic management, Strategic traffic management, Information systems, Databases, Traffic psychology, Social psychology, Traffic ethics, Preventive health care and Traffic Law, which gives the research a multidisciplinary character.

2.2 Methods of research

The research is based on the observation of phenomena, measurements, intuition, evaluation, modelling, conclusions, and it has theoretical and applied characteristics.