



6th European Transport Research Conference  
**MOVING FORWARD:**  
Innovative Solutions for Tomorrow's Mobility  
PGE Narodowy, Warsaw, Poland - 18-21 April 2016



*Proceedings of 6th Transport Research Arena, April 18-21, 2016, Warsaw, Poland*

## Road safety investments and interventions in South East Europe

Alexandra Laiou<sup>a\*</sup>, George Yannis<sup>b</sup>, Alberto Milotti<sup>c</sup>, Guido Piccoli<sup>d</sup>

<sup>a,b</sup>National Technical University of Athens, 5, Heroon Polytechniou st., GR-15773, Athens, Greece

<sup>c,d</sup>Agency of East Lombardy for Transports and Logistics, 16, Via Cipro, I-25124, Brescia – Italy

---

### Abstract

Countries of South-East Europe show relatively low road safety performance among the EU Members. The objective of this paper is the exploration of a number of potential investments and interventions for the improvement of road safety in South-East European regions with regard to relative legislation, policy and institutional capacity. For the identification of the most appropriate road safety investments and interventions, a three step methodology was followed. Firstly, results of the, EU co-funded, ROSEE project concerning several aspects of road safety legislation, policy and institutional capacity in South-East European regions were exploited to identify the particular issues on which the proposed investments and interventions should focus. Then, relevant proposals and recommendations from the international bibliography were taken into account. Finally, original work was carried out by assessing and ranking selected road safety measures, programs, and policies. Specific road safety interventions were assessed and ranked based on three criteria, the estimated safety benefit related to the measure, the implementation cost and the implementation time needed for benefit. The overall results show that road safety legislation, policy and institutional capacity related investments and interventions are generally considered very effective for the improvement of road safety. On the other hand, it seems that most such investment proposals are considered relatively expensive to implement and effective on the long-term. These results were expected and are meaningful given that, based on international literature, the legislation, policy and institutional capacity are strategic aspects of road safety which, if taken into account at national level and in long-term, are considered highly effective. Specifically, the overall results show that investments and interventions considered to provide high safety benefit at low cost, in most partner countries, are the legislation for infrastructure safety management and the legislation for efficient enforcement. However, both types of investments need time to show their effect on the improvement of road safety. The analysis of the assessment results per country revealed important differences among South-East European regions that may be attributed to particular local characteristics and conditions.

*Keywords:* road safety; interventions; assessment; ROSEE

---

---

\* Corresponding author. Tel.: +30-210-772-1575; fax: +30-210-772-1454.  
E-mail address: alaiou@central.ntua.gr

## **1. Introduction**

Worldwide, the improvement of road safety is attracting more and more interest as road accidents have become one of the major causes of death in many countries and road safety is regarded as an issue of public health. In an area where road safety standards as well as rules and regulations vary widely, the European Union (EU) sees approximately 25,000 fatalities and 1.4 million injuries in road accidents each year.

In 2012, the number of road fatalities per million of population in EU countries of the South East regions was higher than the respective EU average. Specifically, 101 persons per million population were killed in Romania, 92 in Greece, 82 in Bulgaria, 63 in Slovenia, 62 in Italy and 61 in Hungary while the respective EU average was 56 fatalities per million population (CARE, 2014). These numbers show that road accidents is a common serious problem of the countries of South-East Europe and common action should be taken in order to improve road safety in this wider part of Europe and not only in particular countries. Although the analysis of road accidents per country may reveal differences and special characteristics that formulate the final road safety performance of each country, there are also common key road safety factors, such as road infrastructure management and road user behaviour that may as well need to be explored in order to improve road safety in this part of Europe. Moreover, knowledge and experience gained in countries of the central and northern Europe that perform better in road safety, should be exploited and further developed.

Within this framework, the project titled “Road safety in South East European regions –ROSEE” of the South East Europe Transnational Cooperation Programme to a consortium originating from Italy, Romania, Hungary, Greece, Slovenia and Bulgaria. One of the project aims was the development of recommendations on interventions and investment proposals for the improvement of road safety in South-East European regions. These recommendations and investment proposals may serve as a basis for decision making by local road safety stakeholders concerning future actions for the improvement of road safety in South-East Europe. Based on the developed recommendations, stakeholders will be able to select the most effective interventions to tackle road safety problems in their area as well as to prioritise implementation of such interventions based on their cost and the time needed for the benefit to be gained.

The objective of this paper is the exploration of a number of proposed investments and interventions concerning legislation, policy and institutional capacity for the improvement of road safety in South-East European regions.

## **2. Development of recommendations on road safety investments and interventions**

Throughout the project, several aspects of the road safety legislation, policy and institutional capacity in the partner countries were examined. The existing relevant conditions in each partner country were recorded and the priorities and needs of the local road safety stakeholders were identified. Based on the findings of these project activities, a general idea of the particular issues concerning road safety legislation, policy and institutional capacity on which the respective recommendations should be focused was obtained. Then the recommendations were specified based on a three step methodology. Initially the results of other activities within the ROSEE project were further exploited. Then, relevant proposals and recommendations from the international bibliography were consulted and finally prototype work on road safety measures, programmes, and policies assessment was conducted. The assessment was based on a questionnaire survey among road safety stakeholders. As a result, a comprehensive table with ranked measures per subject was compiled.

One of the main activities of the project in each partner country was the establishment of a National Advisory Group (NAG) of relevant national or regional decision-makers and other key stakeholders such as roads or transport administration, non-governmental organizations, education, research etc. The contribution of the NAGs was vital throughout the project activities as they actively participated in recording the existing conditions in road safety legislation, policy and institutional capacity in their countries as well as in the identification of road safety priorities and needs. Furthermore, the assessment procedure described above was completed by all NAG members in addition to the project partners and other road safety experts in each partner country.

Apart from the NAGs, a Transnational Working Group (TWG) was also established, consisting of project partners and representatives of the NAGs. The TWG provided feedback on road safety legislation, policy and institutional capacity issues and contributed to the comparison of existing conditions and respective problems in the

various countries and to the examination of the transferability of the proposed solutions between South-East European countries.

The participation of such active road safety stakeholders in all the phases of the project and particularly in the development of the recommendations and investment proposals ensures the accuracy and the trustworthiness of the respective outputs.

The detailed assessment of road safety legislation, policy and institutional capacity in South-East Europe was achieved with the use of a specially developed tool. This tool allowed mapping relevant EU network safety priorities with national road safety policies in the partner countries. The tool was based on relevant work undertaken at European level within the EU funded project DaCoTA which was further exploited.

Specifically, an extensive questionnaire for the assessment of road safety management, legislation and policies in European countries was filled in by two road safety experts, one government representative and one independent expert, in each partner country. The main subject areas of the questionnaire concerned:

- institutional organization, coordination and stakeholders' involvement
- policy formulation and adoption
- policy implementation and funding
- monitoring and evaluation
- scientific support and information and capacity building.

In order to obtain an even more complete picture of the existing conditions concerning the road safety legislation, policy and institutional capacity in the South-East European countries, the priorities and needs of road safety stakeholders in the area were also explored. On this purpose, the "Stakeholders questionnaire" was developed to record the needs and priorities of stakeholders on road safety related data and information.

The questionnaire was constructed in two parts. The first one aimed at collecting "background information" allowing to better describe the stakeholders' involvement in the field of road safety. The second and main part consisted of a list of items structured along the key Road Safety Management tasks. All items listed in correspondence to a given task had been identified as important and/or unavailable by a panel of experts previously interviewed. The respondents were asked to evaluate each listed item on two different dimensions: (1) the perceived priority for their personal work, and (2) the perceived availability at the level of their country (i.e. the extent to which, according to their knowledge, the item in question was available would they want to use it).

The various tasks described above, permitted the identification road safety legislation, policy and institutional capacity issues that concentrated the highest interest in the partner countries. Based on the feedback of the national road safety stakeholders and on the results of the different assessment procedures, it was possible to recognize the most urgent or important issues that need to be solved or altered.

It is noted, that several differences among the partner countries were recorded, on many different aspects of road safety management and on the reported priorities and needs of stakeholders. This was rather expected, as important differences exist among partner countries concerning the general structure of the State and the communities. On the other hand, more or less, all partner countries are among the relatively worse performers on road safety in the European Union. Moreover, there are several road safety problems common across all partner countries. Therefore, despite the particular differences, it was meaningful to compose a set of recommendations on road safety legislation, policy and institutional capacity, applicable to all partner countries and probably to other countries of South-East Europe.

Apart from input from the previous project activities, road safety recommendations found in the international literature were taken into account. The relevant sources included previous EU research projects such as the Save Our Lives – SOL project, reports from international organisations (e.g. Organisation for Economic Cooperation and Development (OECD), the Conference of European Directors of Roads (CEDR)) and other international bibliography.

Based on the above, it was recommended that to improve road safety legislation, policy and institutional capacity focus should be on the following particular subjects:

- Institutional issues

- Legislative issues
- Infrastructure safety management
- Monitoring
- Communication
- Post-Crash treatment

As a third step, specific road safety interventions (measures, programmes, and policies) on the selected subjects listed above were assessed and ranked by the members of the NAGs, the project partners and other road safety experts in each partner country and based on the following three criteria:

- the estimated safety benefit related to the measure: in a scale from 4 (the highest) to 1 (the lowest),
- the implementation cost: from 4 (the highest) to 1 (the lowest)
- the implementation time needed for benefit: >5 years, 1-5 years, 6-12 months, <6 months.

In addition, implementation barriers related to each specific measure could be recorded.

For each one of the six different aspects of road safety on which recommendations were formed, a limited number of proposed interventions were assessed and ranked in order to identify promising investment proposals.

- Institutional issues
  - Development of a road safety national Plan
  - Operation of a national road safety agency
  - Setting up road safety targets
  - Setting up dedicated road safety budget
- Legislative issues
  - Legislation for infrastructure safety management
  - Legislation for new offences
  - Legislation for efficient enforcement
  - Legislation for training, licensing, education
- Infrastructure safety management
  - European Road Assessment Programme (EuroRAP)
  - Road Safety Audits (RSA)
  - Road safety inspection (RSI)
  - High risk site treatment program
- Monitoring
  - Accident data collection system
  - Monitoring road safety indicators
  - Monitoring implementation progress of measures
  - Evaluating measures' effectiveness
  - Road accident analyses
- Communication
  - Campaigns supporting the national programme
  - Coordinate enforcement and promotion campaigns
- Post-Crash treatment
  - Emergency Call system (eCall)
  - Emergency lanes in congestion
  - Trauma management performance
  - Improved emergency medical service

Based on this assessment, a comprehensive table with all interventions ranked was compiled.

### 3. Overall analysis of road safety investment proposals and interventions

The assessment of investment proposals on road safety legislation, policy and institutional capacity revealed similarities and differences among the partner countries. The number of partner countries where each investment proposal was found to be related to high safety benefit, low implementation cost and short time needed for the benefit to be gained is presented in Table 1.

The results show that investment proposals on road safety legislation, policy and institutional capacity are generally considered very effective for the improvement of road safety as indicated by the large number of partner countries where most such investments were related to high safety benefit. However, it seems that most such investment proposals are considered relatively expensive to implement and effective on the long-term. This is indicated by the small number of countries where most of the examined investment proposals were related to low implementation cost and short periods needed for the benefit to be gained. These results were expected and are meaningful given that, based on international literature, the legislation, policy and institutional capacity are strategic aspects of road safety which, if taken into account at national level and in long-term, are considered highly effective.

Overall results also show that the investment proposals considered to provide high safety benefit at low cost, in most partner countries, are the legislation for infrastructure safety management and the legislation for efficient enforcement. However, both investments need time to show their effect on the improvement of road safety.

Table 1: Overall results of road safety legislation, policy and institutional capacity related investment proposals assessment in the six ROSEE partner countries

Investment proposals	Number of partner countries recording high safety benefit	Number of partner countries recording low implementation cost	Number of partner countries recording short implementation time
Development of road safety national plan	6	1	1
Operation of national road safety agency	4	0	0
Setting up road safety targets	4	3	1
Setting up dedicated road safety budget	6	0	1
Legislation for infrastructure safety management	6	4	0
Legislation for new offences	2	5	0
Legislation for efficient enforcement	6	4	1
Legislation for training, licensing, education	4	4	0
European Road Assessment Programme (EuroRAP)	3	1	0
Road Safety Audits (RSA)	5	2	0
Road safety inspection (RSI)	6	1	0
High risk site treatment program	6	0	1
Accident data collection system	4	0	0
Monitoring road safety indicators	3	2	0
Monitoring implementation progress of measures	5	2	0
Evaluating measures effectiveness	6	2	0
Road accident analyses	4	0	1
Campaigns supporting the national programme	2	0	3
Coordinate enforcement and promotion campaigns	2	1	3
Emergency Call system (eCall)	5	0	1
Emergency lanes in congestion	2	0	2
Trauma management performance	3	0	3
Improved emergency medical service	5	0	2

Tables 2, 3 and 4 present the examined investment proposals ranked per gained safety benefit, implementation cost and implementation time for benefit to be gained respectively.

Based on Table 2, 7 out of the 23 examined investment proposals were related to high safety benefit in all partner countries and another 9 investment proposals, in the majority of partner countries. Those highly effective investment proposals belong to almost all the six groups of recommendations (namely institutional issues, legislative issues, infrastructure safety management, monitoring, communication and post-crash treatment) apart from the communication related one. Institutional issues, legislative issues and infrastructure safety management concentrate most of the highly effective investment proposals.

Table 2: Road safety legislation, policy and institutional capacity related investment proposals ranked per gained safety benefit

Investment proposals	Number of partner countries recording high safety benefit
Development of road safety national Plan	6
Setting up dedicated road safety budget	6
Legislation for infrastructure safety management	6
Legislation for efficient enforcement	6
Road safety inspection (RSI)	6
High risk site treatment program	6
Evaluating measures effectiveness	6
Road Safety Audits (RSA)	5
Monitoring implementation progress of measures	5
Emergency Call system (eCall)	5
Improved Emergency Medical Service	5
Operation of national road safety agency	4
Setting up road safety targets	4
Legislation for training, licensing, education	4
Accident data collection system	4
Road accident analyses	4
European Road Assessment Programme (EuroRAP)	3
Monitoring road safety indicators	3
trauma management performance	3
Legislation for new offences	2
Campaigns supporting the national programme	2
Coordinate enforcement and promotion campaigns	2
Emergency lanes in congestion	2

Considering the implementation cost of investment proposals, as shown in Table 3, it seems that those concerning legislative issues were assessed as the easiest to implement in most partner countries. A significant number of measures, 9 out of 23, were related to low implementation cost in few partner countries. This result may be related to important differences on the economic conditions in the various partner countries. Finally, almost half of the examined investment proposals were not related to low implementation cost in any partner country. This is explained by the strategic and long-term nature of the specific investment proposals.

Table 3: Road safety legislation, policy and institutional capacity related investment proposals ranked per implementation cost

Investment proposals	Number of partner countries recording low implementation cost
Legislation for new offences	5
Legislation for infrastructure safety management	4
Legislation for efficient enforcement	4
Legislation for training, licensing, education	4
Setting up road safety targets	3
Evaluating measures effectiveness	2
Road Safety Audits (RSA)	2
Monitoring implementation progress of measures	2
Monitoring road safety indicators	2
Development of road safety national Plan	1
Road safety inspection (RSI)	1
European Road Assessment Programme (EuroRAP)	1
Coordinate enforcement and promotion campaigns	1
Setting up dedicated road safety budget	0
High risk site treatment program	0
Emergency Call system (eCall)	0
Improved Emergency Medical Service	0
Operation of national road safety agency	0
Accident data collection system	0
Road accident analyses	0
trauma management performance	0
Campaigns supporting the national programme	0
Emergency lanes in congestion	0

As far as the time needed for the benefit to be gained, it is shown that almost all the examined investment proposals are considered effective in the long-term in all partner countries. This is also explained by the strategic nature of investment proposals related to legislation, policy and institutional capacity aspects of road safety. Investments related to communication and trauma management performance are the only ones considered by experts in half partner countries to need a short implementation time to provide benefit.

Table 4: Road safety legislation, policy and institutional capacity related investment proposals ranked per time needed for safety benefit to be gained

Investment proposals	Number of partner countries recording short period for benefit to be gained (less than a year)
Campaigns supporting the national programme	3
Coordinate enforcement and promotion campaigns	3
Trauma management performance	3
Emergency lanes in congestion	2
Improved Emergency Medical Service	2
Development of road safety national Plan	1
Setting up road safety targets	1
Setting up dedicated road safety budget	1
Legislation for efficient enforcement	1
High risk site treatment program	1
Road accident analyses	1
Emergency Call system (eCall)	1
Operation of national road safety agency	0
Legislation for infrastructure safety management	0
Legislation for new offences	0
Legislation for training, licensing, education	0
European Road Assessment Programme (EuroRAP)	0
Road Safety Audits (RSA)	0
Road safety inspection (RSI)	0
Accident data collection system	0
Monitoring road safety indicators	0
Monitoring implementation progress of measures	0
Evaluating measures effectiveness	0

#### 4. Synthesis

One of the final outputs of the ROSEE project was the development of recommendations and investment proposals concerning policy and data analysis and in particular, road safety legislation, policy and institutional capacity. This was achieved through the exploitation of the results of previous activities of the project including the consultation of road safety experts in the partner countries, assessment of the existing conditions and the road safety stakeholders' priorities and needs in these countries. The analysis of such results revealed significant similarities and differences among the partner countries considering road safety legislation, policy and institutional capacity. Based on these similarities and differences, the main road safety aspects on which focus should be on in order to improve legislation, policy and institutional capacity in the SEE countries were identified and concerned institutional issues, legislative issues, infrastructure safety management, monitoring, communication and post-crash treatment.



For each of the above recommended road safety aspects, a series of key measures were selected based on the international literature, to be assessed as potential investment proposals. The assessment was completed with the aid of road safety experts from the partner countries and concerned three critical issues meaning the safety benefit that would be gained by the implementation of each measure, the implementation cost and the implementation time needed for the safety benefit to be gained.

The overall results show that road safety legislation, policy and institutional capacity related investment proposals are generally considered very effective for the improvement of road safety as implied the large number of partner countries where most such investments were related to high safety benefit. On the other hand, it seems that most such investment proposals are considered relatively expensive to implement and effective on the long-term. This is indicated by the small number of countries where most of the examined investment proposals were related to low implementation cost and short periods needed for the benefit to be gained. These results were expected and are meaningful given that, based on international literature, the legislation, policy and institutional capacity are strategic aspects of road safety which, if taken into account at national level and in long-term, are considered highly effective.

Specifically, the overall results show that the investment proposals considered to provide high safety benefit at low cost, in most partner countries, are the legislation for infrastructure safety management and the legislation for efficient enforcement. However, both investments need time to show their effect on the improvement of road safety.

The examination of the safety benefit of the measures showed that 7 out of the 23 examined investment proposals were related to high safety benefit in all partner countries and another 9 investment proposals, in the majority of partner countries. Those highly effective investment proposals belong to almost all the six groups of recommendations (namely institutional issues, legislative issues, infrastructure safety management, monitoring, communication and post-crash treatment) apart from the communication related one. Institutional issues, legislative issues and infrastructure safety management concentrate most of the highly effective investment proposals.

Considering the implementation cost of investment proposals, it seems that those concerning legislative issues were assessed as the easiest to implement in most partner countries. A significant number of measures, 9 out of 23, were related to low implementation cost in few partner countries. This result may be related to important differences on the economic conditions in the various partner countries. Finally, almost half of the examined investment proposals were not related to low implementation cost in any partner country. This is explained by the strategic and long-term nature of the specific investment proposals.

As far as the time needed for the benefit to be gained, it is shown that almost all the examined investment proposals are considered effective in the long-term in all partner countries. This is also explained by the strategic nature of investment proposals related to legislation, policy and institutional capacity aspects of road safety. Investments related to communication and trauma management performance are the only ones considered by experts in half partner countries to need a short implementation time to provide benefit.

The analysis of the assessment results per country revealed important differences among the partners that may be attributed to particular local characteristics and conditions. The proposed investments and interventions may serve as a basis for road safety authorities and stakeholders, in their efforts to enhance the overall capacity to coordinate, promote and operate the networks from a road safety perspective to achieve the road safety objectives set at national and transnational level.

## **Acknowledgements**

This research was carried out within the project ROSEE-ROad safety in South-East European regions, co-funded by the South East Europe Transnational Cooperation Program.

## **References**

- Bialas - Motyl A., 2007. EU road safety 2004: Regional differences. *Statistics in focus, Transport*, 14/2007.
- CARE, European Road Accident Database ([http://ec.europa.eu/transport/road\\_safety/specialist/statistics/index\\_en.htm](http://ec.europa.eu/transport/road_safety/specialist/statistics/index_en.htm))
- DaCoTA - Data Collection Transfer and Analysis EU funded research project (<http://www.dacota-project.eu/>)
- European Commission, 2013. Road safety: EU reports lowest ever number of road deaths and takes first step towards an injuries strategy, European Commission, IP/13/236, 19.3.2013, Brussels.

- European Commission, 2010. Towards a European road safety area: policy orientations on road safety 2011-2020, COM(2010) 389 final, 20.7.2010, Brussels.
- European Commission, 2008. Directive on road infrastructure safety management, Directive 2008/96/EC, 19.11.2008, Brussels.
- European Transport Safety Council (ETSC), 2006. Road Accident Data in the Enlarged European Union, Learning from each other, ETSC, Brussels.
- SOL - Save Our Lives EU co-funded research project (<http://www.sol-project.eu/>)
- Tira M., Milotti A., Popolizio M., 2012. SOL Strategy Eastern Lombardy ([www.sol-project.eu](http://www.sol-project.eu/))
- Yannis G., Evgenikos P., Papadimitriou E., 2008. Best practices for cost-effective road safety infrastructure investments, CEDR, Paris.
- Yannis G., Laiou A., 2014. Recommendations and Investment Proposals, Policy and data analysis (<http://www.rose-project.eu/>)