How to achieve Transport- and Trade-related SDGs

Greek Road Safety Statistics – Best Practices

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Podgorica, October 2017
Road Safety in the EU

- In 2016, about **25,500** people were killed and **135,000** were seriously injured in road accidents in the EU.

- In 2016, road accident fatalities were reduced by **2%** after two years of stagnation and by **19%** since 2010.

- The mean number of road fatalities per million population was **50** in 2016 and was reduced by **43%** compared to 2007.

- Only 10 countries have a better performance than the EU average.

Source: European Commission

Stergios Mavromatis, “Greek Road Safety Statistics – Best Practices”
Road Safety in Greece

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<td>1.456</td>
<td>1.258</td>
<td>1.141</td>
<td>0.988</td>
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<td>0.795</td>
<td>0.793</td>
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<td>-51%</td>
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<td>Fatalities/million vehicles</td>
<td>237</td>
<td>218</td>
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<td>122</td>
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<td>Fatalities/million population</td>
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<td>146</td>
<td>140</td>
<td>131</td>
<td>115</td>
<td>98</td>
<td>89</td>
<td>80</td>
<td>73</td>
<td>73</td>
<td>75</td>
<td>-50%</td>
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</table>

Source: ELSTAT

- During the past decade, Greece was among the EU countries with the **worst road safety performance**
- However, Greece recorded an **impressive reduction in road fatalities by 46%** during the period 2009-2015
- This impressive reduction in road fatalities during economic crisis **was stopped in 2015**
## Road Fatalities by Age, Gender and Road User Type

<table>
<thead>
<tr>
<th>Age</th>
<th>Male</th>
<th>Female</th>
<th>Passengers Male</th>
<th>Passengers Female</th>
<th>Pedestrians Male</th>
<th>Pedestrians Female</th>
<th>Drivers</th>
<th>Passengers</th>
<th>Pedestrians</th>
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<th>Female</th>
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<tr>
<td>15-24</td>
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<td>7</td>
<td>21</td>
<td>18</td>
<td>3</td>
<td>3</td>
<td>86</td>
<td>39</td>
<td>6</td>
<td>1</td>
<td>3</td>
<td>131</td>
<td>17%</td>
<td>4.4</td>
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<tr>
<td>25-34</td>
<td>86</td>
<td>10</td>
<td>11</td>
<td>11</td>
<td>5</td>
<td>2</td>
<td>96</td>
<td>21</td>
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<td>2</td>
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<td>4.4</td>
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<td>94</td>
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<td>97</td>
<td>10</td>
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<td>6%</td>
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<td>10</td>
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<td>81</td>
<td>47</td>
<td>545</td>
<td>120</td>
<td>128</td>
<td>65</td>
<td>142</td>
<td>793</td>
<td>100%</td>
<td>7.6</td>
</tr>
</tbody>
</table>

### Male drivers aged 15-24 y.o. account for 65% of all road fatalities in Greece

Older pedestrians account for 63% of pedestrian fatalities

**Greece 2015**

Stergios Mavromatis, “Greek Road Safety Statistics – Best Practices”
Road Fatalities by Area and Road Type

Greece 2015
Road fatalities by area and road type

Road Type | Fatalities | Road accidents | Fatalities per 100 accidents |
<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
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<td></td>
<td>Inside</td>
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<td>189</td>
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<tr>
<td>Municipal</td>
<td>288</td>
<td>38</td>
<td>326</td>
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<tr>
<td>Total</td>
<td>388</td>
<td>405</td>
<td>793</td>
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</tbody>
</table>

57% of road fatalities outside built-up area occurred on national roads.

More than 80% of road accidents and almost half of fatalities occurred inside built-up area. However, accident severity is 5 times higher outside built-up areas.

Stergios Mavromatis, “Greek Road Safety Statistics – Best Practices”
Why Collect Road Safety Data?

• Road Safety is a typical field with high risk of important investments not bringing results

• Absence of monitoring and accountability limits seriously road safety performance
What to Measure?

- Accident Data
- Exposure Data
- Road Safety Performance Indicators
Road Safety Data Collection and Storage

- Importance
- Accident recording
- Data processing and storage
Importance of Road Safety Data Collection and Storage

- Highlight high-risk sites, hierarchize needs and plan necessary improvements
- Investigate the impact of various factors (geometric characteristics, electric lighting, parking, driver training, enforcements, etc.) on accidents reduction
- In the documentation of projects (e.g. signaling, lighting, signage, etc.) and actions (e.g. increased enforcement, parking ban) in order to improve road safety
- In "before and after" studies in order to determine the effect of an intervention at a road section or intersection
- Performing an expert's report on a particular accident
Problems when Recording Road Accidents

• Unclear determination of road accident location
• Insufficient or incorrect recording
• Insufficient accident coverage
Data Processing and Storage

**Data collection**

- **Police**
  - Road Accident Data Collection Form
  - Road Accident Data Collection Form (up to 1997)
  - Road Accident Report
  - Important Road Accident Report

- **Hospitals**
  - Form
  - Hospitalized Form

- **Insurance companies**

**Accident report**

- **Databases**
  - Road Accident DB of ELSTAT
  - Road Accident DB Ministry of Infrastructure, Transport and Networks
  - Road Accident DB Ministry of Citizen Protection
  - Road Accident Data File Ministry of Citizen Protection
  - Vital registration database of ELSTAT
  - Hospitalized Data File (in each hospital)
  - Road Accident DB of Statistical Insurance Company of Greece

**Publications**

- Monthly press releases
- Calendar of Citizen Protection
- Calendar of ELSTAT
- Calendar of Statistical Insurance Company of Greece

Stergios Mavromatis, “Greek Road Safety Statistics – Best Practices”
The Role of Police (1/2)

- The Police are the first to arrive at the accident site and the last to update the related data

- Responsible to
  - Forward the data to the Hellenic Statistical Authority (ELSTAT)
  - Maintain the National Data File

- Draw up an accident report by filling-in an accident data collection form
The Role of Police (2/2)

- Task on accident site
  - Carry out an investigation
  - Fill-in autopsy report, and part of the road accident data collection form (completed later on at the police headquarters)

- The road accident data collection forms are finalised with the necessary updates within 30 days from the day of the accident

- The source with the most detailed data collected at national level, in terms of variables and values collected
ELSTAT Database

- Detailed Disaggregate Data (1985-2012)
- Accident
- Vehicle
- Injured persons

- Road Accident Data Collection Form (DOTA)
- Updated since 1996

- Fatality Definition: Common European definition (Killed within 30 days from the day of the accident)

- Statistics
- Publication of aggregate statistics
- Provide with data international organizations (CARE, Eurostat, OECD etc.)
- Type of accident
- Type of area (inside/outside built-up area)
- Type of road
- Time of accident (week/time/day/month/year)
- Injured persons (fatally, seriously, slightly)
- Number of vehicles involved
- Type of road surface
- Weather conditions
- Road surface conditions
- Night-lighting
- Specific characteristics of vehicles (type of vehicle, nationality, brand, cc, technical inspection, number of drivers and passengers)
Road Accident Data Collection Form (2/3)

- Road characteristics
- Geometric road characteristics
- Type of accident
- Vehicle maneuver type
- Injured pedestrians’ position and movement
- Traffic regulation, signage and signaling
- Driver’s license – category and year
- Sketch
• Restraints systems in vehicle
• Alcotest results
• Driver’s and injured persons’ information
Hospitalized Data Files

In Hospitals
- Recording causes of hospitalization
- Recording road accident injured persons
- These files show the lowest degree of incomplete recording
- No central archive is kept, not electronic form

ELSTAT Vital Registration Database (demographic data included)
- Recording time and cause of death
- Statistics
- Publication of aggregate statistics
Database of Vehicle Insurance Companies

Vehicle Insurance Companies of Greece

- Disaggregate data of road injury accidents and road accidents with only material damages
- Accident
- Driver
- Damage

- It’s the unique source of data on road accidents with only material damages

- Only the accidents that are declared are recorded in the database
Comparison of Data from Different Sources

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<th>Year</th>
<th>Source 1</th>
<th>Source 2</th>
<th>Source 3</th>
<th>Source 4</th>
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</table>

* up to 1995 on accident site, since 1996 within 30 days
Exposure Data (1/2)

Overview

• Road traffic estimates (road length, vehicle kilometres, and vehicle fleet)

• Road user at risk estimates (person kilometres, population, number of trips, time in traffic, driver population)

• Basic requirements
  • Travel/mobility surveys for collecting of veh-km or persons-km data
  • Traffic measuring systems to be established on the national and main interurban road network
  • Common vehicle classification by all countries
  • Common method for calculating veh-km from the traffic measurements
Specific Indicators

• Population

• Driver population
  • Total number of active driver licences
  • Number of driver licences by licence group and by age group

• Road length

• Vehicle fleet
  • Total number of registered vehicles
  • Number of vehicles by vehicle type and by age group

• Vehicle kilometres

• Person kilometres
Traffic Volume

- The **main purpose** of road traffic measurements is traffic management and consequently their use for road safety purposes (accident rates) is not always easy.

- The **frequency and the level of detail** of these traffic volume counts varies considerably.

- There are numerous urban and non urban road networks which are **not covered**.
Traffic Data - Surveys

Data
- Motorway tolls
- Traffic Management Centre
- Other individual studies
- Previous studies
- Louis - Berger Study (1979-1989)
- Annual Average Daily Traffic (AADT) of the main country’s road network
- Measurements with equipment and observations in the sections of all main road nodes

Surveys
- In the context of the Metro Development Study (1996-2000), detailed origin - destination data were gathered for the area of Athens
- Vehicle mileage data for urban and intercity buses are available through the Athens Urban Transport Organization (OASA) and KTEL buses respectively

Stergios Mavromatis, “Greek Road Safety Statistics – Best Practices”
Traffic Measurement Technology

Most common methods for collection of data on traffic volume:

- permanent pneumatic tubes under the pavement (mainly in big cities)
- tolls at motorways
- traffic cameras (Athens and Athens Ring Road Motorway)
- removable pneumatic tubes on the pavement surface (random – occasional measurements)
Database of Vehicles in Traffic (Ministry of Infrastructure, Transport and Networks)

- Disaggregate data
- Technical characteristics of vehicles
- Characteristics of registration licenses

Data could be used in statistical road accident analyses providing useful indicators

Parameters limiting the potential of their exploitation
- Invalid recording of withdrawals
- No information for vehicles that are no longer in traffic
- No information on mopeds

Stergios Mavromatis, “Greek Road Safety Statistics – Best Practices”
Vehicle Fleet Statistics

- **ELSTAT** provides data regarding the vehicle fleet, derived from the Ministry of Infrastructure, Transport and Networks (MITN)
- Data are based on the issuing of new vehicle registrations

- The **monthly report** provides information, at country level, on the brand and type of the motor vehicle, as well as whether it is new or used
- The **annual data** present the breakdown of vehicles by type of vehicle and by geographical area

- The database **does not include** vehicles that move on rails, trolley busses, agricultural tractors and machinery, all motor vehicles of the armed forces, police, fire brigade, state services, diplomatic corps, foreign missions, and invalids of wars, as well as motorcycles with a cylinder capacity less than 50 cc

- Vehicle fleet data can be used as **exposure data** for the accidents and the accident involved vehicles
Vehicle Inspection Data

- **Vehicle technical inspections** in Greece are carried out by public and private vehicle technical control centres.

- Data are collected by **MITN**.

- Monthly **statistics** are commonly available since 2015 (by year, region, type of inspection, vehicle type and final outcome of the control test).
Road Safety Performance Indicators (1/4)

Overview

• Simply counting crashes or injuries, is often an imperfect indicator of the level of road safety
• The number of road accidents and injuries, is subject to random fluctuations
• In order to develop effective measures to reduce the number of accidents/ injuries it is necessary to understand the processes that lead to accidents

Safety Performance Indicators can serve this purpose
**Definition**

- Measurements related to crashes or injuries, used in addition to the figures of accidents or injuries, in order to **indicate** safety performance or **understand** the process that leads to accidents

- **link** between the **casualties** from road accidents and the **measures** to reduce them
Why Use SPIs?

• Provide more complete picture of the level of road safety

• Able to highlight the emergence of developing problems at an early stage, before these problems show up in the form of accidents

• Provide a means for monitoring, assessing and evaluating the effectiveness of safety actions applied

• Utilize qualitative and quantitative information to help determine a program's success in achieving its objectives
  • Able to reflect unsafe operational conditions
  • More general than direct outputs of specific safety interventions
Quality Levels

**Direct measurement** of the identified **unsafe operational conditions**
- the indicator covers the complete scope of the problem and reacts to all possible interventions

**Direct measurement** of the identified problem is **not possible**
- the identified problem is a hidden variable and is described by several indirect variables as indicators will bridge this gap
- normal case in the SPI development
- the solution should be in searching for several indicators, which are independent from interventions and describing the latent variable

Considering the **expected availability of data** and assessing the reasonable effort for **data acquisition**
- in some cases it would be difficult or even impossible to develop an SPI independent from interventions
- bridge the gap by sub-dividing the problem
Europe

Reduction in road deaths (%) between 2010 and 2016
CARE Database

- CARE - the **Community database on road accidents** resulting in death or injury

- **Disaggregate** road accident data since 1991

- Parts of the national data sets are integrated into the CARE database in their **original national structure and definitions**

- For the remaining data, the EC provides and applies a **framework of transformation rules** to the national data sets, allowing CARE to have compatible data

- **Common Accident Data Set (CADaS)** has been developed consisting of a minimum set of standardised data elements
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Accident Data Transformation Process

• CARE and CADaS process the national road accident data files

• The **compatibility** of the accident data among EU countries is **ensured**

• The main **difference** of the two approaches is related to the **degree of involvement** of the country in the process

• **CADaS process allows for more common variables** and **values** but also for **higher quality**

---

Stergios Mavromatis, “Greek Road Safety Statistics – Best Practices”
Optional Adjustments of the National Systems (1/2)

• EU countries continue using their national accident data collection systems, by collecting data in the way they find it more suitable (manually, electronically, links with other databases, etc.)

• Adjustments are implemented in order to transform data according to the CADaS protocol and provide to EU more compatible data

• Certain variables might need to be collected under a different structure to meet local/regional/national needs
Optional Adjustments of the National Systems (2/2)

- EU countries are encouraged to adopt as many as possible CADaS variables and values

- CADaS is structured in a simple way, without levels of hierarchy, constituting in fact the record layout of the data set to be transferred to the EU

- CADaS may also be considered as recommendation for national police road accident data collection reports

- CADaS can be further enhanced (derived variables to be added) inside the CARE database allowing for a wide range of analysis reports
Selection Criteria for CADaS Data

• Variables and values **useful for road accident analysis**, especially at EU level
• **Level of detail** of the variables and values appropriate for macroscopic data analyses
• Each country has the possibility to choose alternative level of detail
• Variables and values must be **comprehensive and concise**
• Data which are **impossible or very difficult to be collected** are not retained in the CADaS
• The **future perspective** of using certain variables and values is taken into account
• Existing variables and values of CARE v1 are of **first priority** within CADaS
• CADaS variables and values refer to **casualty road accidents**
# List of Variables

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<td>road surface condition</td>
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<td>region/province</td>
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<td>sex (person)</td>
<td>speed limit</td>
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<td>age (person)</td>
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</table>

Stergios Mavromatis, “Greek Road Safety Statistics – Best Practices”
Variable Categories

- The **CADaS variables** are divided into **4 basic categories**, identified by the unique letter (code) which refers to the beginning of the respective variable’s name:
  - A, for Accident related variables,
  - R, for Road related variables,
  - V, for Vehicle related variables,
  - P, for Person related variables
CADaS Structure
Variable Components

• **Variable Label:**
  - Section identifier (A, R, V or P)
  - Numbering and Name
  - Variable rating (H or L)

• **Variable definition and scope:**
  - Variable definition
  - Brief description
  - Importance and usefulness (rational lying behind its selection)

• **Values list**
Value Components

- **Value Labels:**
  Each value is further identified by the code of the variable, followed by a number which corresponds to each value and its name.

- **Value definitions:**
  Definition of each value is given, indicating also any particularities and any relevant assumptions regarding its collection process.

- **Data format:**
  - The possibility to attribute one or more values to a variable
  - The format of the value (number of digits, decimal places etc.)
Variable Example

A-6 WEATHER CONDITIONS (H)

Variable definition and scope
This variable defines the atmospheric conditions at the accident location at the time of the accident and allows for the identification of the impact of weather conditions to the road safety.

Value definitions
A-6.01: Dry / Clear
No hindrance from weather. Includes clear and cloudy sky.
A-6.02: Rain
Heavy or light rain at the time of the accident.
A-6.03: Snow
Snowing at the time of the accident.
A-6.04: Fog, Mist, Smoke
Existence of fog or mist or smoke at the time of the accident.
A-6.05: Sleet, Hail
Existence of sleet or hail at the time of the accident.
A-6.06: Severe winds
Presence of winds deemed to have an adverse affect on driving conditions.
A-6.07: Other
Other atmospheric conditions that affected the drivers or the road environment are not included in the list of the previous values.
A-6.99: Unknown
Atmospheric conditions not recorded or unknown.

Data format
A two digit number corresponding to one of the values is filled-in to indicate the weather conditions.
Classification of the Variables

• At a first stage, each country can adopt (if they wish) only a subset of CADaS variables

• This selection can be based on the importance of the recommended variables

• For that reason, all variables were separated into two broad categories, according to their importance for road accident analysis:
  - Variables of high importance (H)
  - Variables of lower importance (L)
### Summary of CADaS Variables and Values

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<th>Code</th>
<th>High (H) Importance</th>
<th>Lower (L) Importance</th>
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<th>Detailed values</th>
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The ERSO is the information system of the European Commission with harmonised specialist information on road safety practices and policy in European countries. The framework of ERSO was developed within the SafetyNet project (2004-2008), in which 22 institutes from 17 countries cooperated. Its content was updated and expanded within the DaCoTA project (2010-2012), in which 17 institutes participated. Current updates of the ERSO (2015-2018) are carried out by NTUA, KFV and ERF for the EC DG-MOVE.
DaCoTA Master Tables

- A wide range of data was gathered together in the form of Master Data Tables, which were filled in for each European country for the period 1975-2010
- The Master Tables contain the following data:
  - Road accident data
  - Risk exposure data
  - Safety Performance Indicators
  - Under-reporting of crashes
  - Country characteristics
  - Social Costs
  - Traffic Laws and Measures
- Various data sources were used (European, international, projects)
ERSO Data

- Data included in ERSO (macroscopic and in-depth) concern:
  - Road accidents
  - Risk exposure
  - Safety performance indicators
  - Under-reporting of accidents
  - Country characteristics
  - Social costs
  - Traffic laws and measures
  - Accident causation data
  - Accident injury data

- The knowledge section contains several reports on important road safety issues, as well as the road safety country profiles

Current interface of ERSO: