Analysis of road crash costs in EU countries

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Introduction

• W2Economics: research/consultancy, specialized in economic analysis of road safety
  – Economic evaluation road safety programs/measures
  – Costs of road crashes
  – Economic valuation of saving lives, quality of life
  – Financing road safety measures
  – Impact of economic development on road safety

• Clients:
  – International organizations
  – Governments
  – Private companies
  – Other research institutes
  – Universities
SafetyCube

- SafetyCube: Safety CaUsation, Benefits and Efficiency
- A European Commission supported Horizon 2020 project
- Aims at developing an innovative road safety Decision Support System (DSS), helping policy makers to
  - Assess effectiveness of road safety measures
  - Prioritize measures
  - Assess cost-effectiveness of measures
  - Monitor serious injuries and the associated socio-economic costs
- Including an Economic Efficiency Assessment (EEA) tool
  - Cost-benefit analysis
  - Cost-effectiveness analysis
Economic Efficiency Assessment tool

**WP4,5,6 Info on measures**
- Effectiveness
  - saved crashes per unit
  - per severity category
- Time horizon
- Measure costs

**CBA calculator**
- Cost Effectiveness Analysis
  - Costs per crash prevented
    (for each severity category separately)
- Cost Benefit Analysis
  - Net present value
    (benefits – costs)
  - Cost benefit ratio
    (benefit / costs)

**WP3 Info per country**
- Crash costs by severity category
- Distribution of severity categories
- Discount rate
Cost-benefit analysis

Road safety investments

Road crash cost savings (+ other impacts)
Costs as road safety indicator
Analysis of road crash costs

- Literature review to identify
  - All relevant cost items
  - Methods
- Survey among EU countries
- Descriptive analysis
- Further statistical analysis
- Developing standardized EU-values for EEA-tool.
- Data collection in collaboration with H2020 project InDeV

This presentation: descriptive analysis, preliminary results
The SafetyCube-InDeV cost team

SafetyCube partners:
• BRSI
• SWOV
• TOI
• IFSTTAR
• KfV
## Previous cost reviews

<table>
<thead>
<tr>
<th>Study</th>
<th>Year</th>
<th>Number of countries</th>
<th>Regions</th>
</tr>
</thead>
<tbody>
<tr>
<td>COST313 (1994)</td>
<td>1994</td>
<td>14</td>
<td>EU</td>
</tr>
<tr>
<td>Elvik</td>
<td>1995</td>
<td>20</td>
<td>EU (13), other (6)</td>
</tr>
<tr>
<td>Elvik</td>
<td>2000</td>
<td>12</td>
<td>EU (6), other (6)</td>
</tr>
<tr>
<td>Trawen et al.</td>
<td>2002</td>
<td>11</td>
<td>EU (8), US, AU, NZ</td>
</tr>
<tr>
<td>Wijnen &amp; Stipdonk</td>
<td>2016</td>
<td>17</td>
<td>Asia (8), EU (6), US, AU, NZ</td>
</tr>
</tbody>
</table>
The survey

• Survey among EU member states plus Iceland, Norway, Serbia and Switzerland
• Questionnaires received from 31 countries
• Issues:
  – Which cost items included?
  – Method(s) per cost item
  – Total costs (value, % of GDP)
  – Distribution costs among cost items
  – Costs per casualty or crash
  – Total costs by severity level
• Official values used by national governments
<table>
<thead>
<tr>
<th>Cost component</th>
<th>Cost item</th>
<th>Method</th>
<th>Database</th>
<th>Cost element</th>
<th>Cost item is included in:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>if 'other' or several options: specify in 'further comments'</td>
<td>for explanation see blue tab below.</td>
<td>fatalities</td>
<td>severely injured</td>
</tr>
<tr>
<td>Medical costs</td>
<td>First aid and transportation</td>
<td>Restitution</td>
<td>Hospitals</td>
<td>ambulance</td>
<td>✔</td>
</tr>
<tr>
<td></td>
<td>Emergency department</td>
<td>Restitution</td>
<td>Hospitals</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td></td>
<td>In-patient hospital treatment (overnight stay)</td>
<td>Restitution</td>
<td>Hospitals</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td></td>
<td>Out-patient treatment (no overnight stay)</td>
<td>Restitution</td>
<td>Hospitals</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td></td>
<td>Non-hospital treatment</td>
<td>Restitution</td>
<td>other</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td></td>
<td>Aids and appliances</td>
<td>other</td>
<td>other</td>
<td>✔</td>
<td>✔</td>
</tr>
</tbody>
</table>

1. Several types of data sources have been used for costs of non-hospital treatment have been used, including hospital data, national surveys and insurance data. 2. For some cost items, e.g. out-patient treatment of victims who have not been treated at the emergency department, national surveys have been used in addition to hospital data. 3. The severity categories for which costs of non-hospital treatment are calculated differ between the cost items (e.g. rehabilitation does not include 'other' injuries, while costs of general practitioner do include this group).

Calculation of loss of future market production is based on statistics of Statistics Netherlands (production data, sick leave and inability to work) and Netherlands Bureau for Economic Policy Analysis (CPB), which are based on national surveys.
### Costs per component

#### More detailed information
Do you have more detailed information on the crash costs *per cost component* and *per casualty*? If so, please fill those in here. If you only have data on total costs, please choose the right tick box.

<table>
<thead>
<tr>
<th>Is the information below given in costs per casualty or in total costs?</th>
<th>Costs per casualty (preferred)</th>
<th>Total costs</th>
</tr>
</thead>
</table>

**Currency in which the official information is provided (EUR/Pound/etc.): EUR**

### Official figure

<table>
<thead>
<tr>
<th>Official figure</th>
<th>Medical costs</th>
<th>Production loss</th>
<th>Human costs</th>
<th>Property damage</th>
<th>Administrative costs</th>
<th>Other costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>serious injuries</td>
<td>10.229</td>
<td>20.859</td>
<td>232.957</td>
<td>10.498</td>
<td>5.667</td>
<td>431</td>
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<tr>
<td>slight injuries</td>
<td>1.036</td>
<td>1.122</td>
<td>-</td>
<td>4.323</td>
<td>1.747</td>
<td>405</td>
</tr>
<tr>
<td>fatal crashes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>serious injury crashes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>slight injury crashes</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>property damage only (PDO) crashes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other injuries</td>
<td>222</td>
<td>-</td>
<td>-</td>
<td>3.060</td>
<td>965</td>
<td>623</td>
</tr>
<tr>
<td>[other groups] (your definition from tab ‘Costs per unit’)</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

### Further notes:
Costs of house adaptions and visiting people in hospital are included in medical costs
Cost components

Costs of road crashes

Injury related
- Medical costs
- Production loss
- Human costs
- Other

Crash related
- Property
- Administrative
- Other

Other
Cost components included
Methods

Valuation methods

- **Restitution costs approach**
  - Costs of resources needed to restore casualties to initial situation

- **Human capital approach**
  - Loss of productive capacities of road casualties approach

- **Willingness to pay approach**
  - Amount of money individuals are willing to pay for a risk reduction

  - Gross incl. consumption loss
  - Net excl. consumption loss

  - Individual
  - Society
Value of Statistical Life - method

vsl_mtd
Total costs

Costs of crashes, as percentage of GDP

Austria
Croatia
Iceland
Latvia
Slovenia
Estonia
Bulgaria
Hungary
Poland
Netherlands
Italy
France
Luxembourg
Switzerland
Finland
Serbia
Greece
Czech Republic
Belgium
Germany
Portugal
Lithuania
Norway
Spain
UK
Malta
Cyprus
Slovakia
Sweden
Denmark
Ireland
What explains the differences in total costs?

- Road safety level (number of casualties / crashes)
- Methodological issues:
  - Cost items included
  - Methods
  - Severity categories included, particularly property damage only crashes
  - Correction for underreporting?
Relation mortality – total cost
Compensation for underreporting of casualties
Costs by component

- medical costs
- production loss
- human costs
- property damage
- administrative costs
- other costs
Costs per fatality
Human cost fatalities

![Graph showing the relationship between human cost of fatality and cost per fatality. The x-axis represents the human cost of fatality, while the y-axis represents the cost per fatality. The data points suggest a positive correlation.]
Costs of serious injuries
Costs of slight injuries

Relative cost of Slight Injury, compared to Fatality

Bulgaria
Portugal
Slovakia
Denmark
Iceland
Czech Republic
Norway
Greece
Poland
Estonia
Finland
Slovenia
Italy
Ireland
Croatia
Belgium
Hungary
Cyprus
Malta
Sweden
Austria
UK
Switzerland
France
Spain
Germany
Netherlands
Latvia
Total costs by severity
Conclusions

- Official estimates of costs of road crashes in European countries range from 0.5 to 3.8% of GDP
- Costs per fatality range from 0.7 to 3.0 EUR (2015)
- Variations mainly explained by methodological differences:
  - Different cost components
  - Willingness to pay or other method
  - Correction for underreporting
  - Inclusion of property damage only crashes
- Harmonization of cost estimates is needed for cost-benefit analysis on EU level
Next steps

• Developing a coherent set of values for cost-benefit analysis
• Value transfer
  – *Adding missing cost components*
  – *Estimating values using methods recommended in guidelines*
• Incorporating all values in the EEA-tool of the SafetyCube Decision Support System
Thank you for your attention!

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