Elaborating an Index Methodology for Creating an Overall Road Safety Performance Score for a Set of Countries

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for target setting and monitoring performances and progress

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Overview

- Introduction
- Index methodology
- Conclusion

Introduction

- Road safety problem
- Improvement requires detailed insight
- Risk factors rather than crash data are studied
- Objective =
  - Methodology for comparing countries wrt their overall safety performance
  - Computation of a RSPI score for a set of European countries

Introduction (2)

- Various indicators are combined in a performance index
  - Overall safety performance picture
  - Representation of a multitude of risk information
  - Advantages in terms of interpretation, ...
  - Scientifically sound and appropriate index methodology is required!
- Index building in other domains (e.g. Nardo et al., 2005) is studied while accounting for the specific road safety case

Index methodology

- Indicator selection
- Data collection
- Data analyses
- Weighting
- Aggregating
- Robustness testing
- Final index scores

Essential steps in creating a road safety performance index

1. Selecting appropriate indicators

- Starting from 6 essential risk domains

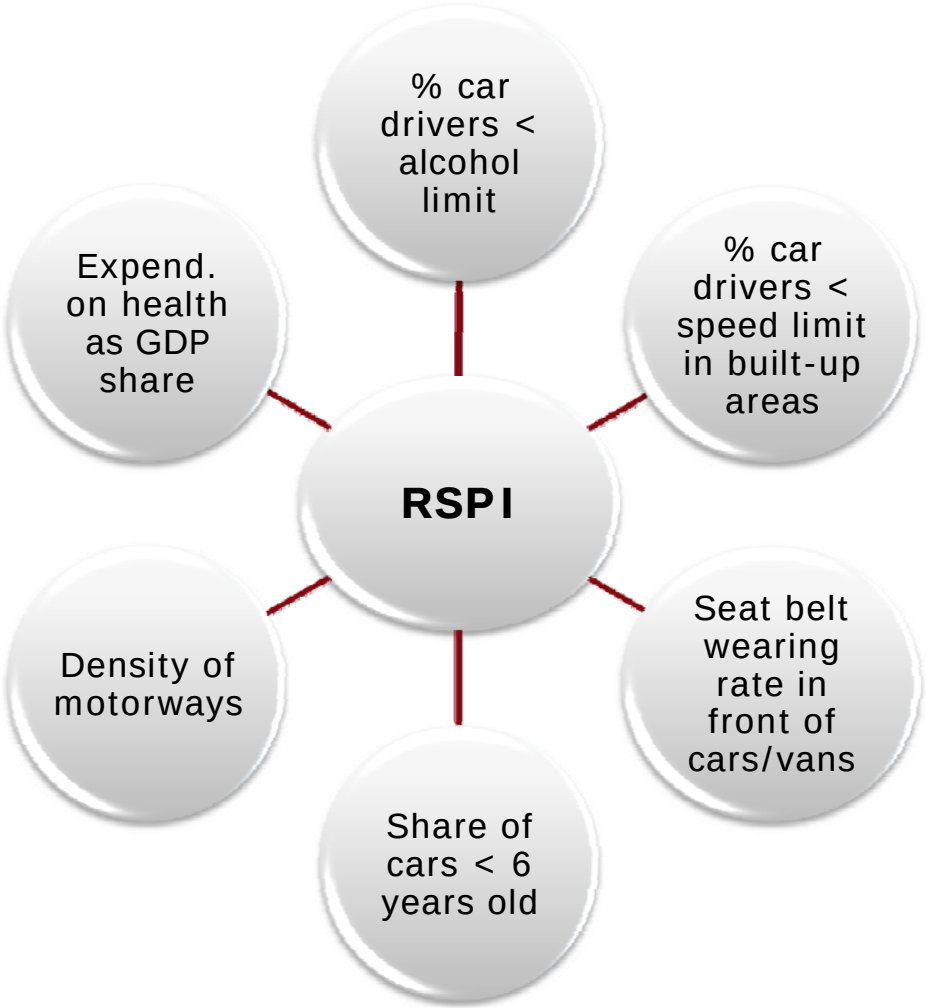
- 'best' indicators are searched for

1. Selecting appropriate indicators (2)

- Possible indicators are evaluated
  - ➢ Relevant/valid
  - ➢ Measurable
  - ➢ Understandable
  - ➢ Specific
  - ➢ Sensitive
  - ➢ Available data
  - ➢ Reliable
  - ➢ Comparable/coherent

Best available indicators

1. Selecting appropriate indicators (3)

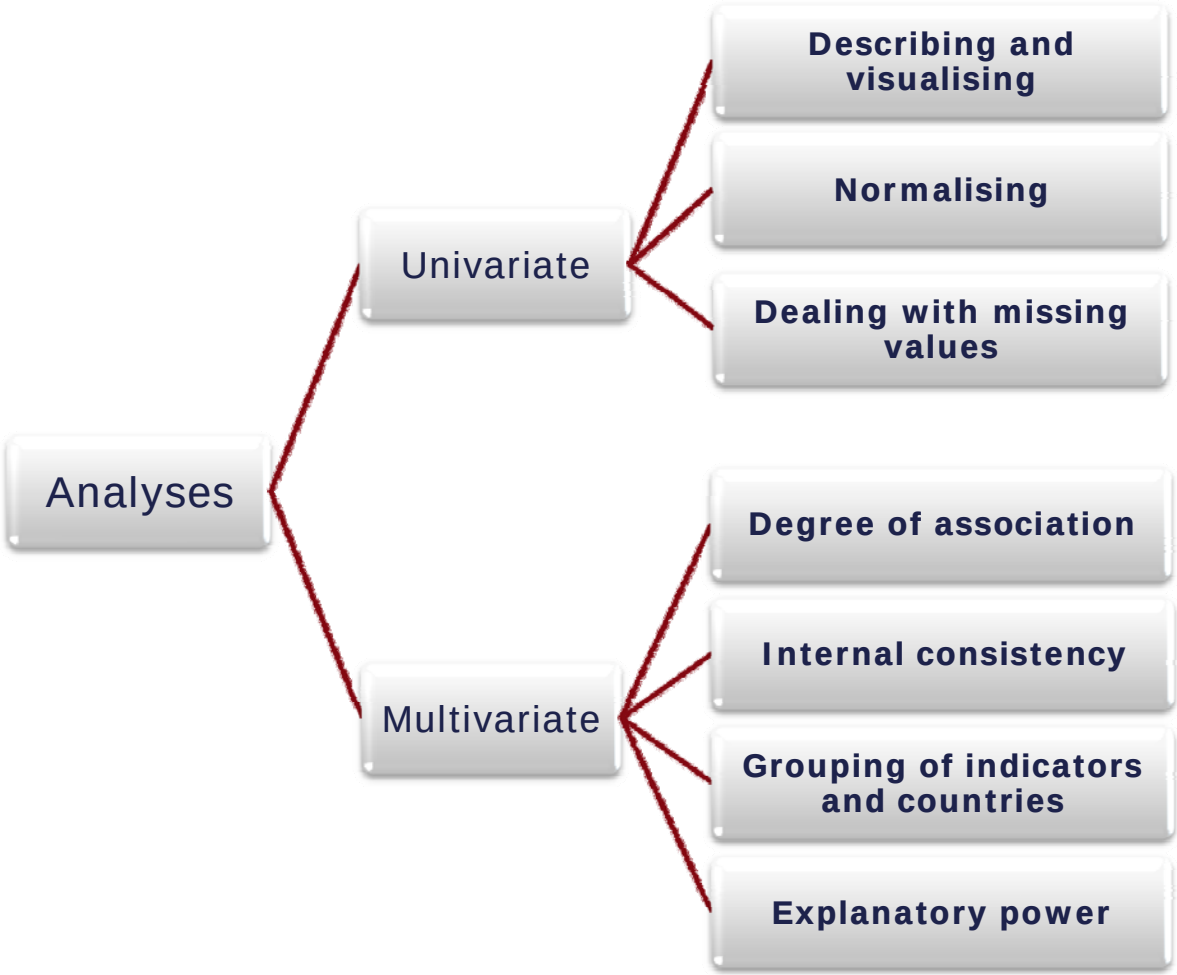


2. Gathering data

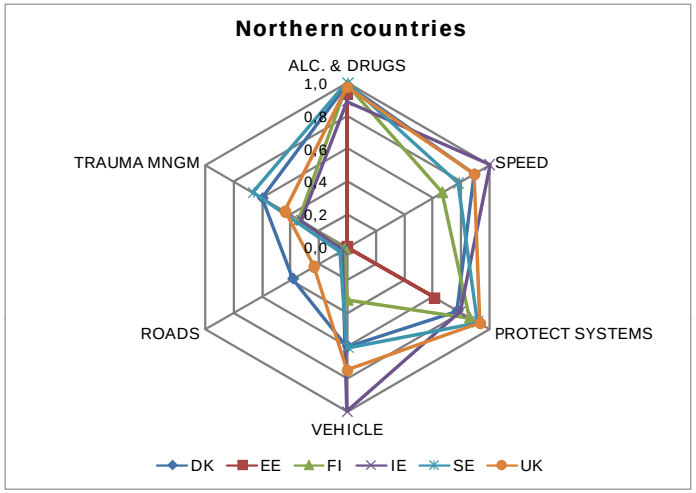
- Various international data sources were consulted (WHO, ERF, SARTRE, ...)

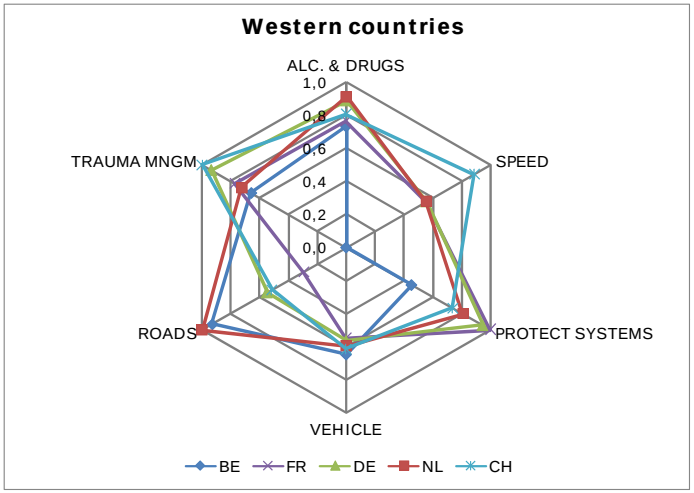
Indicator values for each risk domain	6
Large set of European countries	21
Particular time period or year	2003
With the same expected direction	max

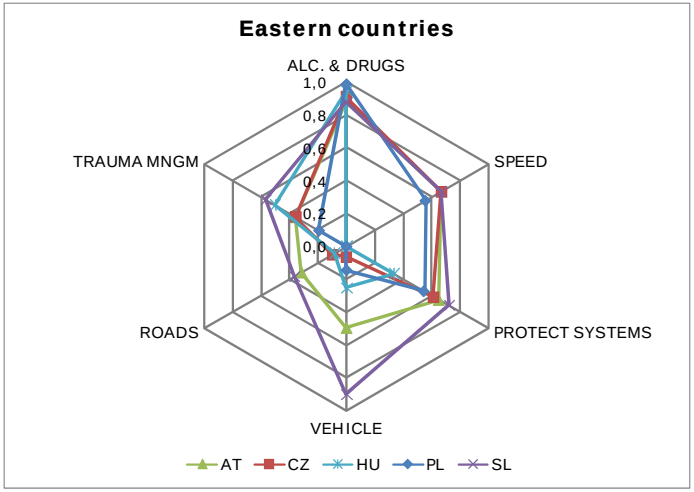
3. Gaining insight into the data set

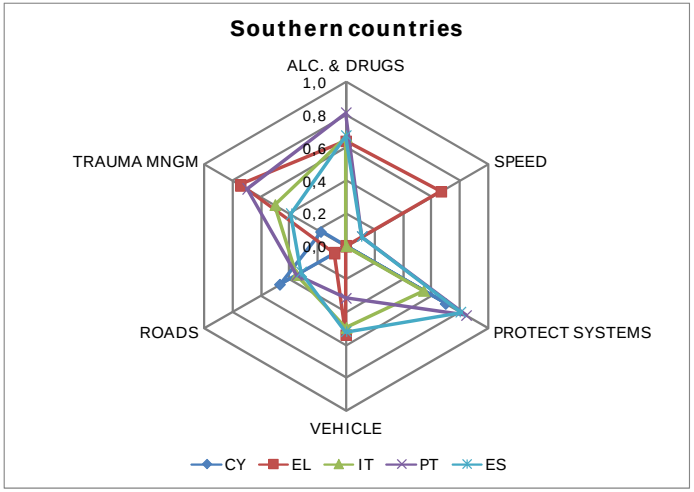


3. Gaining insight into the data set (2)









4. Assigning a weight to each indicator

- Five common methods were evaluated: FA, BA, AHP, DEA, EW
- DEA = most promising method
  (Hermans et al., 2009)
  - ✓ High degree of correlation with the road fatality ranking
  - ✓ Best possible yet acceptable weights
  - ✓ Most optimal index score
  - ✓ Identification of benchmarks

5. Deciding on the way of aggregating the indicators

- Class of averaging aggregation operators
  - Weighted mean operators
  - Ordered weighted averaging (OWA) operators
- In case of OWA good and bad performances can be weighted differently
- A panel discussion revealed some degree of intolerance; ordered weighting vector = (0.03; 0.08; 0.14; 0.19; 0.25; 0.31)

6. Testing the robustness of the index

What is the impact of methodological choices…

- Indicator selection (7)
- Normalisation technique (3)
- Weighting method (4)
- Expert selection (9)
- Way of aggregating (3)

… on the end result?

- Global average shift in rank

6. Testing the robustness of the index (2)

- Global average shift in rank:
  - 3.87 positions wrt the fatality ranking
- Most influencing factors:
  - Weighting method
  - Indicator selection

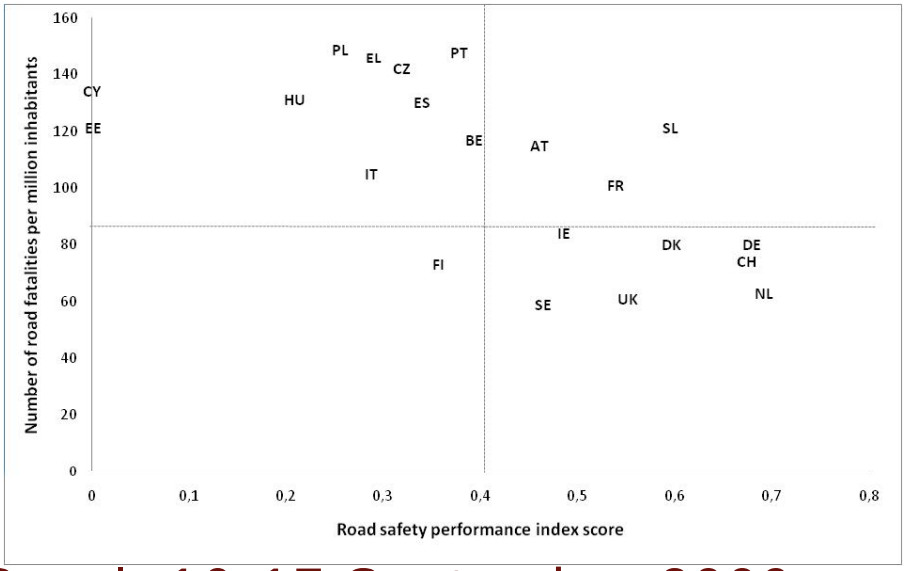
7. Computing, evaluating and visualizing final index scores

- Final index scores are computed taking all acquired information into account
  - ➢ 6 best available indicators
  - ➢ DEA weighting method
  - ➢ Ordered weighted averaging operator
- 3 groups of countries were identified based on their optimal index score

7. Computing, evaluating and visualizing final index scores (2)

7. Computing, evaluating and visualizing final index scores (3)

- The results are compared to related research
- High degree of agreement with:
  - Corruption perceptions index
  - SUNflowerNext study
  - Fatality ranking



Conclusion

- Indicators can be used to represent the concept of road safety
- Countries can be compared based on their overall safety performance
- An appropriate index methodology is required
- All methodological steps need careful investigation
- Here, the most optimal index score was computed for each country

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Thank you for your attention
Questions?!