



## Benchmarking road safety performances of countries

Fred Wegman\*, Siem Oppe

*SWOV Institute for Road Safety Research, Delft University of Technology, Faculty Civil Engineering & Geosciences, The Netherlands*

### ARTICLE INFO

#### Article history:

Received 14 September 2009

Received in revised form 31 December 2009

Accepted 4 February 2010

#### Keywords:

Road safety

Performance indicators

International comparison

Model

Policy evaluation

### ABSTRACT

In order to obtain political interest in road safety problems and to learn from other countries' 'good practices', it is often helpful to compare one's own safety situation with that of other countries. In a number of projects tools have been developed for such comparisons. These tools range from simple ratings of countries on their safety outcomes, such as the annual number of fatalities per capita or per kilometre driven by (motor)vehicles to more comprehensive comparisons.

These comparisons not only show differences in safety between countries, but to a certain extent also explain such differences in terms of their safety background and measures taken. Finally, tools have been defined to support road safety policy makers in developing possible safety measures or actions. Procedures for such complex safety comparisons have been developed and tested in several so-called SUNflower studies.

This promising approach can be further developed into standard procedures for safety comparisons between all countries in the European Union, and other countries worldwide. This paper wishes to outline the development of such standards for the benchmarking of road safety and safety trends as well as procedures for quantifying safety performances of countries.

Starting point of this conceptual framework is the so-called SUNflower-pyramid in which three types of indicators are distinguished. The first one of these, the road safety performance indicator, is called an outcome indicator and is based on the number of killed and injured road users. The second indicator type indicates the quality of the implementation of road safety policies: the implementation performance indicators. The third type of indicator indicates the quality of response in policy documents to improve road safety (policy performance indicator). The three types of indicators are embedded in a policy context: the structure and culture of a country, which are considered as background variables.

This paper sets out to describe the framework for the development of a comprehensive set of indicators to benchmark road safety performances of countries or of sub-national jurisdictions. The paper also discusses the advantages and disadvantages of combining such indicators and if combined, how to aggregate how different indicators in one composite performance index. It is argued to group countries in different classes with more or less comparable countries. Different procedures are used for this grouping. The results are promising and it is recommended to work with classes of countries.

© 2010 Elsevier Ltd. All rights reserved.

### 1. Introduction

It is important for countries to compare their safety performances with those of other countries. A first motivation for comparison is to know how the overall safety situation in the most recent years compares with that in other countries. Based on this we expect to learn from other countries and to identify advanced policies in use abroad in order to apply them in one's own country. Sometimes the comparisons are expressed in terms of rankings. In order to do so, it is necessary to define safety. Safety is often defined in terms of mortality rates: fatalities per head of the popula-

tion. Mortality rates are used primarily to rank road safety or traffic risk to other risks, such as mortality due to diseases, during labour accidents, or accidents in and around the house. For the comparison of traffic risks this has the disadvantage that the level of motorization is not taken into account. Therefore, another indicator is commonly used as a criterion for traffic safety: fatality risk, defined as the number of fatalities per motor vehicle kilometre. For those countries in which the motor vehicle kilometres are not available, the fatality rate – defined as the number of fatalities per motor vehicle – will be used instead.

Not only the recent safety situation is of interest, but also the safety development over time: has the country's safety been increasing or decreasing over time? Therefore, trend analyses should be carried out to enable comparisons between countries over time.

\* Corresponding author. Tel.: +31 653693816.

E-mail address: [fred.wegman@swov.nl](mailto:fred.wegman@swov.nl) (F. Wegman).

For all types of comparison the most important question is: which country do we want to compare ourselves with? This question is not easily answered. The answer depends on the purpose of the comparison. If only a simple ranking of countries in a certain year is required, then the fatality risk indicator seems to provide sufficient information. However, even then it is not fair to carry out a direct comparison between all countries. Some countries have a more difficult task to fulfil than others and a correction for such a handicap should be applied. However, it is not easy to define and measure such a handicap. Basically this statement on 'handicaps' goes back to two observations. First of all, weaknesses and opportunities of different countries should be identified in the structure and culture layer. To mention two examples only: a strong leadership in a country to implement effective road safety measures, or a willingness in a society to accept freedom-restricting legislation and enforcement to improve road safety such as lowering speed limits and drinking at driving limits. Another observation is that if a country has taken all well-known, easy to implement road safety measures, new approaches have to develop to make further progress. This may result in a stage of diminishing marginal return of investments, and consequently, in less support from society and politics.

If a comparison over time needs to be carried out, then the situation is even more complicated. In that case there is not a single indicator that unambiguously ranks countries. It is not easy to define 'the-best-in-class' this way. Nor is a comparison of a large number of trends easy to make. Comparisons between a smaller range of countries with similar traffic systems or safety levels, or with a more general common background seem to be more promising. Of course countries can learn from measures taken in all other countries. But to formulate targets or plans it is more realistic to compare with countries in the same situation, and/or with the same economical, historical and geographical background, and/or the same level of motorization and safety development as resulted from the SUNflower+6 study (Wegman et al., 2005).

To address this problem of meaningful comparisons in the field of road safety, the SUNflower approach was developed. SUNflower is the acronym of a series of projects. These studies started with a comparison of road safety developments in Sweden, the United Kingdom and the Netherlands (Koonstra et al., 2002). Later this approach was extended to include six other European countries: SUNflower+6 in which three groups of three countries compared themselves using the same methodology (Wegman et al., 2005).

These countries include the traditional SUN countries, three countries in the South of Europe: Greece, Portugal, Spain (with special emphasis on Catalonia) and three in Central Europe: the Czech Republic, Hungary and Slovenia. The third and most recent study, SUNflowerNext (Wegman et al., 2008), developed a framework for benchmarking the safety performance of countries and made first attempts to capture this process in a safety performance index.

This paper introduces the SUNflowerNext approach. This approach aims to develop a knowledge-based framework for comprehensive benchmarking of road safety performances and developments of a country or of sub-national jurisdictions. Benchmarking is the search and implementation of best practices. For this benchmarking we introduce different indicators for road safety performances (Section 3). These different indicators will be combined in a composite index and the pros and cons of this approach are discussed (Section 4). Three different types of performance indicators are discussed (Section 5). Benchmarking compares the performance of a country with other so-called 'best-in-class' practices (in other countries). How to form 'classes' is subject of Section 6. The paper concludes with a section on conclusions (Section 7).

## 2. The SUNflower approach

The SUNflower approach attempts to answer the question what exactly caused road safety to improve in (SUN) countries. When specific beneficial aspects of measures, operational practices, or underlying concepts can be determined, what are the possibilities for transferring these aspects to another SUN country or other countries? A better insight into the relationship between the developments of traffic risks and road safety policies, programmes and measures in these countries might conceivably identify key actors, which could further improve the current road safety practice in each of the SUN countries, and in other countries.

The methodological approach is based on a road safety target hierarchy as shown in Fig. 1 and was adapted from the consultation document on the Road Safety Strategy 2010 of New Zealand (LTSA, 2000). In this approach a fundamental understanding is required of traffic safety processes at different levels in the hierarchy of causes and consequences that lead to casualties and costs for society. The main reference is the model that describes a target hierarchy of 'structure and culture' towards 'social costs' (Koonstra et al., 2002).

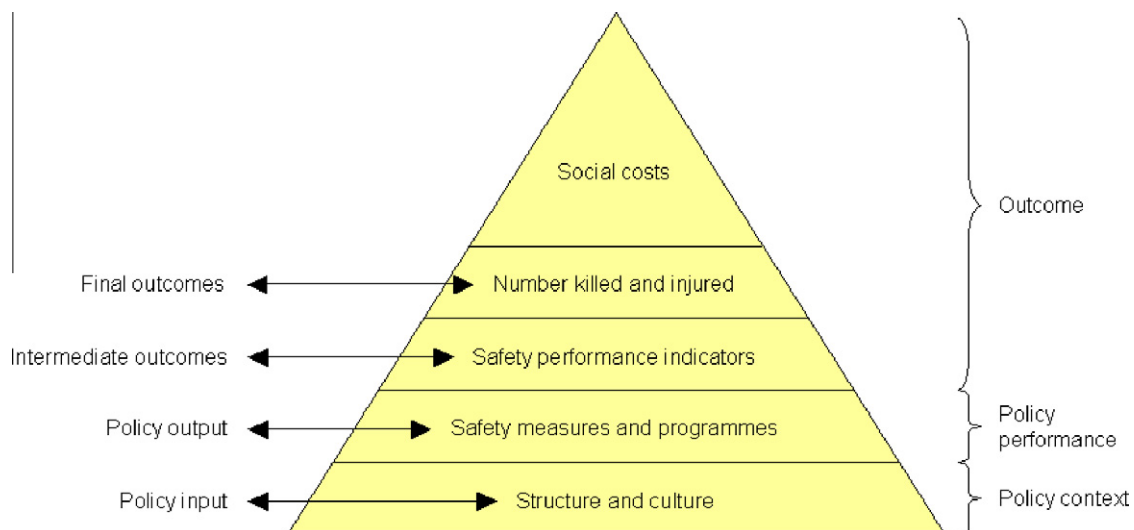


Fig. 1. A target hierarchy for road safety (Koonstra et al., 2002; LTSA, 2000).

متن کامل مقاله

دریافت فوری ←

**ISI**Articles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات