

Summary:

Assessment and applicability of road safety management evaluation tools: Current practice and state-of-the-art in Europe

This report surveys current practice and the state-of-the-art in Europe with respect to the use of ten different tools for safety management of road systems. These tools and their intended functions include:

1. Road safety audits, to help incorporating the best knowledge about how to design a safe road into decisions about the design and construction of new roads, thus making new roads safer than existing roads,
2. Road safety inspections, to systematically identify and treat defects in design and traffic control on existing roads, ideally speaking before these defects contribute to accidents,
3. Network screening, to survey road safety on the entire road system and identify those parts of the system that have a higher expected number of accidents, or a higher severity of accidents, than the rest of the system,
4. Accident modelling, to help identify and assess the importance of various factors that contribute to accidents and injuries,
5. Road protection scoring, to help identify roads which offer substandard protection from injury in case of an accident,
6. The identification and analysis of hazardous road locations, i.e. road locations that have an abnormally high number of accidents due to deficiencies of road design and/or traffic control,
7. Road safety impact assessment, which estimates the safety benefits expected from various road safety measures before these measures are introduced,
8. Monitoring of road user behaviour, to help detect unwanted changes in behaviour that may have an important effect on road safety,
9. Traffic conflict studies and naturalistic driving behaviour studies, which is the study of events that nearly lead to accidents or of driver behaviour in a natural setting,
10. In-depth accident studies, in order to learn more about the factors that precipitate accidents and the opportunities for controlling or removing these factors.

A questionnaire survey was conducted in order to describe current use of these tools and assess the requirements for using them. The survey found that all countries use several of the tools listed above, but few countries use all of them.

A total of 17 countries answered the questionnaire. Between 14 and 16 of these countries were included in statistical analyses designed to uncover the relationship between use of the safety management tools and road safety performance. Use of the management tools was described in terms of an index with a range from 0 to 27 points. Country scores ranged from 9 to 26 points. Four indicators of road safety performance were used:

1. Fatality rate per billion km of travel in 2008.
2. Mean annual percentage reduction of the number of road accident fatalities between 1990 and 2009.
3. Mean annual percentage reduction of fatality rate per billion km of travel from 2000 to 2008.
4. Change in the mean annual percentage reduction of fatality rate from the period 1990-2000 to the period 2000-2008.

Two models of analysis were applied. In the first model, each country had the same statistical weight. In the second model, countries were assigned different statistical weights depending on the number of fatalities in 2008 or on the goodness-of-fit of an exponential trend curve fitted to annual fatality counts from 1990 to 2009. The weighted analyses are regarded as statistically most appropriate.

The findings were mixed and highly uncertain. No clear relationship was found between the use of the safety management tools and safety performance. It is not the case that a more extensive use of these tools automatically ensures a superior road safety performance. It is likely that the findings of the study are primarily related to methodological weaknesses.

The main conclusions of this study highlight the opportunities for further development of the tools for road safety management:

1. Road safety audits, road safety inspections and road protection scoring can be further developed by evaluating their effects on safety and their performance in identifying safe and less safe solutions.
2. Network screening should be based on accident models and should apply the techniques developed in the Safety Analyst approach in the United States.
3. Road accident modelling needs to be developed by testing models empirically and by incorporating in them variables describing road user behaviour.
4. The identification and analysis of hazardous road location should employ the Empirical Bayes (EB) approach for identification of hazardous locations and the matched-pair approach for the analysis of factors that may contribute to accidents at hazardous road locations.
5. The state-of-the-art of road safety impact assessment is described in the Highway Safety Manual recently published in the United States. Changes made in current practice should try to bring it closer to the state-of-the-art.

6. Monitoring of road user behaviour should be targeted at about five types of behaviour that make the largest contributions to road accidents and injuries. In most countries, this would include speeding, not wearing seat belts and drinking and driving.
7. Conflict studies, naturalistic driver behaviour studies and in-depth studies of accidents are tools that road authorities may choose to include in their safety management toolbox; neither of these tools is essential.