

# EVALUATION METHODS OF ROAD SAFETY CONCEPTS: THE EXAMPLE OF THE SUSTAINABLY-SAFE 60 KM/H-ZONES

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## ABSTRACT

In recent years implementation of the Sustainable Safety Programme gained ground in the Netherlands. Aim of the programme is to reduce the number of injuries with 25% and the number of casualties with 30%, compared to the numbers in the year 1998.

The implementation of the Sustainable Safety Programme includes a (hierarchical) categorisation of roads. In rural areas one of these categories consists of the minor rural roads, with mixed traffic and level crossings. Within the Sustainable Safety Programme speeds at these minor rural roads will be reduced from 80 km/h to 60 km/h. Many roads have to be adjusted to support safety and speed control. Measures for instance include construction of small roundabouts and traffic humps.

Although many roads will be adjusted in rural areas there is little knowledge about the effects. This knowledge however, is necessary to determine the effectiveness and the need for additional measures. Besides it can support an efficient implementation of measures in other areas.

The aim of this paper is to present a method to determine the contribution of measures to road safety at minor rural roads and to evaluate their cost-effectiveness. This method considers number and seriousness of road accidents, traffic volumes, speeds, costs and both users' and authorities' experiences. The method is modular-based and can be used by road administrators themselves.

## KEY WORDS

EVALUATION / SAFETY / COST-EFFECTIVENESS / CATEGORISATION / MINOR RURAL ROADS

## 1. INTRODUCTION

In the Dutch Sustainable Safety Programme, the traffic infrastructure, surroundings, and rules are tuned to the possibilities and limitations of road users. Preventive measures are taken to prevent accidents and limit the accident severity. Following this idea, this means that for high speeds and big differences in mass, traffic modes and driving directions should be separated, and conflicts and crossing movements should be avoided. Mixing traffic modes and the presence of (level) crossing movements is only acceptable if the driving speeds are low (Wegman, 1997; Jaarsma, 2000).

The implementation of the Sustainable Safety Programme includes a (hierarchical) categorisation of roads: (1) motorways; (2) rural highways and (3) minor rural roads (MRRs). On MRRs cars, trucks, agricultural vehicles, bicycles and pedestrians use the same road. Within the Sustainable Safety Programme speeds at these MRRs will be reduced from 80 km/h to 60 km/h on a zonal basis. Many roads have to be adjusted to

support safety and speed control. Measures for instance include restricting the carriageway (physically or by means of an adapted road marking) and construction of small roundabouts and/or traffic humps.

Although within the framework of 60 km/h-zones many MRRs will be adjusted by local authorities such as municipalities and water management boards there is little knowledge about the effects. This knowledge however, is necessary to determine the effectiveness and the need for additional measures. Besides it can support an efficient implementation of measures in other areas.

The aim of this paper is to present a method to determine the contribution of measures to road safety at minor rural roads and to evaluate their cost-effectiveness. This method is developed on request of the Association of Watermanagement Boards and described in more detail by Jaarsma and Hauptmeijer (2001).

## **2. OBJECTIVE OF THE EVALUATION STUDY**

The overall objective of the 60-km/h projects evaluation study is to gain more insight into the effectiveness of measures taken in 60-km/h zones as part of the Sustainable Safety Programme. The study's central research question – 'Do the projects yield the expected objective, cost-effective improvements in road safety?' – can be further broken down into the following sub-questions:

- a. Do the measures impact the number and nature of accidents (in terms of the parties involved, severity of the outcomes and manoeuvres leading to accidents) for each individual area and for all areas combined?
- b. Do the 60-km/h projects yield the expected cost-effective improvements in terms of road safety?
- c. Does speed ( $V_{av}$  and  $V_{85}$  in particular) change locally, near the speed-reducing measures and in the areas? How does this impact travel times through the area?
- d. Do the measures impact the share of through traffic (i.e. people who neither start nor end their journey in the area)?
- e. Do the measures heighten road users' perception of safety? Do the relevant target groups sufficiently support 60-km/h zones?

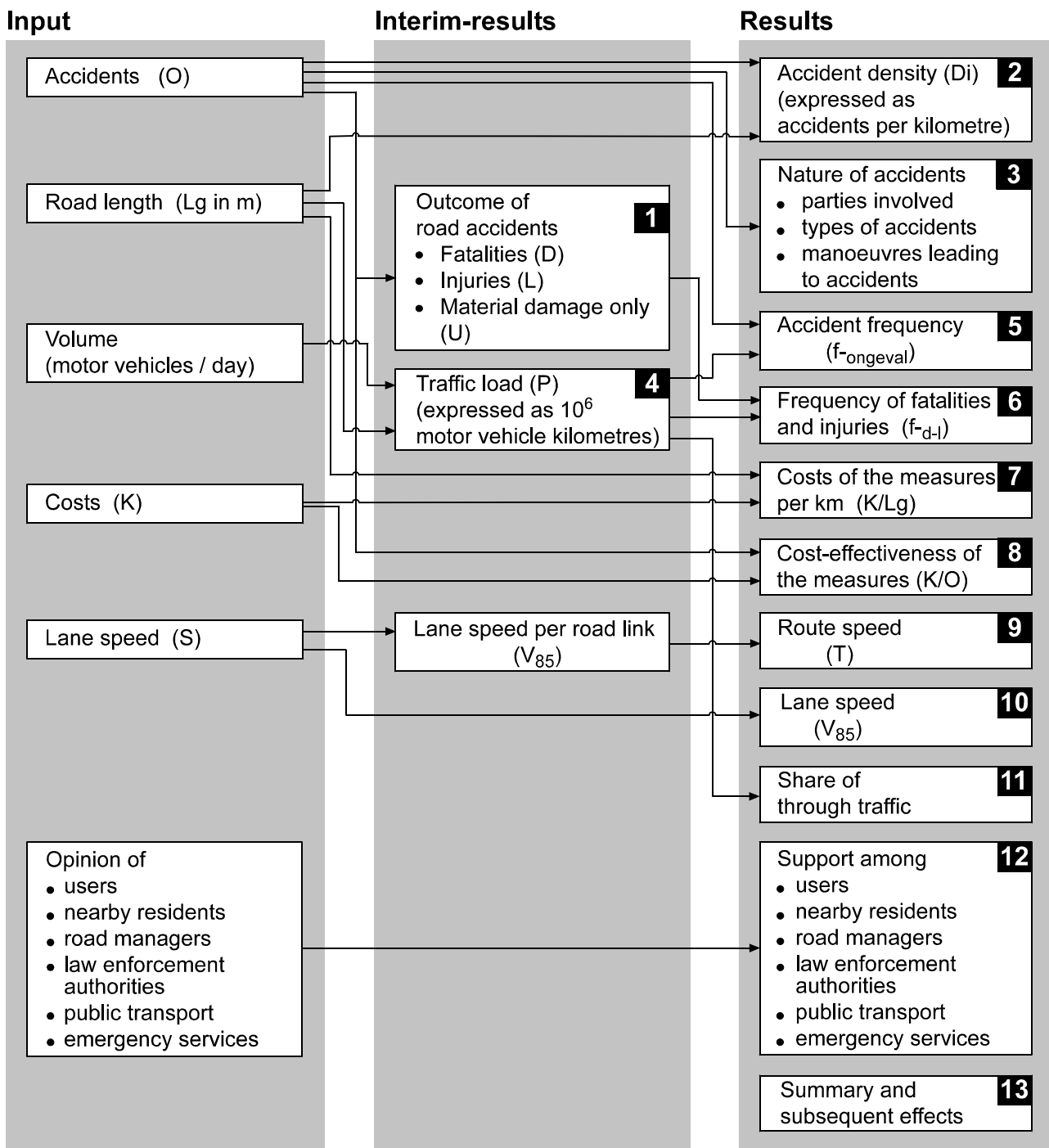
## **3. RESEARCH MODULES OF THE EVALUATION STUDY**

Research modules were drafted on the basis of the above research questions. The design of these modules was standardised in accordance with available literature, experience from elsewhere and the results of a survey into data availability involving 11 water boards and 8 police regions. Figure 1 presents the resulting 13 research modules.

Figure 1 also presents the interrelationship between the research modules and the relationship with the input data. When conducting the research, this is vital to be able to indicate which data is required and in which order the research results will be available.

Figure 1 reveals a close relationship between a number of research modules. With a view to efficiency, it is recommended to jointly implement the related modules. For example, modules 1-6 respond to the study questions regarding road safety, and modules 7-8 to the questions regarding the costs and cost-effectiveness of the measures implemented. The remaining modules (9-12) can be implemented separately.

This design allows a phased approach (in terms of time and costs) to the study. The combined results of modules 1-12 jointly provide the answer to the primary research question (module 13), which in any event should be implemented as this provides a summary of the research results and subsequent effects.



**3** nr. research module

The results of modules 1-12 jointly provide the answer to the primary research question (module 13)

Figure 1. Relationship between the research modules and input data. The results of modules 1-12 jointly provide the answer to the primary research question (module 13).

#### 4. SELECTING AREAS TO STUDY AND THE DATA REQUIRED

The study focuses on areas that have already been redesigned as 60-km/h zones. In addition to the 60-km/h zones to be studied, as large a reference area as possible is required to assess road safety effects. Data from areas redesigned as 60-km/h zones, collected in the period prior to the redesign, can be used. In addition, areas can be used

that have not yet been redesigned as 60-km/h zones. Areas that have already been or have yet to be redesigned will only be included in the evaluation study if the road network comprises several road sections and intersections, and if data is available – or can be accurately extrapolated – regarding traffic accidents, traffic loads and speeds.

Preliminary study in areas already redesigned can only be conducted when there is sufficient data available for the areas in question. This pertains to speed measurements in particular, as these cannot be performed once the area has been redesigned. As far as the availability of data regarding traffic loads is concerned, estimates made in consultation with the road manager involved will be used from now on in the event of missing traffic count data.

## 5. DISCUSSION AND CONCLUSIONS

The assessment of 60-km/h zones is essential for a number of reasons. It enables determining the degree to which additional measures are required or whether there is a need for maintenance efforts (Directorate-General for Public Works and Water Management/AVV Transport Research Group, 2000). In addition, assessment facilitates communication with the public. As the lack of safety on rural roads is not always evident due in part to the limited accident frequency, support among road users is sometimes limited or prone to wane quickly. Implementing the research method described above can underscore the usefulness and necessity of 60-km/h projects and thus help generate support.

The water boards play a unique role in Dutch road management (Jaarsma and Van Dijk, 2002). Nearly two-thirds of the road network under their purview is being redesigned. For this reason, in 2001, the Association of Water Boards already initiated an assessment. However, other road managers that oversee 60-km/h zones can likewise benefit from the method. In actual practice, this will mainly involve municipalities comprising extensive rural areas.

The method also has possible international applications. After all, wherever measures are being implemented to improve road safety in rural areas, it will be necessary to assess the impact of such road improvements. The method schematically presented in Figure 1 can offer a well-founded response, based on sub-questions regarding safety, cost-effectiveness, speeds, through traffic and road users' perception of safety.

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