SAFETY; INTERACTIONS OF THE VARIOUS FACTORS OF THE VEHICLE, INFRASTRUCTURE, DRIVER, ENVIRONMENT SYSTEM

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Summary

In the Netherlands there are plans to set up a data bank which will contain data for pursuing a national road safety policy. This will enable the nation-wide developments in the sphere of road safety and dangers to road users to be monitored (monitoring function) and to pinpoint specific subjects (regions, categories or roads, transport modes, age groups, etc.) deserving closer attention.

1. Introduction

The developments of road safety has to be closely followed by policy makers in order to learn from the past. Anything they learn is, in the first place, of importance with regard to the effects of their policy. For this it is necessary to be able to distinguish these effects demonstrably from the effects of other influencing factors (other measures, disturbances, etc.). A good possible approach consists in seeking to explain the developments of traffic accidents in the past. For this purpose a causal model would appear most suitable. Next, basing oneself on such a model, a prognosis fo future developments may be attempted. What can be expected in terms of the developments of traffic accidents if policy remains unchanged and no sudden drastic changes from other causes occur (severe winter weather, energy crisis)?
Not only should it be possible to indicate how the total number of accidents/casualties evolves, but also how the various component features develop and which of these deserve particular attention.
This paper summarizes a number of ideas and considerations which are being applied in developing a measuring instrument for ascertaining the developments of traffic accidents of roads: "a road safety thermometer".

2. Background philosophy

As the basis for road safety policy in the Netherlands it is presupposed that accidents can be regarded as a multicausal chance phenomenon. Every

person who participates in road traffic is exposed to the chance of being involved in an accident as a result of a critical coincidence of circumstances. The elimination of one of the causes will not necessarily guarantee that no accidents of this type will happen ever again.
The system of accident registration in the Netherlands, and in many other countries, is based on this philosophy. It is necessary to find out the relationships between the theoretically well-known relevant characteristics of the accidents, the traffic, the persons involved, the vehicles involved, the roads, and the general circumstances, and to register these characteristics. Equipped with these data, which quite often have to be processed by complicated analysis techniques, the policy maker can establish priorities for tackling problems. The registration of characteristics in the Netherlands now is not sufficient to explain on a nation-wide level the developments of traffic accidents. Obviously, this creates problems in formulating a road safety policy. In the Netherlands a "road safety thermometer" is now in preparation.

3. Choice of indicator

On the basis of the philosophy that accidents are due to a critical coincidence of circumstances it will, for obtaining a valid and reliable road safety thermometer, be necessary to know what indicators it should comprise. From the social point of view all the consequences of traffic accidents are relevant - not only the direct consequences (injury and material damage), but also the indirect ones. The latter comprise the limitations that people experience in the development of their activities from the fear of being involved in an accident: elderly people are afraid to go out in the streets, the choice of schools for children is restricted by traffic considerations.

An indicator of road safety is built up of a measure for damage ("unsafeness") and an associated exposure quantity. There still exists a great deal of misconception as to the meaning of "exposure" and the use of exposure data. This is probably due to the fact that, in the context envisaged here, this term may have three different meanings.
In the first place, exposure denotes a neutral standardizing or correcting measure: number of inhabitants, area of a region, or length of the

road network. Relating the accident figures to such a standardizing measure constitutes the first general step in an analysis. With the quotients obtained it is possible to make approximate overall comparisons between the respective regions.
Furthermore, exposure is also used to express the measure of participation in road traffic: vehicle or passenger kilometres. By relating accident data to this measure of production it is possible to ascertain to what extent differences or changes in the level of traffic accidents can be explained from differences or changes in traffic or transportation performance.
Finally, exposure also indicates a measure of being exposed to danger. This implies various specific situations that contain a risk of an accident, e.g. the number of pedestrian crossing a street, or the number of vehicles passing a road junction within a certain time. Data of this kind are used in detailed analyses.
The operationalization of an indicator depends on the definition of the problem for which the indicator is used.
For monitoring the developments of traffic accidents and for distinguishing the areas on which policy attention must be focused the definition of the problem will always have to be comparative in character. In following a development of road safety indicators at particular times and over particular periods are compared with one another.
Comparing absolute numbers of accidents does not yield enough information, however. The figures can be meaningfully interpreted only if they are related to a measure for exposure, for example:
- in 1978 the average risk per inhabitant, to be killed in a road accident was lower in the Netherlands than in Germany;
- in 1978 the average risk, per kilometre travelled, to be killed in a road accidents in the Netherlands was more than three times as high for a cyclist as for a car driver;
- in 1978 the average risk, per kilometre walked, for a pedestrian in the Netherlands to be killed in a road accident was about eight times as high for persons over 65 years of age as compared with those between 25 and 44.

Areas, categories of road user (motorists, cyclists, etc.), ages of road users, road categories, types of road intersections, times of year, weather conditions - these are factors which can be meaningfully compared

with one another with the aid of a suitable road safety indicator, so that attention areas can be deduced from such comparisons.
If a comparison shows that the road safety indicator for a particular criterion (e.g., the total number af fatalities per travellers kilometer) was more unfavourable - indicating a higher level of risk - in 1980 than in 1979, it does not explain the "why", i.e., the underlying cause of this difference. Further investigation will have to provide the answers to a number of "yes, but" questions, e.g.:
- yes, but is the increase in the use of public transport to blame for that;
- yes, but was it not due to the severe winter in 1979;
- yes, but was this not caused by the ever growing number of old people who are more vulnerable than younger people;
- yes, but has it not something to do with the introduction of summer time;
- yes, but is there not an increase in the number of drinking drivers;
- yes, but is the number of car drivers wearing no safety belt decreasing;
- yes, but is the number of car drivers not observing the speed limits on motorways not steadily increasing?
Only if all relevant "yes, but" questions can be answered is it possible to explain for any increase or decrease in road safety. This often requires a laborious process of thorough investigations. It can then be indicated which changes in the influencing factors are responsible for increase or decrease, and to what extent they do so. When this has been established, the two important aims of the policy makers draw nearer: indicating the consequences of policy implemented and, on the basis of obtained data, defining attention areas.

4. Further elaboration

Starting from the problems defined by policy makers and based on the philosophy that accidents are a multicausal chance phenomenon, data banks should be set up. These comprise data relating to accidents, traffic, persons and vehicles involved, roads, and the general circumstances. The central problem in setting up a data bank is that the aims of the various users of the bank must not be contradictory with one another to such an extent that one national data bank becomes "nobody's friend and everybody's enemy".

A properly functioning system of collecting and processing accident records should, in terms both of input and of output, be very flexible because of the wide variety of the requirements to be fulfilled: "It is likely that one data bank in which all data for all users are available at all times cannot possibly meet this flexibility requirement."

Accordingly, it is proposed that the central data bank should be so arranged as to supply its users only with the information most essential to them. Depending on the users' wishes, the central data bank can be supplemented with more specialized data banks which are to be linked via references to the central data bank. Such specialized data banks are indispensable for the formulation to scientific theories and also, indirectly, to policy making.