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Summary:

A method for setting priorities for measures designed for pedestrians and cyclists
– criteria and guidelines

This report presents a method for setting priorities for road investments designed for pedestrians and cyclists according to a point system, in which points are given to seven criteria indicating the need for investments. An important reason for developing this system is that meaningful cost-benefit analyses are currently not possible, chiefly because the needed data are often not available. Two types of measures for pedestrians and cyclists are included in the points based system: (1) traffic separation along road sections by the provision of tracks for walking and cycling, and (2) crossing facilities.

The objective of the report was to develop a system for assessing in a consistent way both (a) the need for road facilities (tracks or crossing facilities) for pedestrians and cyclists, and (b) how to assign priorities between multiple projects, at least by identifying broad groups of projects according to the expected net benefits of those projects. The intention is to use the priorities resulting from the points based system as a basis for developing a more satisfactory basis for cost-benefit analyses. The report includes guidelines for the use of the points based system.

Criteria used in the points based system and aggregation of scores in the system

The points based priority system determines the priority of a given investment project (track or crossing facility) by assigning points according to seven criteria that are regarded as relevant for priority setting. As opposed to cost-benefit analysis, there is no monetary valuation of the relevant impacts or criteria for priority setting. The points given to each criterion are, however, all measured according to the same units and are aggregated to form an overall score. The logical structure of the system is therefore closely analogous to the logical structure of a cost-benefit analysis. In the points based system it is, however, not possible to assess different *designs* of measures, since optimising design requires that all effects are measured in monetary terms. The following seven criteria are used in the system:

- The volume of motor traffic (AADT = annual average daily traffic)
- The speed of motor traffic (approximated by the prevailing speed limit)

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- An estimate of the current volume of walking and cycling (trips per day)
- An estimate of the potential for generating more walking and cycling by improving road facilities (trips per day)
- The number of injury accidents involving pedestrians or cyclists during the last ten years
- The total number of police reported injury accidents during the last ten years
- Whether the road is used by school children or not (number of children walking or cycling along the road on trips to and from school).

There is still not sufficient data concerning road user insecurity to include it formally as a criterion in the points based system. It is not unreasonable, however, to assume that road user insecurity is influence by the speed and volume of motor traffic.

With the exception of the potential for more walking and cycling, all these criteria are used to assess the need both for tracks along roads and for crossing facilities. The potential for generating more walking and cycling is used only to assess the need for tracks along road sections. Each criterion is given a score ranging from 0 to 5. The scores for each item are then multiplied to obtain an overall score. All calculations are done on an Excel spreadsheet. Table S.1 shows the scores assigned to each criterion in the system.

Table S.1 Points based priority system for measures designed for pedestrians and cyclists

Criterion		Points					
Tracks along roads	Crossing facilities	0	1	2	3	4	5
AADT motor vehicles	The same	0-499	500-999	1000-1999	2000-3999	4000-5999	6000 =
Current volume of walking and cycling	The same		0-199	200-399	400-599	600-799	800 =
Speed limit (km/h)	The same	30	40	50	60	70	80 =
Accidents involving pedestrians or cyclists per km or road	Ditto accidents per 100 m of road		0-0.49	0.5-0.99	1-1.49	1.5-1.99	2 =
All accidents per km of road	Ditto accidents per 100 m		0-1.99	2-3.99	4-5.99	6-7.99	8 =
Potential for generating more walking and cycling	Not included		0-99	100-199	200-299	300-399	400 =
Number of school children	The same		0-49	50-99	100-149	150-199	200 =

When applied to tracks for walking or cycling, the points based system considers the length of the road section and the costs of constructing the track. Three classes of cost were defined: average, cheap and expensive (depending on terrain). In addition, a minimum cost was specified. A score of 0 was assigned when traffic volume is very low and the speed limit is 30 km/h. It was assumed that there is no need for providing separate road facilities for pedestrians and cyclists in these circumstances. The overall score obtained for the criteria listed above can be

interpreted as an indication of the need for providing better road facilities for pedestrians and cyclists.

Road user security counts heavily in both the points based system and in cost-benefit analyses

An attempt has been made to assess the performance of the points based priority system by comparing the priorities assigned by this system to the priorities assigned according to a cost-benefit analysis for the same set of projects. It should be stressed that this comparison is very preliminary, since the lack of needed data to do meaningful cost-benefit analysis was an important reason why the points based system was developed. It is clear, however, that reducing road user insecurity counts heavily on the benefit side in both the points based system and in cost-benefit analysis. The main reason that can be given for this conclusion. is that many of the factors included in the points based system, especially the volume and speed of motor traffic, and use of the road by school children, can be assumed to influence road user insecurity.

The correspondence between priorities assigned according to the points based system and priorities assigned according to cost-benefit analysis

To test the performance of the points based system. data for 20 road section in the county of Aust-Agder were used. The priorities assigned to these 20 projects (from 1 to 20) were compared to priorities assigned by a – albeit highly preliminary – cost-benefit analysis of the same projects. It is stressed that the cost-benefit analysis should be regarded as a numerical example only. It was nevertheless decided to make the comparison in order to get a first impression of the external consistency of the points based system.

There was a good correspondence between the two sets of priorities. The correlation between the priorities was 0.78 for tracks along roads and 0.73 for crossing facilities. The type of crossing facility considered was a grade separated crossing (bridge or tunnel). The cost-benefit analyses that were made in this report are hypothetical analyses, showing how such analyses should in principle be made if all needed data were available.

The design of facilities cannot be considered in the points based system

An important difference between the points based priority system and a cost-benefit analysis, is that points are used as the common metric in the points based system, not monetary values. This means that the choice of design of various types of facilities cannot be analysed by means of the points based system.

The priorities assigned to crossing facilities were found to depend strongly on the choice of facility. There is a choice between three types of facilities: signalised crossings, raised crossings, and grade separated crossings.

Current values of travel time can be questioned

The cost-benefit analyses of crossing facilities include gains or losses in travel time for motorists, pedestrians and cyclists. The priorities assigned by the cost-benefit analyses turn out to be very sensitive to the value of travel time used. If this value is reduced by 50%, or set to zero, the correspondence between the priorities assigned according to cost-benefit analysis and the priorities assigned according to the points based system improves substantially. The value of travel time is highly uncertain, and it is by no means obvious that the results of the cost-benefit analyses are "correct". The role of travel time in these analyses needs to be carefully reviewed in the ensuing work of further developing both the points based system and cost-benefit analysis of road facilities for pedestrians and cyclists.

Further development of the points based system

The points based system described in this report is a first generation tool. One of the least satisfactory elements of the system is the crude way in which the amount of walking and cycling is estimated. The number of pupils in school is used as the basis for estimating the amount of walking and cycling. The accuracy of the method of estimation described in the report is not known. The method was nevertheless recommended, because counts of pedestrians and cyclists are only rarely available and are costly to perform in a sufficiently reliable way.

It is desirable to make more precise estimates of the amount of walking and cycling. It is envisaged that geographical information systems (GIS) can be applied in the future to develop better estimates of traffic volume for pedestrians and cyclists.

Further development of cost-benefit analysis

It is, however, necessary to do extensive research in order to develop a satisfactory basis for cost-benefit analyses of road investments designed for pedestrians and cyclists. Cost-benefit analyses of road investments that mainly benefit motorists have been made for a long time. A fair treatment of all categories of road users, and an efficient allocation of funds between projects that mainly benefit motorists and projects that mainly benefit pedestrians and cyclists can only be accomplished when cost-benefit analyses of all projects are made according to the same principles.

In order to perform meaningful cost-benefit analyses of projects that mainly benefit pedestrians and cyclists, it is necessary to improve knowledge with respect to:

- The amount of walking and cycling before and after a measure is carried out
- The behaviour of pedestrians and cyclists and the relationship between behaviour and accidents
- Factors that influence road user insecurity
- The effects on health of walking and cycling

- The exposure of pedestrians and cyclists to air pollution and the effects on health of this
- How to estimate the generalised costs of travel for pedestrians and cyclists. This includes the problem of using valuations of goods obtained by studying a single good at a time in cost-benefit analyses that include multiple non-market goods.