Thematic Network

ROad **S**afety and **E**nvironmental **B**enefit-Cost and Cost-Effectiveness Analysis for **U**se in **D**ecision-Making

- WP2 –

Barriers to the use of efficiency assessment tools in road safety policy

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ROSEBUD

Road Safety and Environmental Benefit-Cost and Cost-Effectiveness Analysis for Use in Decision-Making

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1 Background and purpose

Many European countries have set ambitious targets for reducing the number of road accident fatalities. The European Union has a target of reducing the number of road accident fatalities from 40,000 in 2000 to 20,000 in 2010. In order to realise these targets, it is necessary to implement effective road safety measures. Formal efficiency assessment tools can help policy makers to identify the most cost-effective road safety measures. Previous research has shown that road safety can be improved by basing policy priorities on formal efficiency assessment tools (Elvik 2003). Moreover, research has shown that actual policy priorities are not always very much influenced by formal efficiency assessment (Elvik 1995, 2001, Fridstrøm and Elvik 1997, Nyborg 1998, Odeck 1996). The objective of this report is to try to identify some barriers that may prevent the use of efficiency assessment tools in road safety policy. The report will assess the use of efficiency assessment tools primarily at the administrative level.

Efficiency assessment tools comprise CBA and cost-effectiveness analysis (CEA). These tools, or methods, provide a ranking of potential road safety measures. CEA sets out from road safety targets and rank measures according to lowest market-based monetary costs. It is a method for estimating the € cost of, e.g., one life saved, for a given road safety measure (Tengs *et al.* 1995). CBA represents the only economic method that involves monetary assessment of both costs and benefits of a measure. CBA enables ranking of road safety measures and also infrastructure investments in which road safety measures compete with mobility (travel time) and environmental effects (air pollution, noise). It can thus handle monetary comparison of safety goals with other societal goals (Layard and Glaister 1994, Hanley and Spash 1993).

The use of efficiency assessment tools (EAT) in road safety policy is founded on an analogous raison d'être as for other areas of public policy. EAT provide input to complex decision making based on clear rational-choice models, enabling ranking of options/measures with differing degrees of effects. EAT are compatible with democratic principles, the analyses are founded on individuals' own values (for CBA and, partly, CEA). EAT follow the housekeeping principle of getting the most out of limited resources. Principally EAT should provide a transparent structuring of society's own wants.

It is perhaps useful to divide the application of CBA for road safety measures into "maxi CBA" and "mini CBA". The "maxi CBA" is to be understood as a complete analysis involving best available inputs and estimations of costs and benefits. The "mini CBA", on the other hand, would involve a simpler "at the back of the envelope" estimation of main costs and benefits. Indeed the elaboration of CBA is not standardised in neither maxi nor mini – various circumstances and elements will govern the thoroughness of any scientific analysis. However, it may be helpful to regard "mini CBA" as a relevant approach to preliminary assessments of road safety measures – isolated or within infrastructure development – or even at a regional/local level where resources are not available for elaborated analysis. The "maxi CBA", the state-of-the-art analysis, would be aspired at for the larger infrastructure and safety projects.

In most EU/EEA countries EAT are regularly applied for physical road safety measures, and also for this component within larger infrastructure investments. The

UK and Scandinavian countries have gone furthest in using CBA as an integrated tool in the decision-making process. But no country bases its actual policy priorities strictly on CBA. Doing so is likely to result in a large reduction in accidents (Elvik 2003). For many types of safety measures neither CBA nor even CEA are applied. And, if applied, the results from these methods are often disregarded when it comes to final political decisions. Several types of barriers may prevent policy from being based on formal efficiency assessment. These may be philosophically based, involving a *fundamental* rejection of the principles of EAT. The barriers may also be related to *institutional* settings – the organisation of policy making – with decision making based on rationality-principles and trade-offs incompatible with EAT. Further, barriers may be related to inherent methodological or *technical* deficiencies of EAT. Finally, the barriers may be related to the *implementation* of policies (Elvik 2001).

In transport and road safety projects, most of the decision makers are governmental bodies. This report presents results of interviews with decision makers in six European countries and in Israel – the countries of the Partner institutions in Work Package 2 of the Thematic Network ROSEBUD. The reported survey comprised both EU, national, and local/regional decision levels. The main objective of the research was to get knowledge about what the barriers to the use of EAT are according to these decision makers. They were asked about the current use of CBA/CEA and they were asked to give personal opinions about potential controversies and objections.

The following delimitations for the research in Work Package 2 were set: Concerning the level of decision-making, it was initially focussed on the national level. The questionnaire was first developed and applied for this level. Then some small changes were made before performing interviews at the local/regional level and the EU level. A relatively swift initiation at the national level was also adapted to the needs of Work Package 3, “Improvements in efficiency assessment tools”, that would naturally follow-up the findings of Work package 2.

Work Package 2 of the Thematic Network ROSEBUD should provide information, from Partner countries, about current road safety policy, the use of formal efficiency assessment tools for setting priorities for road safety measures, reasons why formal efficiency assessment tools are not used as an element of road safety policy, and assessing the relative importance of various barriers to the use of efficiency assessment tools. A survey of decision makers constituted the main procedure designed to shed light on these issues.

A distinction has been made between barriers to the *use* of EAT (either fundamental, institutional and technical barriers) and barriers to the *implementation* of policies that have been found to be efficient according to CBA or CEA (that politicians either plainly disregard these results or make priorities in dissonance with these results). Another important distinction is between *absolute* and *relative* barriers. Absolute barriers are barriers that cannot be removed as a result of the Thematic Network ROSEBUD. These barriers are primarily fundamental and some institutional barriers related to the use of EAT in planning, in addition to the barriers to the implementation. Relative barriers are those that the ROSEBUD project can attempt influence, consisting primarily of technical and some of the institutional barriers related to the use of EAT.

2 Description of efficiency assessment tools

Cost-effectiveness analysis (CEA) is based on the notion that certain targets for, e.g., road safety are set (politically) and the method involves finding the least costly manner of achieving the targets. Although the approach resembles the cost minimisation in basic microeconomic theory (Varian 1992), CEA does not require a monetary valuation of accidents or injuries, nor of any other relevant policy objective. The good provided is measured in 'natural units', such as the number of road accident fatalities prevented. A cost-effectiveness analysis simply estimates the cost-effectiveness ratio, which can be defined as:

$$\text{Cost-effectiveness ratio} = \frac{\text{Number of accidents prevented}}{\text{Cost of measure}}$$

The number of accidents prevented forms the numerator, consistent with the idea that one wants to maximise the cost-effectiveness ratio. Cost refers to the direct costs of implementing the measure. The value principle is the application of market-based prices (costs) reflecting the individuals' aggregate preferences for the allocation of private/market goods. Tengs *et al.* (1995) provide CEAs of a large number of road safety measures in the US.

There are three main limitations of CEA: (1) The definition of cost-effectiveness becomes a problem if accidents of different severities are to be considered. It may then be necessary to estimate a cost-effectiveness ratio for each level of accident severity and then compare ratios across levels of severity. (2) CEA does not include a criterion stating when a certain measure should be regarded as cost-ineffective, that is as giving too small safety benefits compared to the costs of the measure. It can only be used to rank order measures by cost-effectiveness. (3) CEA cannot be used to make tradeoffs against other policy objectives. It seeks to maximise a single objective only, that of preventing accidents or injuries.

Cost-benefit analysis (CBA) seeks to overcome these limitations of CEA. Accidents or injuries of different severities are made comparable by estimating the benefits to society, stated in monetary terms, of preventing them.[1] Measures are classified as inefficient if benefits are smaller than costs. The value principle in CBA broadens that of CEA. All monetary values principally reflect individuals' willingness to sacrifice income to obtain increased provision of market goods (by purchasing these) or public goods (by accepting taxation). Tradeoffs against other policy objectives are made possible by converting all policy objectives to monetary terms. Thus, theoretically a CBA may include all relevant economic aspects and provide a comprehensive, holistic ranking of options. As far as road safety policy is concerned, the most important potentially conflicting policy objectives are those related to travel time, costs of transport (vehicle operating costs), and the quality of the environment (noise, air pollution). CBA has been applied to a wide variety of road safety measures in Europe, and a large number of measures have been found to have higher – in some cases far higher – benefits than costs (ROSEBUD-WP1 2003).

CEA is, conceptually, the simplest method to apply. It fits relatively easy to an engineering, financial and layman approach to costs and prices related to budgeting. Actually it can be applied without fundamental comprehension of economic theory. If physical impacts of alternative safety measures are known, the needed data will

[1] The economic value of reducing by one the expected number of fatalities is also known as the 'value of a statistical life'.

consist of market prices of relevant inputs. However the mere minimisation may involve a complicated modelling if it includes many interrelated factors in addition to the time dimension. Certainly, such a minimisation will also enter into CBA.

CBA may be as 'straight' to perform as CEA, but it may also involve more demanding elements, if e.g., survey-based estimation of new values of time saving, life saving, noise/pollution reduction are to be included. A CBA should principally include all costs and benefits of a specific measure/project, and everything measured on a common monetary unit of measurement. The complexity of CBA is partly philosophical, in the sense that it may confront the analyst with fundamental value definitions when including public goods into the calculations. The values should be founded on individuals' willingness to sacrifice income for gains and acceptance of compensation for losses, as far as it is possible to gauge these values. Thus, economic values in CBA encompass values of market goods – given as market prices – and values of non-market goods (public goods) – estimated indirectly from observed behaviour or directly by surveying. Indeed, the theoretical attraction of CBA does not by itself make it easy to implement in practice, nor does it ensure that the results of CBA are always accepted.

3 Alternative models of road safety policy making

3.1 An ideal model of policy making

While CEA is designed to identify the least costly way to realise a given political goal (evading the assessment of benefits), CBA takes the multiplicity of political objectives as its point of departure but grades the proposed projects with a 'pass' or 'reject' and, eventually ranks those with a 'pass'. The objective of CBA is economic welfare maximisation. The criterion of 'potential Pareto improvement' (PPI) is applied to determine if a given measure/project increases welfare. According to PPI the measure/project should be implemented if those who benefit from it can compensate those who lose from it (in utility terms) and still retain a net benefit (in utility terms). Thus, from a given agenda of relevant measures/projects CBA provides an analytical method – with firm foundation both in economic theory and democratic theory – to sort out those that merit implementation (Elvik 2001).

It is important to stress that decision makers can be regarded as rational even if they do not base their decisions on CBA. Politicians may value the elements in a CBA differently from what is given from individuals' valuations (either within or outside markets). They will also take into consideration elements that do not enter CBA.

The use of formal efficiency assessment tools in road safety policy-making is, implicitly, based on an ideal model of the policy making process, as depicted in Figure 1. It is emphasised that this model is used as a heuristic device only. It is not meant to be a literally correct description of how road safety policy-making actually proceeds. The stages identified are listed in logical order, but in actual policy-making this does not necessarily correspond to chronological order.

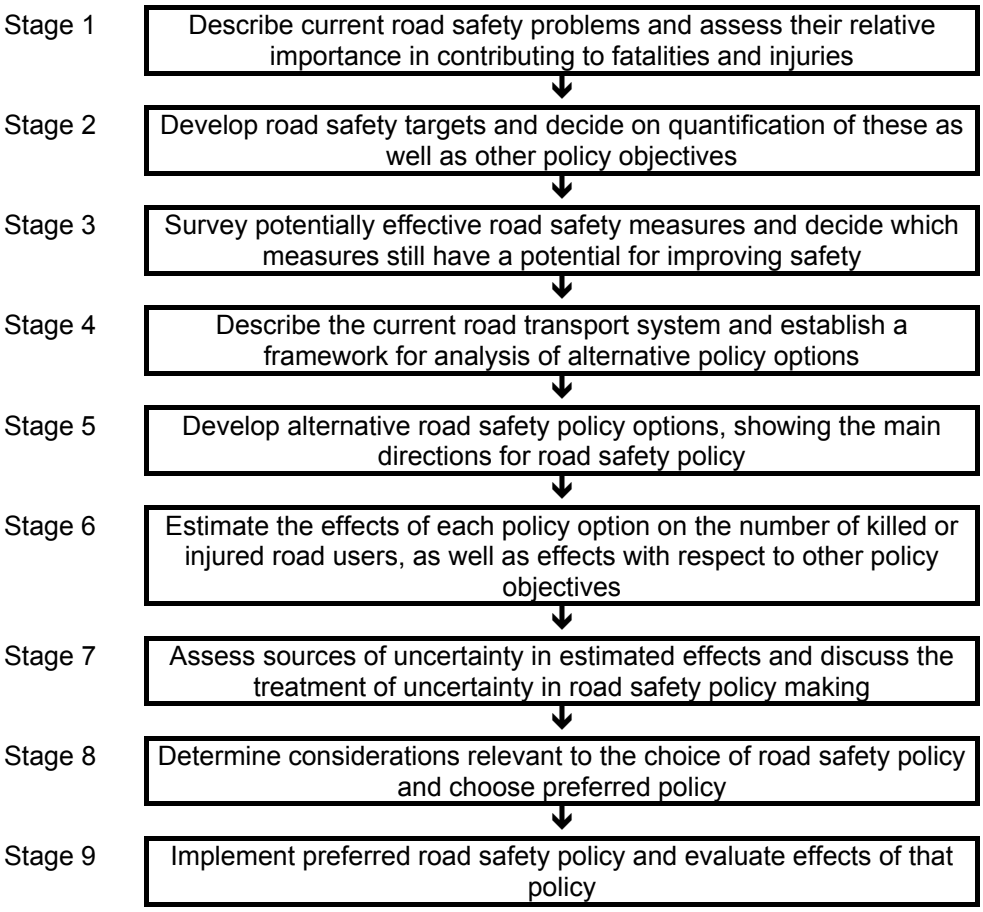


Figure 1: An analytical model of road safety policy making

Formal efficiency assessment of road safety measures contributes to policy making at stages 5 and 6 in particular. It is, however, a misunderstanding to think that the results of a CEA or a CBA amount to a policy recommendation. These analyses shed light on the efficiency in economic terms of alternative policy options. However, considerations other than efficiency in the sense of that term within the framework of formal efficiency assessment tools will nearly always be relevant for policy choice. It would therefore rarely, if ever, be the case that a CEA or a CBA would form the only basis for making a policy choice.

3.2 A model of actual policy making

As noted, the model of the policy making process in Figure 1 is an ideal model, in the sense that it shows how policy making is ideally assumed to proceed according to the logic of rationality embodied in formal efficiency assessment tools and other scientific contributions to policy making. In reality, though, the logic of policy making differs greatly from that of a research process or a scientific approach to the analysis and solution of a social problem. In order to provide a backdrop for a structured discussion of the contrast between the ideal model of policy making and actual policy making, Figure 2 presents a model of the policy making process intended to describe this process as it really is.

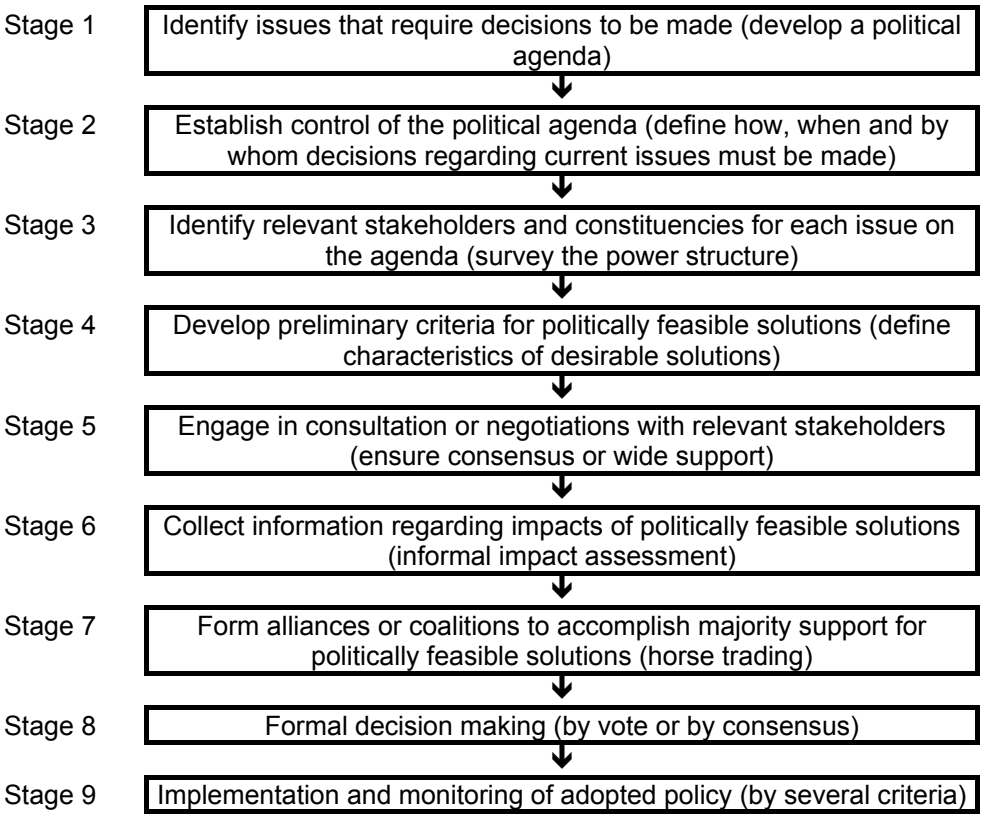


Figure 2: A model of policy making as it actually occurs

As can be ascertained by comparing the model in Figure 2 to the model in Figure 1, there are big differences between the "scientific" logic of policy making and the actual logic of it. Political decision makers do not always look for the most efficient solution to a problem, although efficiency is sometimes an important criterion. When a researcher asks: "Does it work?" a politician may ask: "Is it popular?" By contrasting these two models of policy making one may identify barriers to the use of efficiency assessment tools.

Some of the contrasts between the two models serve as the basis for identifying barriers to the use of efficiency assessment tools. While politicians seek consensus and try to embed their decisions firmly in existing institutions, efficiency assessment tools assume that there is already consensus on political objectives and that a suitable technical apparatus exists for implementing cost-effective policy options. These assumptions may not conform to political realities, and in actual policy making processes, it is always the political realities that determine the outcome, and not the input provided by technical experts.

This does not necessarily mean that there is no role for technical experts, nor that any policy recommendation based on a formal efficiency assessment will always be turned down. One should recognise, however, that efficiency assessment will nearly always be just one element of a policy making process that involves a multitude of other considerations.

4 A typology of barriers to the use of efficiency assessment tools in road safety policy

4.1 Introduction

This chapter will describe a typology of barriers to the use of efficiency assessment tools in road safety policy, based on Elvik (2001). Four main groups of barriers have been identified. These can be listed as:

A Barriers of a philosophical nature ("fundamental barriers")
A1 Rejecting principles of welfare economics
A2 Rejecting efficiency as a relevant criterion of desirability
A3 Rejecting the monetary valuation of risk reductions

B Barriers related to the organisation of policy making ("institutional barriers")
B1 Lack of consensus on relevant policy objectives
B2 Formulation of policy objectives inconsistent with EAT (-50 vs WTP –25)
B3 Priority given to policy objectives unsuitable for EAT
B4 The rationality of horse trading
B5 The rationality of political opportunism
B6 Unfunded mandates and excessive delegation of authority
B7 Abundance of resources
B8 Rigidity of reallocation mechanisms
B9 Wrong timing of EAT information in decision-making process

C Barriers related to inherent elements of the efficiency assessment tools ("technical barriers")
C1 Lack of knowledge of relevant impacts
C2 Inadequate monetary valuation of relevant impacts
C3 Indivisibilities
C4 Inadequate treatment of uncertainty

D Barriers related to the implementation of cost-effective policy options
D1 Social dilemmas
D2 Lack of power (related to B6 above)
D3 Vested interests in road safety measures
D4 Lack of incentives to implement cost-effective solutions
D5 Lack of marketing of efficient policies

This typology starts from basic barriers and moves on to barriers that, in principle, can be modified or made less binding. Barriers in categories A and B are related to characteristics of policy making in general, and are thus not inherent in EAT. Barriers in category C are inherent to EAT and identify weaknesses of these tools. Finally, barriers in category D may not prevent formal efficiency assessment of road safety measures from being made, but will prevent the results of those analyses from serving as an important basis for actual policy priorities. In the following sections, each of the barriers will be defined more precisely and some illustrations of them will be discussed. It should be noted that this typology was developed with regard to both a political point of view and a bureaucratic point of view. With a focus on the bureaucratic agenda and situation the typology may be extended and adjusted.

4.2 Fundamental barriers – objections to the use of efficiency assessment tools

4.2.1 Rejecting the principles of welfare economics

Cost-benefit analysis is based on normative economic welfare theory, which embodies a set of principles intended to ensure that welfare is maximised. The main principles (based on Elvik 2001 and the references quoted in it) are:

1. Consumer sovereignty
2. Valuation of goods according to willingness-to-pay
3. Pareto-optimality as the criterion of welfare maximisation
4. Neutrality with respect to income distribution

Consumer sovereignty is the principle that the choices made by consumers with respect to how to spend their income are respected and are treated as data. Economists are not moralists. They will not say that someone who spends most of his income on alcohol, tobacco and unhealthy foods is a fool, whereas someone who saves part of his income for old age, while spending the rest prudently on safe foods and safe activities is a wise person. Economists simply treat individual demand for various goods and services as data.

Some people argue that it is wrong to accept consumer sovereignty for every conceivable consumer decision, arguing that consumers sometimes have to be protected from themselves. Consumption which is considered very harmful to health, like taking drugs, is prohibited in many countries. As far as road safety is concerned, it has been argued that individuals cannot rationally determine their demand for it, since they do not fully know the risk of accidents. This claim can to some extent be tested empirically. Whether or not incomplete knowledge of road accident risk is a convincing argument for denying consumers the sovereignty to influence the provision of road safety is a matter of judgement. There are many commodities that consumers are allowed to buy, although their long term effects on human health and well being are imperfectly known. Automobiles are a case in point. Why, one might ask, should not consumers be allowed to decide whether they want more road safety to be provided, when they are allowed to buy the product that is the source of the risk?

The second main principle of welfare economics is that goods and services should only be provided to the extent that there is a demand for them. Demand is expressed in terms of the maximum amount of money individuals are willing to pay for the provision of a certain quantity of a good. The valuation of non-market goods in cost-benefit analysis is based on the willingness-to-pay principle. Assessing willingness-to-pay for non-market goods is a complex task, involving many potential sources of error. Hence, a common objection to the willingness-to-pay principle, is that it is not possible to obtain credible estimates of willingness-to-pay. A more fundamental objection is that willingness-to-pay depends on ability to pay. The rich can afford to pay more for road safety than the poor. If the distribution of income is highly unequal, an indiscriminate use of the willingness-to-pay principle may lead to the provision of non-market goods, like road safety or cleaner air, only to the richest groups of the population.

This objection is highly relevant. To some people it is decisive: We cannot allow the provision of basic goods like health care to be based on individual ability to pay,

since that would generate gross social differences in the access to expensive health care. Since road accidents represent a threat to human health, one could argue that all groups of road users ought to have equal access to measures intended to improve road safety, irrespective of their individual demand for it.

In response to these points of view, three arguments can be made in favour of basing the provision of road safety on the demand for it, as manifested in the amounts that individuals are willing to pay for safer roads. In the first place, it is never the case that the provision of road safety – at least when it is a public good – can be matched exactly to individual demand for it. The rich may state that they want to pay a lot for road safety, the poor may state that they cannot afford to pay anything, but both groups benefit when roads or cars are made safer. It is just not possible to match supply and demand at the individual level, as opposed to the case for most market goods (in the sense that, as a rule, we buy the mix of commodities that gives us the greatest satisfaction). In the second place, it is in principle possible to convert the amounts of money individuals are willing to pay for road safety to utility terms, by estimating the marginal utility of money. By converting monetary amounts to units of utility, one may account for the fact that giving up 1,000 Euro is a much smaller sacrifice for a rich man than giving up, say, 250 Euro would be for a poor man. At present, however, converting money to utility is not an easy task. In general, economists will recommend using the willingness-to-pay principle provided it does not lead to unacceptable changes in income distribution. What counts as "unacceptable" in this respect is, of course, ultimately a political question. In the third place, basing the provision of road safety on the demand (willingness to pay) for it ensures that it is not overprovided. Road safety is overprovided if overall welfare can be improved by transferring resources from the provision of road safety to the provision of other commodities, or if the benefits of marginal road safety measures (as measured by willingness to pay) are smaller than the costs of those measures.

The third principle of welfare economics states that welfare is maximised if Pareto-optimality is realised. A state is Pareto-optimal if it is impossible to increase the utility level for one individual without thereby reducing it for at least another individual. Pareto-optimality is a very strict, and therefore not very practical criterion. Most economists therefore subscribe to a less demanding criterion, a potential Pareto improvement. A potential Pareto improvement is realised when those who gain from a measure can compensate those who lose from it (in utility terms) and still retain a net benefit. Applied to cost-benefit analysis, this criterion is usually regarded as satisfied when benefits exceed costs.

The most frequently encountered criticism of the Pareto criterion, as applied to cost-benefit analysis, is that compensation of losers almost never takes place in practice. It is therefore entirely possible that a consistent use of cost-benefit analysis in public policy would create an underclass of permanent losers, who would never be compensated. A related point is that compensation would involve monetary transfers that are costly. These costs should then be added to project costs, making the cost-benefit test more stringent. Finally, there is the problem of creating systems of transfers that would not give losers an incentive to overstate their losses. A neutral arbitrator would be needed in order to negotiate agreement between winners and losers, or the system of compensation would have to be a very simple one, based on fixed rates not subject to negotiation in each case.

Cost-benefit analysis is neutral with respect to the distribution of costs and benefits. All that counts is that overall benefits are greater than overall costs. Cost-benefit analysis is not intended to help find the most equitable solution to a social problem, only the most efficient solution. As the above discussion has made clear, objectives related to the distribution of costs and benefits often figure prominently in public policy. To the extent that realising a desired distribution requires the use of other policy instruments than those sanctioned by cost-benefit analysis, it follows that actual policy priorities cannot be based on cost-benefit analysis exclusively.

The objections to cost-benefit analysis discussed in this section are all of a rather philosophical or fundamental nature. If one takes all the objections seriously, the use of cost-benefit analysis as an element of policy making becomes difficult to defend. It is important to recognise that all the objections discussed here are entirely legitimate, and are not based on an erroneous conception of cost-benefit analysis.

4.2.2 Rejecting efficiency as the criterion for the best solution

The main objective of both cost-effectiveness analysis and cost-benefit analysis is to identify the most efficient combination of measures to promote a given set of policy objectives. Within cost-benefit analysis, efficiency is a technical term, referring to a potential Pareto improvement (see section 4.2.1). Within cost-effectiveness analysis, an efficient solution is one that moves along the frontier of production technology; which means that it gives the largest possible effect for a given budget (effect maximisation) or a given effect for the smallest possible budget.

In either case, efficiency is the criterion for the best solution, and efficiency is about squeezing as much benefit as possible out of a given amount of money. While wasting public money will have few defenders, some people think that efficiency in the strict sense of the term is too narrow to serve as the single criterion for the best solution to a given problem. In addition to being reasonably efficient, the solutions sought for social problems ought to be:

1. Equitable, that is, not introduce unacceptable inequality in the distribution of costs and benefits.
2. Legitimate, that is, rely on instruments of power that are accepted as morally defensible (the end does not justify the means).
3. Reversible, that is possible to change if one discovers that a mistake has been made.

These are relevant considerations in the choice of policy options in addition to the efficiency of those options. For the purpose of efficiency assessment, these considerations can be treated as constraints that any efficient solution must satisfy. A first-best unconstrained optimal solution is seldom possible. The existence of constraints in the form of other relevant considerations than efficiency does not mean that efficiency is not relevant, only that it is constrained.

4.2.3 Rejecting the monetary valuation of risk reduction

Within cost-benefit analysis, all relevant impacts of a measure should be valued in monetary terms according to the willingness-to-pay principle. This includes a monetary valuation of the prevention of fatalities and injuries sustained in road accidents.

Some people find this unacceptable. Thus, Hauer (1994) writes: “It is impossible to have preferences for an option involving the death of the deciding organism and it is meaningless to speak about them”. Others argue that it is ethically wrong to assign a monetary value to the saving of human life, thereby suggesting that life-saving

actions could be regarded as too expensive. One of the ethical principles of Vision Zero states that one should always do the utmost to save human life and never refrain from any life-saving action by reference to an abstract economic criterion. Human life, it is argued, is incommensurable with other goods. It cannot meaningfully be made commensurable with other goods by means of a monetary valuation of risk reductions, even if these valuations refer to “statistical lives” only and not to specific individuals.

The argument that it is unethical to assign a monetary value to human life rests on wishful thinking. The amount of resources available to save humans from untimely death or preventable injury is limited, as it always has been and always will be. It is simply an illusion to pretend that the prevention of death or injury – however laudable that objective is – can somehow escape from the resource constraint that any human activity is subject to. Tradeoffs have to be made; in fact they are made all the time. To pretend otherwise is an exercise is self-deception. This does not necessarily mean that the tradeoffs that must be made have to be stated in purely monetary terms. It is entirely possible to use another scale, such as QALYs (Quality Adjusted Life Years; generally defined so that being dead has the value of 0, and being in a state of perfect health has the value of 1). One would then convert a road traffic fatality to an average number of QALYs lost; a serious injury would correspond to a different number of QALYs lost, and so on. It is even conceivable to convert travel time to the QALY scale, thus making it possible to trade off additional travel time against gains in road safety in terms of QALYs. Money would then only enter the efficiency assessment as a measure of cost; yet even cost estimates could be converted to QALYs. This could be done by studying the relationship between gross national income and average quality of life in a society, stated in terms of QALYs. An expenditure representing X percent of GDP per capita, would then be associated statistically with a loss of Y QALYs per individual.

In this way, everything could be converted to a quality of life measure. It would still be the case, however, that tradeoffs would have to be made and that some measures would cost more QALYs than they would create. Those measures would then have to be rejected.

Any ethical principles intended to guide policy in a world of scarcity must recognise that scarcity and not pretend that tradeoffs do not have to be made, just because those tradeoffs are unpleasant and may strike us as cynical. The ethical objections against a monetary valuation of human life are thus unconvincing. It may nevertheless in practice be regarded as more legitimate to state tradeoffs in non-monetary terms, such as QALYs, in order to avoid giving the somewhat misleading impression that human lives are being sacrificed for the sake of cheaper groceries.

4.3 Barriers related to the organisation of policy making – institutional factors

4.3.1 Lack of consensus on important policy objectives – heterogeneity of preferences

As noted previously, formal efficiency assessment tools, in particular cost-benefit analysis is implicitly based on ideal model of policy-making, in which politicians, technical experts, and the population are all given rather clearly defined roles. One of the tasks of the population is to inform politicians about the relative importance of

different policy objectives, by indicated the value placed on realising them. Although it is rarely stated, this relies on the assumption that there is consensus about the policy objectives that are worth pursuing.

Political controversies cannot be resolved by resorting to calculations of how much various policy objectives are “worth” in monetary terms. If people disagree about the political objectives worth pursuing, this disagreement must be resolved either by majority vote or by negotiations that bring the different opinions closer together.

By the same token, if preferences for the provision of a certain non-market good are very heterogeneous, relying on the population mean willingness-to-pay as a measure of the demand for the good may be dubious. A sizable proportion of the population will then feel that their demand is not being satisfied, while perhaps an equally large proportion of the population will think that the good is being overprovided. Willingness-to-pay has often been found to be positively skewed, meaning that a few high values significantly influence the mean. In many cases, median willingness-to-pay is substantially lower than mean willingness-to-pay. Economic theory clearly states that mean willingness-to-pay is the correct measure of demand, since multiplying the mean by the size of the group will accurately estimate aggregate willingness-to-pay (i.e. the sum of what all individuals are willing to pay). On the other hand, the majority of the population will think that a road safety budget derived from mean willingness-to-pay will be too large. If the median voter theorem of public choice theory is taken as a model of how best to aggregate individual preferences in a democracy, then median willingness-to-pay should be used as the basis for the provision of road safety. Although the median voter theorem is not intended normatively, it is not altogether unreasonable to interpret it normatively, since support for a policy option is maximised if that policy option conforms to the preferences of the median voter.

It is beyond the scope of this report to offer precise guidelines as to when preferences become so conflicting or heterogeneous as to make cost-benefit analysis unproductive. It is, however, important to probe for heterogeneity of preferences as part of any cost-benefit analysis. For cost-effectiveness analysis heterogeneous preferences is less of a problem.

4.3.2 Formulations of policy objectives that are inconsistent with the use of cost-benefit analysis

In order to perform a cost-benefit analysis, the analyst needs to know what are the policy objectives for which a monetary valuation is sought. These policy objectives need to be stated in sufficiently precise terms to allow the design of a valuation survey. There is, however, no requirement that policy objectives be quantified. In fact, setting quantified targets may be inconsistent with setting policy priorities on the basis of cost-benefit analysis.

Suppose that an acceptably reliable estimate of the willingness-to-pay of the population for safer roads is available. A road safety programme is developed and a cost-benefit analysis performed. Suppose it turns out that cost-effective road safety measures (measures for which benefits are greater than costs) can reduce the number of road accident fatalities by 25%. Assume further that a quantified target has been set of reducing the number of road accident fatalities by 50%. It is then against the rules of cost-benefit analysis to tamper with the willingness-to-pay

estimate in order make a programme reducing the number of fatalities by 50% cost-effective. A more appropriate conclusion, consistent with the principles of cost-benefit analysis, would be to give up the target of a 50% reduction in fatalities, because the population is not willing to pay what it costs to reduce fatalities by 50%. This example illustrates both what the principle of consumer sovereignty implies and how a quantified policy target can be inconsistent with the application of cost-benefit analysis. In general, a consistent application of cost-benefit analysis is not supported by the existence of quantified policy objectives. It is better to leave the objectives non-quantified.

4.3.3 Priority given to policy objectives inconsistent with the use of efficiency assessment tools

Policy makers usually have multiple objectives. Some of these objectives, such as promoting road safety or mobility can be handled within the framework of cost-benefit analysis without any theoretical problems. As noted above, this is more difficult when it comes to distributional objectives. Such objectives can be stated in a number of ways. Requiring a minimum standard for roads, independent of traffic volume, is an example of a distributional objective. Setting a target for reducing injury rates more for unprotected road users than for protected road users is another example of a distributional objective.

In general, any distributional objective is inconsistent with a first-best use of efficiency assessment to set policy priorities. Distributional objectives can be entered as constraints on the priorities set by efficiency assessment. However, if there is a large number of distributional objectives, finding appropriate policy options may be next to impossible. In order to illustrate how this can occur, a case from road safety policy making at the county level in Norway will be presented. The case is discussed more in detail in Elvik (1993).

The county of Vest-Agder in Norway set a target in the early 1980s to reduce the number of injured road users from 523 in 1982 to 350 in 1986. A target was also set to reduce the number of accidents from 382 to 280 during the same period. These main targets were broken down into a number of sub-targets:

1. The reduction of accidents in the weekend, i.e. between Friday evening and Monday morning should be twice as great as the reduction of accidents during the rest of the week.
2. The reduction of accidents in the city of Kristiansand should be twice as great as the reduction of accidents in other parts of the county.
3. The number of injured children and youth should be reduced more than the number of injured road users in other age groups. Separate targets were set for the age groups 0-14 and 15-24 years.
4. Separate quantified targets were set for pedestrians, cyclists, riders of mopeds or motorcycles and car occupants. The largest reduction in the number of injured road users was sought for car occupants.

When combined, these targets represent a table of 2 x 2 x 3 x 4 = 48 cells. The set of targets implies a specific distribution of the number of injured road users in the cells of this table.

It was not stated how the expression “twice as great” should be interpreted. A reasonable interpretation is that the percentage accident reduction should be twice as great. This means that if weekday accidents are to be reduced by 15%, weekend accidents should be reduced by 30%. The targets can be represented as a set of linear equations of the form $Y = A + 2X$ to the solution of which yields the targeted number of injured road users.

When the joint implications of these targets for the number of injured road users are worked out, it turns out that in order to realise all the targets, the number of injured road users above the age of 25, on weekdays outside Kristiansand, have to increase from 60 to 74. Unless this increase occurs, all the conditions of “twice as great” and so on will not be fulfilled.

This extensive set of sub-targets is plainly absurd. The road to Hell is paved by good intentions. In this case, there are just too many good intentions. Having so many targets is like wearing a straightjacket. There is simply no way of identifying a set of road safety measures that would lead to the realisation of all targets. Seat belts, to take an example, are not twice as effective on Saturdays as they are on Wednesdays. Virtually the only part of the whole elaborate system of targets that could easily be realised, is to increase the number of injured road users above the age of 25 on weekdays outside Kristiansand. Simply offer them drinks along the roadside and ask them not to belt up. That will do the trick.

4.3.4 The rationality of horse trading

One can imagine several levels of use of efficiency assessment tools, in particular cost-benefit analysis. Traditionally, cost-benefit analysis has been used in road investment planning at the project level. The objective of an analysis has often been to identify the best design of a new highway. To some extent, cost-benefit analysis has also been used to set priorities between projects within a given budget. Projects are then typically ranked by benefit-cost ratio until the budget has been spent.

In principle, cost-benefit analysis could even be used to determine the optimal size of the budget. An optimal budget would be exactly large enough to deplete the pool of cost-effective measures (within a certain time frame), but not larger. Within an optimal budget, all those, and only those, measures whose marginal benefits were greater than the marginal costs could be funded.

Traditionally, cost-benefit analysis has not been used to determine the size of the budget. Public budgeting tends to be a rather conservative process, in which the budget for the current year is mainly based on last year’s budget, allowing only for changes in prices and, usually, small changes in the volume of activity. Budgets therefore tend to be quite stable over time.

The stability of public budgets over time is not just the result of the conservative bias built into the process by which budgets are prepared. In some cases, budgets are determined by means of a process of negotiation, or horse trading, resulting in a game-theoretic equilibrium that can be very stable and resistant to change. A case in point is the regional allocation of state funds for national road investments in Norway. This case is analysed in greater detail by Elvik (1995); in this report only the basic ideas of the horse trading game will therefore be explained.

Imagine that there are five voters. These five voters are faced by five issues, all to be decided by majority vote. Each issue is an investment project which is of particular concern for one of the voters, but less important for the other four. Table 1 shows the net benefits (+) and net costs (–) to each voter associated with each issue.

Table 1: Numerical example of a horse-trading game (also referred to in the literature as vote trading or logrolling). Five voters and five issues. Net benefits (+) or net costs (-) to each voter.

	Issues				
Voters	1	2	3	4	5
1	+10	–8	–3	–7	–4
2	–9	+20	–13	–1	–8
3	–6	–7	+15	–9	–5
4	–2	–1	–7	+30	–3
5	–2	–3	–2	–7	+10
Total net benefits	10	20	15	30	10
Total net costs	19	19	25	24	20
Benefit–cost ratio	0.53	1.05	0.60	1.25	0.50

For voter 1, it is essential to ensure passage of issue 1. If issue 1, perhaps a local road investment project, is passed, voter 1 gets a net benefit of 10. Voter 2 takes a strong interest in issue 2, voter 3 in issue 3, and so on. The payoff matrix in Table 1 can be interpreted as a model of the provision of local public goods, funded by means of grants from the central government. Local road safety measures fit the description of local public goods. Since most traffic is local, the benefits are almost exclusively local, whereas the costs are spread among all taxpayers.

In order to ensure passage of issue 1, voter 1 needs the support of at least two other voters. The logic of the game of vote trading, or horse-trading, is that: “I will vote for you if you vote for me”. Voter 1 therefore starts looking for other issues he might be able to support. Issue 2 is not very attractive. It is expensive, carrying a net cost of 8 to voter 1. Issues 3 and 5 are the most attractive ones to support for voter 1. Voter 1 therefore approaches voter 3, whose salient issue is issue 3, to ask for his support. As it happens, voter 3 considers voter 1 an attractive partner, since voting for issue 1 only costs voter 3 a loss of 6, whereas voting for issues 2 and 4 carries a price tag of 7 and 9, respectively, for voter 3.

By an analogous reasoning, voters 1, 3, and 5 agree to form a coalition to vote for issues 1, 3 and 5. For voter 1, the net benefit of this solution is: 10 – (3 + 4) = 3. For voter 3, the net benefit is: 15 – (6 + 5) = 4. For voter 5, the net benefit is: 10 – (2 + 2) = 6. Hence, all three voters in the coalition gain from the agreement and issues 1, 3 and 5 are passed by majority vote.

Society at large loses by this arrangement, however. At the bottom of Table 1 is shown the net benefits and costs to society of the five issues. It is seen that issues 2 and 4 have benefits greater than the costs, whereas for issues 1, 3, and 5, benefits are smaller than costs. If the budget were to be allocated according to a cost-benefit analysis, issues 2 and 4 would be funded. Issues 1, 3, and 5 would not be funded. However, if the budget is allocated according to a horse-trading game, exactly the opposite happens. The least cost-effective proposals are supported, because it is in the interest of a majority to support these proposals.

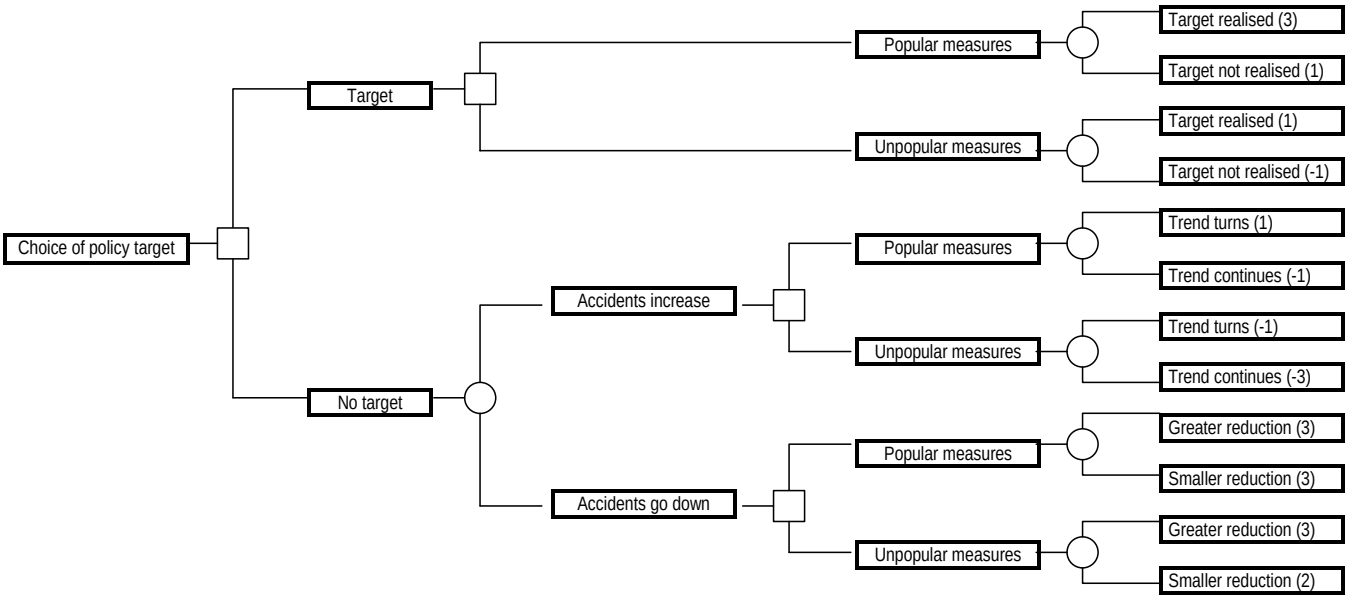
Analyses made by Elvik (1995) show that the regional distribution of state funds for national road investments in Norway is consistent with what a horse-trading model

would lead one to expect. Huge funds are given to remote counties, in which the benefits of the investments are smaller than the costs. It is important to understand that such a distribution can be explained in terms of rational choice theory, as the equilibrium solution to a horse-trading game. Politicians who want to bring local benefits to their constituency are rational to engage in horse-trading. A totally different system for determining the size of public budgets would need to be introduced in order to prevent horse trading from taking place. As long as it takes place, one cannot expect the allocation of budgets to be optimal from the point of view of cost-benefit analysis.

4.3.5 The rationality of political opportunism

For politicians, acting opportunistically can be very rational. By political opportunism is meant the tendency for politicians to act in ways that will maximise their popularity. To illustrate the temptation to act opportunistically, consider the decision to set a quantified road safety target. While such a target, as indicated above, can be a mixed blessing in a system designed to promote efficient priority setting, it can also have a number of useful functions and act as a catalyst for road safety policy.

Figure 3, reproduced from Elvik (2001) shows a decision tree for politicians faced with the choice of whether or not to set a quantified road safety target. The decision tree shows that it is sometimes rational for politicians to prefer vague policy objectives. This is easily shown by means of a model making fairly innocuous assumptions about the preferences of politicians. Figure 3 is a decision tree, showing the options facing politicians with respect to the formulation of road safety targets. The squares denote decision nodes, that is, points at which a decision is made between the options that form the branches emerging from the squares. The circles denote chance nodes. These are points at which the outcome of a decision is determined partly by chance, meaning that politicians do not have full control of the outcome.



Preference relations assumed, ceteris paribus:

Clear (quantified) targets 〉 No clear targets

Popular measures 〉 Unpopular measures

Reduction in accidents 〉 Increase in accidents

Payoff for outcomes assumed, ceteris paribus:
if accidents are unchanged;

Clear target: 1; No clear target: 1, if accidents go down; 0

-1 if accidents increase

Popular measures: 1; unpopular measures: -1
Accidents go down: 1; accidents increase: -1

Figure 3: Decision tree for politicians

Politicians are faced with the choice of either setting a clear, perhaps quantifiable, road safety target, or not doing so. If a clear target is set, there is a choice between popular and unpopular measures to realise it. The measures taken, irrespective of whether they are popular or not, will either realise the target or they will not. These outcomes are indicated by the boxes to the far right in Figure 3. Inside each box, the payoff to politicians of that outcome is shown. The numbers denoting payoffs are meant as an indicator of ordinal preference only.

If a clear policy target is not set, it is assumed that the actions taken by politicians will depend on how the number of accidents develops. If accidents increase, politicians can take either popular or unpopular action to curb the increase. If accidents go down, the same options are available, but the need for exercising them will perhaps not be felt as equally pressing. Figure 3 shows that as long as accidents tend to decline, politicians are likely to prefer not setting a clear policy target. It is only when accidents increase that the option of setting a clear target becomes more attractive. Although this conclusion is bound to follow from the assumptions made in the model, it is still of some interest, as these assumptions are not highly unreasonable.

4.3.6 Unfunded mandates and excessive delegation of authority

One of the most fashionable ideas of current governmental reform in many democracies is to delegate as many tasks as possible to the lowest level of government. The arguments made for such reforms are that local problems are best solved at the local level, and that local government can be reinvigorated if it is given more tasks and more freedom to choose how to solve these tasks.

It is very often the case, however, that tasks are handed over to local government without any accompanying resources. Delegation of policy functions without the supply of additional resources is referred to as unfunded mandates. Local government is asked to perform a function, but is not given additional grants for it. For example, the Danish road safety plan for the period 2000-2012 makes the assumption that a number of road safety measures will be carried out at the local level, but does not provide funding for it.

The delegation of the responsibility for road safety to the lowest level of government, without extra funding, may make the use of formal efficiency assessment tools less likely and may lead to serious sub-optimisation. In the first place, small municipalities will rarely have technically trained staff to perform efficiency assessment. In the second place, the smallest municipalities have, at least in predominantly rural and sparsely populated countries like Norway, Finland or Sweden, a very low number of accidents per year – often less than 10 injury accidents per year. Such a low number of accidents may not be felt as a problem. In the third place, small municipalities have fewer road safety measures to choose from than national governments. They cannot issue vehicle safety regulations. They cannot introduce police enforcement. They cannot afford large road investments. In short, delegation of road safety policy to local government is likely to lead to a less systematic planning of road safety measures, a “tunnel vision” analysis of road safety problems, in which only the most trivial local problems are seen, and the bigger picture is lost, and hardly any use of efficiency assessment tools as an aid in setting priorities for road safety measures.

On the other hand, keeping decision making authority as close to citizens as possible may lead to more involvement by the public in the process of making decisions. This may in turn result in decisions that are more widely supported and more likely to be implemented.

4.3.7 Abundance of resources

The complaint is sometimes made that a lack of resources prevents cost-effective measures from being implemented. This argument is clearly relevant when measures have been ranked by benefit-cost ratio, all the best measures have been implemented, but there is still a large pool of cost-effective measures that cannot be funded. In such a situation, there is scarcity, in that the current budget is too small to fund all cost-effective measures. One would expect scarcity to provide a strong incentive for efficient priority setting, thus encouraging the use of efficiency assessment tools.

Studies of the influence of cost-benefit analyses on priority setting for road investments in Norway (Fridstrøm and Elvik 1997, Nyborg 1998) show that actual priorities are only weakly related to the results of these analyses. Nearly half of the investment projects that are funded by the national government have benefits smaller than the costs. These projects are nevertheless funded, for “other reasons”, the nature of which is almost never revealed, other than their contribution to overall welfare. In the long run, say during a period of some 10-12 years, virtually all the investment projects proposed for national roads in Norway that have ever been proposed are implemented, including those whose benefits are frightfully close to zero.

In fact, one may ask whether the formal priority setting process for road investments is merely a ritual act. Evidence from interviews of Norwegian politicians suggests that the road sector has an abundance of money, and does not really need to set priorities. It gets everything it asks for. Thus Nyborg writes (1998, 398): “In our data, there was some evidence that the total amount of money allocated to construction of national roads was quite generous, as compared to other Norwegian public sectors. For example, when asked which projects they were against, several respondents could not remember any. … If it is true that the budget restriction did not bind too tightly, this may have contributed to a political situation where efficiency was less important.” Why indeed bother about efficiency, when funding is so generous that every project ever proposed is ultimately realised, no matter how small its benefits.

4.3.8 Rigidity of reallocation mechanisms

There is scarcity of resources whenever cost-effective measures cannot be implemented for a lack of funding. Relative scarcity and rigidity of budget reallocation mechanisms can prevent priorities from being set strictly according to efficiency criteria, as can be illustrated by the following hypothetical data:

Sector 1: Budget 500			Sector 2: Budget 1,000		
Measure	Benefits	Costs	Measure	Benefits	Costs
A	700	300	E	300	300
B	400	200	F	200	300
C	150	100	G	100	200
D	120	100	H	50	200

Sector 1 has a budget of 500, allowing for measures A and B to be implemented, yielding a total benefit of 1,100. Sector 2 has a budget of 1,000, enough to implement all its measures, giving a total benefit of 650. Overall benefit is 1,750 for an overall cost of 1,500. If the budget for sector 2 is reduced by 200, which is transferred to sector 1, sector 2 would drop measure H, while sector 1 could introduce measures C and D. Total benefits would then become 1,970, while total costs would become 1,300.

Rigidity in public budgeting systems often makes this kind of transfer difficult, or impossible. The result is that overall priorities (across sectors) become less efficient than they would if transfers between sectors were possible.

4.3.9 The timing of efficiency assessment in the policy making process

The timing of efficiency assessment in the policy making process has two aspects. One timing aspect relates to its screening of specified measures, while another relates to its effect on actual implementation of efficient measures. These two aspects may pull in different directions with respect to timing.

Seen from the first aspect efficiency assessment functions as a screening device. Once a measure is found to be inefficient, it is dropped from further consideration. It is therefore essential to conduct a broad survey of potentially effective road safety measures before embarking on formal efficiency assessment. The objective of a broad survey of potentially effective road safety measures is to make sure that every measure is included. Unless a broad range of potentially effective measures is

included, one cannot be sure that the measures that are found to be cost-effective really are the most cost-effective measures.

From this aspect formal efficiency assessment should therefore enter the planning of road safety policy at a comparatively late stage. A premature introduction of formal efficiency assessment can lead to erroneous conclusions, by failing to consider promising measures.

However, from the other aspect of influencing policy implementation, performing EAT at an early stage may enhance the influence of its resulting prioritisation when measures are to be realised. After the screening of relevant (physically effective) measures, the economic efficiency analysis should probably come into the stage swiftly in order to carry weight at the end of the final decision-making process (BCI 2002, OEEI 2003).

4.4 Barriers inherent in efficiency assessment tools

4.4.1 Lack of knowledge of relevant impacts of potentially effective measures

A formal efficiency assessment, whether it is cost-effectiveness analysis or a cost-benefit analysis, requires quite detailed knowledge about relevant impacts of the measure. For a cost-effectiveness analysis, one needs to know at least the following:

1. The types of accidents or injuries affected by a measure, and an estimate of their long term expected values, preferably partitioned according to accident or injury severity.
2. An estimate of the effect of a measure on accidents or injuries, again preferably specified according to accident or injury severity.
3. An estimate of the cost of a measure, both the cost to the public sector and any private costs.

In a cost-benefit analysis, there is also a need to know any other impacts of a measure, in addition to impacts on road safety. Finally, but not least important, all relevant impacts must be valued in monetary terms.

Lack of knowledge of relevant impacts of a measure may make it impossible to perform a formal efficiency assessment. In addition to safety impacts, for CBA one would also want to know the impacts on mobility (travel time) and environmental quality (air pollution, noise). In an analysis of road safety policy in Norway (Elvik 1999), a total of 132 potentially effective road safety measures were surveyed. For 13 of these measures, efficiency assessment was impossible because relevant safety impacts were too badly known. In a similar analysis for Sweden (Elvik and Amundsen 2000), 139 potentially effective road safety measures were surveyed. A total of 15 measures were classified as having too badly known impacts for an efficiency assessment to be made.

Although very many road safety evaluation studies have been reported, and the effects of a large number of road safety measures can be estimated with acceptable accuracy, there are still measures whose effects are unknown. When entirely new measures are introduced, it is obvious that their effects will be unknown. If a road safety measure were to be applied only when its effects are well known, it would become difficult to introduce new measures. In this sense, formal efficiency assessment tools have a conservative bias: These tools are more readily applied to measures that are tried-and-tested, than to more innovative measures.

4.4.2 Lack of monetary valuation of relevant impacts

In order to do a cost-benefit analysis, all relevant impacts of a measure should, at least ideally speaking, be valued in monetary terms. If not all relevant impacts are included, a cost benefit analysis can give biased and highly misleading results. Illustrative, albeit somewhat hypothetical, examples of this can be found in a paper by Elvik (2000). The paper discusses cost-benefit analysis of road safety measures that are primarily intended to benefit pedestrians or cyclists. In addition to influencing road safety, facilities for pedestrians or cyclists are likely to have a number of other impacts for which no credible, or at least no firmly established, monetary valuation exists. These potential impacts include:

1. Savings in travel time. Values of travel time tend to be estimated for motorised travel only, not for pedestrians or cyclists.
2. An increased feeling of safety. Separate facilities for walking or cycling make pedestrians and cyclists feel safer. No adequate monetary valuation of this impact exists.
3. More advantageous route choices. When previously disconnected roads are connected to form an integrated road system for walking and cycling, more advantageous route choices become available. The benefits of these should be assessed in terms of the generalised costs of travel by foot or by cycle. Again, however, estimates of the generalised costs of travel are not available.
4. Walking or cycling as a form of exercise. Some people may take up walking or cycling as a form of exercise. The benefits to public health of this impact are poorly known and inadequately valued in monetary terms.

In a subsequent study, Sælensminde (2002) has attempted to include as many impacts of facilities for walking or cycling as he could in an “ideal” cost-benefit analysis, which was of course not really ideal, since a number of the monetary valuations used in it are highly preliminary. It is nevertheless clear that the lack of monetary valuations of many relevant impacts of measures for pedestrians and cyclists introduces serious bias in current cost-benefit analyses.

This sort of bias can be eliminated by obtaining valuations of all relevant impacts of a measure. Once the number of impacts starts to grow, one should take care, however, to avoid double counting of impacts. Another example of the lack of monetary valuation of relevant impacts, also involving important environmental impacts, is given in Elvik and Amundsen (2000).

4.4.3 Indivisibilities

Strict optimisation requires a marginal analysis of measures. A marginal analysis is an analysis which seeks to determine marginal costs and marginal benefits of a measure. To perform a marginal analysis, it must be possible to vary the level of use of the measure in small steps, and examine the additional costs and benefits associated with each of these small steps. For many road safety measures, a marginal analysis is in principle possible. Conversion of junctions to roundabouts, for example, can reasonably be modelled as a process involving perhaps hundreds of steps, each one involving the conversion of one junction to a roundabout. In Norway, as an example, there are now about 1,100 roundabouts. In principle, each of these, as well as candidates for future conversion, could be ranked according to benefit-cost ratio, thus finding exactly the point at which marginal cost and marginal benefits were equal. Converting junctions to roundabouts would be cost-effective up to this point, but not beyond it. Additional conversions would then produce smaller benefits than costs.

In order to perform a meaningful marginal analysis, two assumptions must be fulfilled:

1. Each road safety measure should be used in the technically most effective way (at the frontier of production technology).
2. The idea of varying the level of use of a road safety measures in so small steps as to approximate a continuous function should make sense.

Indivisibilities refers to a violation of the second assumption. Indivisibilities typically arise in two cases. The first case is legislation. Legislation normally has to apply to the whole country and all citizens. Take mandatory use of daytime running lights as an example. Driver accident involvement rates vary. Some drivers are so rarely involved in accidents, that – for these particular drivers – the benefits of using daytime running lights are smaller than the costs. It is, however, impossible to reliably identify the safest drivers and exempt them from a law requiring the use of daytime running lights. The law has to apply equally to everybody. It may not be the case that benefits are exactly equal to costs; in this sense strict optimisation may not be possible.

The second case of indivisibilities concerns technical standards set for road maintenance and traffic control devices. Any road that is open to traffic needs to be maintained to a certain minimum standard, irrespective of traffic volume. Snow must be cleared, pavements renewed, illegible signs replaced, and so on. It is convenient, and likely to save substantial administrative cost, to standardise as many maintenance functions as possible by setting standards for them. In practice, this means that roads are usually classified into a few classes. High-volume arterial roads are maintained and operated at higher standards than low-volume rural roads. The standards set will, however, not necessarily correspond exactly to the optimal level of maintenance for a specific road. The standards introduce an indivisibility that could in principle be removed, but would then need to be replaced by administrative decisions made on a day-by-day, case-by-case basis (“Should we clear this road of snow, or should we forget about it? Nobody is going there anyway”).

4.4.4 Uncertainty

There are numerous sources of uncertainty in the estimated effects of road safety programmes. Elvik and Amundsen (2000) identify the following sources of uncertainty:

1 Uncertainty in the definition of the target group of accidents or injuries affected by each road safety measure.
2 Random variation in the number of accidents or injuries affected by each road safety measure.
3 Incomplete and variable reporting of accidents or injuries in official accident statistics.
4 Random variation in the estimated effect of each road safety measure on the number or severity of accidents or injuries.
5 Unknown sources of systematic variation in the effects of each road safety measure on the number or severity of accidents or injuries.
6 Incomplete knowledge with respect to how the effects of each road safety measure are modified when it is combined with other road safety measures to form a strategy consisting of several measures affecting the same group of accidents or injuries.
7 Uncertain estimates of the societal costs of accidents or injuries and the value of preventing them.
8 Uncertainty with respect to the duration of the effects of each measure on accidents or injuries.

At the current state of knowledge it is not possible to meaningfully quantify all these sources of uncertainty. Following a discussion of each source of uncertainty, Elvik and Amundsen (2000) conclude the following with respect to the possibility of quantifying the sources:

Source of uncertainty	Possibility of quantification
1: Which accidents or injuries are affected	In principle, quantification is possible; in practice this is rarely considered
2: Random variation in count of accidents or injuries	Can easily be quantified by relying on the Poisson probability law
3: Incomplete accident reporting	In principle quantification is possible; in practice it is usually disregarded
4: Random variation in effects of road safety measures	Can be quantified by relying on confidence intervals for estimates of effect
5: Unknown systematic variation in effects of road safety measures	As long the sources of systematic variation remain unknown, it is difficult to account for them
6: Modification of effects when several road safety measures are combined	Too little is known about it to quantify this source of uncertainty
7: Uncertain monetary valuation of road safety	Part of the uncertainty can be quantified; part of it is not of a statistical nature
8: Uncertain duration of effects	Very difficult to quantify at the current state of knowledge

In traditional normative decision theory, a distinction is made between four cases, depending on how well known the potential consequences of a decision are:

1. Decisions under certainty: All consequences are known with certainty.
2. Decisions under risk: All consequences are known and their probability of occurrence can be estimated.
3. Decisions under uncertainty: All consequences are known, but their probability of occurrence is unknown.
4. Decisions under ignorance: Not all consequences are known, nor can their probabilities of occurrence be estimated.

Decisions made about road safety measures represent a mixed case. Some of the consequences of these decisions are fairly well known, others are less well known, and some may not be known at all. This means that it is rather difficult to adequately describe the uncertainty inherent in such decisions.

One rarely sees any attempt to discuss, let alone quantify uncertainty, in formal efficiency assessment. This is regrettable. In some cases, uncertainty will be so great that it ought to be considered explicitly when decisions are made. Consider, as an example, the following two road safety measures:

Measure A	Measure B
Best estimate of benefit cost-ratio: 2.0	Best estimate of benefit-cost ratio: 1.5
95% prediction interval for benefit-cost ratio: 0.5 – 3.5	95% prediction interval for benefit-cost ratio: 1.2 – 1.8

In this case, a decision maker disregarding uncertainty would opt for measure A. A decision maker who considered uncertainty might want to prefer measure B, since it gives an assurance that benefits will be greater than costs. In that case, an explicit consideration of uncertainty would lead to a different choice from that based strictly on the best estimate of the benefit-cost ratio.

4.5 Barriers related to the implementation of efficient road safety measures

4.5.1 Social dilemmas

Costs and benefits of road safety measures can be assessed from various perspectives. Cost-benefit analysis takes a societal perspective, in which all impacts are included and valued according to market prices or the willingness-to-pay (for non-market goods). Road users may adopt another perspective. From the road user perspective, some of the impacts that are relevant from the societal perspective will

be external, and will therefore not be included. Two examples will be given to illustrate this point.

The first example concerns the use of studded tyres. Several cost-benefit analyses of this measure have been made in Norway. One of these analyses, made by Christensen (1993) is particularly illuminating. The main results of the analysis are summarised below:

	Amounts in million NOK (1 NOK = 0.12 EURO)	
Item	Gains (favourable impacts)	Losses (adverse impacts)
	Gains and losses to road users	
Accidents	132.5	
Travel time	53.1	
Additional trips made	5.0	
Costs of studded tyres		95.2
Fuel consumption		44.0
Total impacts	190.6	139.2
	Gains and losses external to road users	
Accidents	61.4	
Road wear		46.4
Air pollution		180.0
Total impacts	61.4	226.4
	Gains and losses for society as a whole	
Total impacts	252.0	365.6

Cars having studded tyres have a lower accident rate than cars not having studded tyres. They are driven slightly faster, and owners tend to cancel fewer trips because of slippery roads. On the other hand, studded tyres cost more than standard tyres, and are associated with a small increase in fuel consumption. Still, from the road users' point of view, studded tyres make sense. Benefits are greater than costs, so it is not surprising that many car owners opt for studded tyres.

The external impacts of studded tyres are, however, quite significant. Part of the benefit in terms of fewer accidents is an external benefit, since part of the costs of accidents are external from the road users' point of view. However, studded tyres wear down roads. Moreover, the grinding of the road surface by the studs tears off particles, which are suspended in air and may impair health, in particular by worsening the condition of people who suffer from respiratory diseases. Inhalation of micro-particles may also lead to premature deaths. These external impacts are clearly negative.

When impacts for road users and external impacts are added, losses are larger than gains. This is a social dilemma. Car owners will prefer studded tyres, as the advantages are greater than the disadvantages. From a societal point of view, on the other hand, studded tyres should not be allowed.

A second illustration involves the determination of optimal speed limits. The optimal speed limit is that speed limit which minimises the total costs to society of travel. From the drivers' point of view, the major impacts of speed choice include travel time, the risk of accidents, fuel consumption and the pleasure of choosing a preferred speed. From a societal point of view, environmental impacts should be considered in addition to the impacts that drivers take into consideration. Moreover, part of the cost

of accidents are external; hence drivers are likely to underestimate the impact of speed choice on the accident rate.

In a paper, Elvik (2002) has estimated optimal speed limits for Norway and Sweden based on four different perspectives. Comparing the road user perspective and the societal perspective gave the following results or Norway:

	Optimal speed limits in km/h by perspective	
Category of road	Road user perspective	Societal perspective
Motorway class A	110	100
Motor traffic road	90	80
Rural main road	80	70
Urban arterial road	60	50
Access road	50	40

As can be seen, the speed limits that are optimal from the road users' point of view are always higher than those that are optimal from the societal point of view. This can obviously create conflicts. If government wanted to introduce optimal speed limits, many road users would protest and argue that those limits were too low.

The existence of social dilemmas is probably a major reason why not all road safety measures whose benefits are greater than the costs are introduced. Road users view the impacts of these measures from a different perspective. The fact that, from a societal point of view, benefits are greater than costs does not by itself make a road safety measure popular.

4.5.2 Lack of power

Suppose one of the progressive countries of the world, let us say Sweden, wanted to introduce technology for intelligent speed adaptation as a new safety standard for cars. Would the Swedish government be able to do that? Not likely. The European Union strives to harmonise vehicle safety standards. If one member country were suddenly to set different safety standards from all other countries, this would probably be considered as trade discrimination, since any new safety standard would add to the costs of a car. In short, the Swedish government does not have the power to introduce national safety standards for motor vehicles.

Lack of power may prevent some cost-effective road safety measures from being introduced. In particular this is likely to apply to a number of vehicle safety standards, that some national governments might want to introduce unilaterally, but no longer have the power to do so. This may also be seen as an error in the design of institutions – that the power to make decisions is not placed at the level of government that has the greatest interest in exercising the power.

4.5.3 Vested interests

There are vested interests in road safety programmes. In discussing the problem of performing good road safety evaluation studies, Ezra Hauer (1991:136) writes: "Now, it is the nature of road safety that it is not visible to the naked eye. Nobody can tell whether a programme was a success or failure unless trained and independent researchers are given the opportunity to devise and carry out long-term studies. By the time estimation of programme effect is possible, the public body has already developed a large stake in its success. Under these circumstances why should the stewards of public bodies wish to find out what effect their programme has had? Nobody is attracted by the possibility of political, institutional, professional or personal

embarrassment. The upshot is that programmes are rarely evaluated, and if evaluated, this is done "in-house", with success eagerly sought and failure unpublicised. In this inhospitable soil, spindly flowers of factual knowledge grow in the shadow of the weeds of misinformation."

One can easily give examples of how vested interests in road safety programmes have developed and are stifling research, or at least trying to fight it back. In Norway, the association of driving schools has for a long time successfully lobbied the Public Roads Administration to set very strict standards for obtaining a driver licence. Teenagers in Norway who want to learn to drive, are required to undergo an extensive training programme, costing thousands of kroner. There is no evidence that any of the various training programmes that have been introduced over the years improve safety.

The consequence of the way policy concerning driver training is made in Norway, is that no serious cost-benefit analysis of different training schemes has ever been made. Cost-benefit analysis is not applicable to driver training, it is argued, because "we need to train drivers no matter what it costs". Besides, it is argued that: "trying to measure the effects of training in terms of accidents is misguided; other indicators should be used". Regrettably, rational analysis has so far been driven out by religious gobbledygook, propagated by powerful commercial interests that government has so far not been able to stand up to.

4.5.4 Lack of incentives

It is sometimes argued that: "Since road accidents impose such huge costs on society, there must be a lot of profitable opportunities to invest in road safety measures that will reduce these costs." This argument is flawed. The mere fact that road accidents impose huge costs does not mean that reducing these costs will be easy. Indeed, not even the fact that a road safety measure has been found to be very cost-effective guarantees that it will be implemented. Consider the case of police enforcement. The current status can be summarised as follows.

It is apparent that violations of road traffic legislation is a major road safety problem, and that increasing enforcement can reduce this problem. Cost-benefit analyses (see e.g. Elvik 1999 and Elvik and Amundsen 2000) show that even quite substantial increases in the amount of police enforcement – such as trebling the number of officers – would give benefits greater than costs. Still this does not happen. Why not?

The reasons are probably related both to the way the police currently organise their work, and to a lack of incentives. The police have many duties. Most of the time, the police act only when a crime is reported and resources need to be deployed to solve the crime. Trying to reduce traffic violations by doing more enforcement is a task, which by its nature differs from many other tasks assigned to the police.

In the first place, the police have to go looking for violations on their own, rather than waiting for reports from the public. In the second place, most traffic violations are minor. There is usually no victim of the crime. Most of the time, speeders do not have accidents; they simply reach their destinations sooner than those who do not speed. While homeowners are grateful when burglars are caught, few speeders rejoice at the sight of a police patrol. In the third place, to the extent that the police are successful in detecting and prosecuting traffic violators, traffic enforcement will be reduced. Successful traffic enforcement brings about its own demise: Why should

police offers waste their time watching over road users who are perfectly compliant? If the police succeed in bringing down violations, they will therefore be tempted to reduce the amount of traffic enforcement, at least temporarily, until the number of violations starts rising again. In the fourth place, the benefits of more effective traffic enforcement in terms of fewer accidents are, in a sense, invisible. Nobody records accidents that were prevented, only those that occur.

For these reasons, it is likely that there is too little traffic enforcement in many countries. Can the barriers to increasing traffic enforcement be removed, or at least made less powerful? The key to getting more police enforcement and to promoting the optimal use of enforcement is to provide the right incentives for it:

- Firstly, there should be a dedicated traffic police, doing traffic enforcement only. That is the only way to prevent traffic enforcement from losing in the competition with other, perhaps more challenging, police duties.
- Secondly, the traffic police should be funded by income generated from traffic tickets. The more tickets the higher the income. This would give the police an incentive to do as much enforcement as they possibly could.
- Thirdly, the size of the tickets or fines imposed for various types of violations should be proportional to the accident risk represented by the violation. Drinking and driving has a major effect on accident risk. The fine for drinking and driving should therefore be substantial, say, 10,000 Euro at a BAC-level of 0.012. Illegal parking, on the other hand, may not have much of an effect on accident risk. For this type of violation the fine should perhaps be 10 Euro.
- Fourthly, the deployment of police manpower should be completely randomised. Why? There are three main reasons. In the first place, road users have an uncanny ability to detect the presence of police enforcement. Once a place gains a reputation for being frequently visited by the police, some road users will choose other routes, or behave nicely just at that location. If enforcement is completely at random, no such pattern can be detected and road users will be hard put to second guess the police. In the second place, randomisation will prevent the ebb and flow pattern that characterises traditional enforcement: intense enforcement followed by withdrawal, followed again by intense enforcement, and so on. In the third place, a random deployment of police enforcement is equitable, in that, ideally speaking it gives every road user the same probability of encountering a police patrol. Today, one of the most common criticisms of the police is that they target some groups of road users more than others.

If enforcement could be organised the way described above, it is likely that both the amount of enforcement, and the targeting of enforcement to different types of violations, would be much closer to the social optimum than is the case today.

4.5.5 Lack of marketing

The desirability of implementing efficient road safety measures may seem obvious to many economists. To most ordinary mortals it is not necessarily so. In addition to social dilemmas, conflicts of interest and lack of power or incentives, the efficient solutions may in some cases be hampered merely by the lack of an information strategy related to, e.g., a CBA. Certainly, in some cases a CBA result may be hailed and propagandised by strong lobbyists that find themselves benefited, but in other cases the feeble voice of an economist may easily drown in the howling chorus of vested interests, sensationalist media or narrow-minded politicians. If it is regarded as important to use EAT in the decision-making process some concern should also be lent to the propagation of the results of the efficiency analyses. This includes both a pedagogical aspect – that the results should be presented in a comprehensive way, and an emphasising aspect – that benefits of road safety measures actually represent saved lives and limbs (BCI 2002, OEEI 2003).

4.6 Alternative barrier dimensions

In the first part of the ROSEBUD project, Work Package 1 (ROSEBUD-WP1 2003), a main distinction of barriers is given between *use* and *implementation*. Barriers to use are presented as comprising the categories A, B and C, according to the typology used in this report. In Work Package 1 a main emphasis is given

- to the institutional barrier of not having mandatory efficiency assessment of road safety measures – or that it is not mandatory to include road safety impacts in CBA of infrastructure developments – (closely related to B2/B3), and
- to the technical barrier of lacking regular guiding on safety effects (closely related to C1).

Barriers to the implementation basically amount to category D. However, it is also indicated that technical (methodological) problems may constitute a barrier to the implementation.

Although the main issue of this report is the identification of barriers, it should also glimpse ahead at possible solutions for the identified barriers, which is the topic of Work Package 3. Thus, barriers will be classified as *absolute* or *relative* (Bax and Wesemann 2003). Absolute barriers denote the barriers that are not readily influenced by proposals from the Thematic Network ROSEBUD. These comprise primarily barriers related to the implementation (category D) and the institutional barriers (category B). It is reasonable to assume that barriers well rooted in policy implementation and, partly, in the organisation of policy-making will not be surpassed or eliminated within any short-termed time horizon. One might also reckon fundamental barriers (category A) among the absolutes at least, if it is presumed that such objections to EAT are not founded on lack of information about EAT or misunderstandings about EAT.

The relative barriers comprise primarily the technical barriers (category C). These barriers can in principle be influenced by providing improved knowledge and guiding on impact assessment, valuation methods for risk reductions, and treatment of uncertainty. Some institutional barriers, especially those closest linked to the technical barriers (like B9 and B2), could also constitute relative barriers.

The barriers typology from A to D and its relation to the dimensions of use and implementation and of absolute and relative is illustrated in Figure 4.

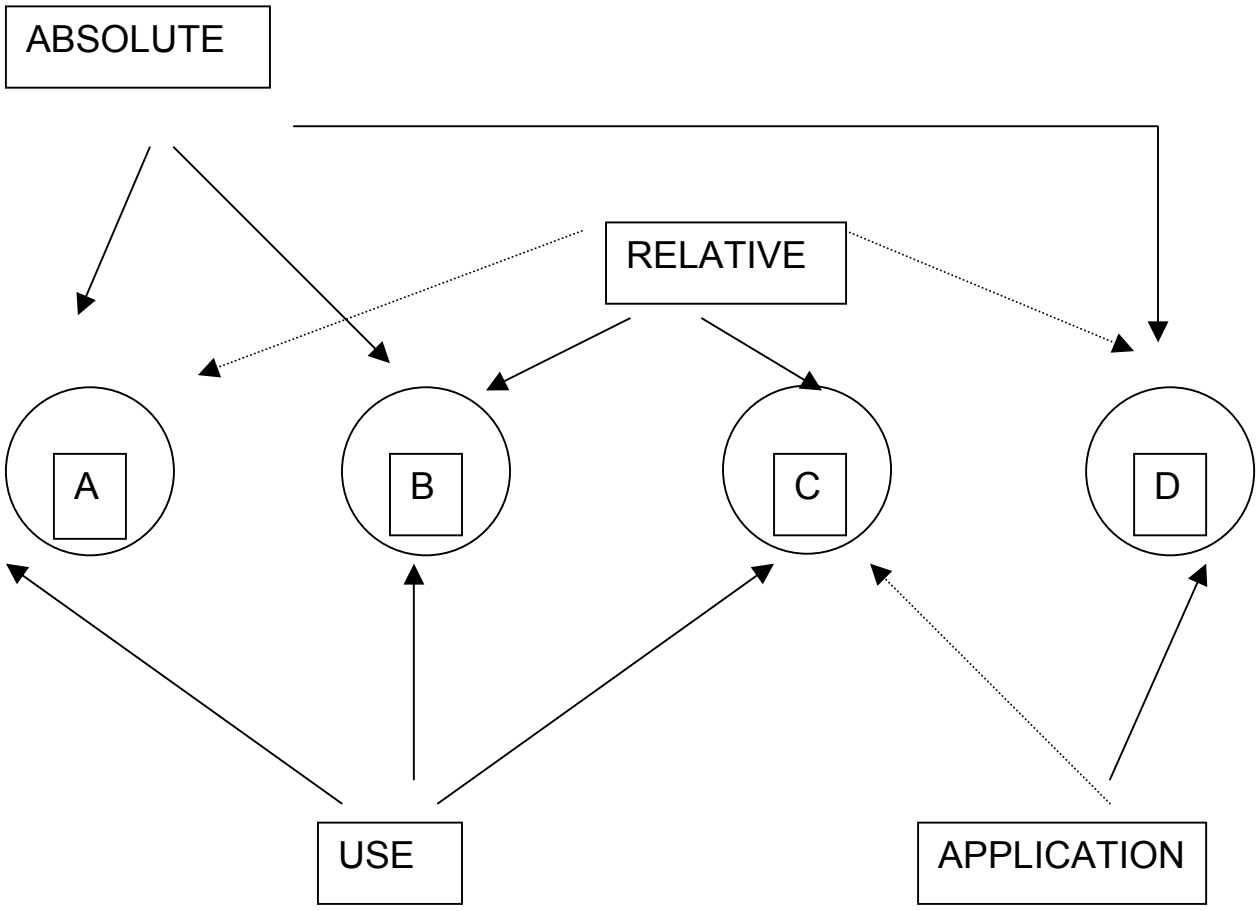


Figure 4: The typology of barriers and its relation to use-implementation and absolute-relative.

The relevance and importance of the four groups of barriers to the use of EAT will be assessed with respect to the collected statements of European decision makers.

5 Description of interviews with decision makers

5.1 Questionnaire design

The questionnaire was primarily designed to elicit decision makers' own assessments of barriers to the use of efficiency assessment tools (EAT) in road safety policy. The questions comprised issues of all four categories of barriers, i.e., relating both to the fundamental, the institutional, the technical, and to the implementation. However, the strongest emphasis was on technical (inherent/methodological) issues and issues related to the organisation of policy-making (institutional), especially those that eventually can be influenced.

A one-person pre-test of a first draft questionnaire was carried out in the beginning of May 2003. This was followed-up with adjustments and pilot testing of the new draft questionnaire on two decision makers in late May. Certainly, this forms a limited testing, but the period for design did not allow a more comprehensive development.

Notwithstanding this, the limited testing indicated that the questionnaire functioned fairly well, and the main surveying was initiated on 4 June, at the national level.

The main questionnaire contained approximately thirty questions, including those asking for background information. It was designed for personal, face-to-face interviews. Although put into fairly fixed forms the questions were open-ended to enable the interviewees to broaden their opinions. Further, since the interviewees generally had a distinct aptitude to express themselves about the topic of the survey, it is probably not undue to characterise the interviews as a hybrid of quantitative and qualitative approaches.

However, different approaches to the application of the questionnaire were taken in the different countries. In various cases the questionnaire was mailed to a respondent for self-administered filling-in, instead of conducting a personal interview. Since the questionnaire was only slightly altered in the development process, and since the sample consisted of experts rather than ordinary citizens, we have chosen to include all observations in one pile. It will be noted in the country-specific summaries below if face-to-face or mail survey was performed.

Some small differences also exist between questionnaires applied at different decision levels. A couple of questions were edited, added or skipped, for the survey at the local/regional level and EU level, relative to the national level. However, in general, the questions are comparable between decision levels.

It is to be remarked that the introduction to the questions stressed the confidentiality of responses. Thus, we provide respondent background information only to the extent that identification of single respondents cannot be revealed. The interviewees were also told that they would be asked about personal opinions and personal knowledge – not be confronted primarily with quizzes and knowledge tests. Further, they were informed that the purpose of the interview was to learn more about the use of formal methods for impact assessment in planning and priority setting for road safety measures. Explanations were also given of the meaning of the concepts of impact of safety measures, CEA and CBA.

For the evaluation of the responses the following should be remembered. Those interviewed provide a mix of information about practices and attitudes in their respective institutions and organisations and their own personal practices and attitudes. To some extent the cast of the question will indicate if the response is a personal decision-maker indicator or a institutional indicator, but the division is not clear cut. Related to the question about barriers, one question will be considered principal, asking openly about major reasons for not always applying EAT. Other questions ask about specific barrier topics, thus providing a stronger framing.

5.2 The survey at the national level

The sample size at the national level was 50. This included 10 from Norway (No), 6 from The Netherlands (Nl), 6 from Germany (De), 12 from Italy (It), 5 from Hungary (Hu), 7 from the Czech Republic (Cz), and 4 from Israel (Il).

Most of the interviewees were from the bureaucratic level, about 30 from either the Ministry of Transport or the Public Road Administration. The rest were mostly

transport or road safety consultants, researchers or officials, with some few from the police. Only three politicians were included.

About half of the interviewees were in a manager/director position in their institution or organisation. Nearly half of them had engineering background, with economics and law as the second and third most numerous backgrounds. Also, about half of the interviewees either worked with EAT on road safety or made decisions based on such tools. Most of the remaining made decisions based on non-economic approaches.

5.3 The survey at the local/regional level

The sample size at the local/regional level was 27. This included 4 from Norway (No), 4 from The Netherlands (Nl), 3 from Germany (De), 6 from Italy (It), 3 from Hungary (Hu), 3 from the Czech Republic (Cz), and 4 from Israel (Il).

Most of the interviewees represented regional or municipal public institutions with responsibility for transport and road safety planning. The rest mainly comprised road safety authorities or interest groups.

More than ⅓ of the interviewees were in a manager/director position in their institution or organisation. More than ⅔ had engineering background. An identical proportion made decisions based on non-economic approaches. Very few worked with EAT on road safety or made decisions based on such tools.

5.4 The survey at the EU level

Six interviews were performed at the European level – some at the superior level and some at the transport professional level. They predominantly represented the manager/director position in their institution or organisation. Economists and engineers were approximately equally present in the sample. Many made decisions based on EAT.

5.5 Quantitative summary of responses

5.5.1 A caveat about quantification

An attempt is made to summarise in tables the answers to the questions. This should only be regarded as a contraction of multifarious open-ended responses and statements. Although some tendencies can be identified, this is not meant to be a waterproof statistical analysis of clearly identified categories. The samples from each country or decision level are also somewhat too small and unbalanced to enable well-founded statistical analysis. They represent small convenience samples of experts. Further, the samples from the large countries are not larger than samples from smaller countries. Although a weighting procedure may provide a counterbalance, it will not offset the basic problem of small convenience samples from each country. A procedure that equalises sample size differences and adds population weight has been undertaken, and in cases where such a weighting procedure alter the results it will be stressed.

Tables/questions are presented thematically, merging the national and local/regional level. This was judged to be defensible due to relatively small overall differences between the national and local/regional level. The EU level is given as “a single nation” in the tables. The numbering of questions will follow the questionnaire applied at the national level (indicated by N); specific questions not applied at the national level will be noted.

5.5.2 The reported use of EAT in decision making process

Que. N6. To what extent is EAT performed for RS measures?

	EU	No	Nl	De	It	Hu	Cz	Il	all
generally performed	**1**	**6**	**7**	**1**	**3**	**1**	**0**	**0**	19
to some extent performed	**1**	**2**	**2**	**4**	**1**	**2**	**0**	**0**	12
only exceptionally performed	**3**	**4**	**1**	**2**	**0**	**2**	**0**	**1**	13
not performed	**0**	**2**	**0**	**2**	**10**	**1**	**5**	**7**	27
other / don't know	**1**	**0**	**0**	**0**	**4**	**2**	**5**	**0**	12

Que. N3. What method is applied for making preliminary decisions on RS measures?

	EU	No	Nl	De	It	Hu	Cz	Il	all
primarily CBA	**1**	**4**	**3**	**2**	**0**	**0**	**2**	**0**	12
primarily CEA	**1**	**0**	**1**	**0**	**1**	**1**	**0**	**0**	4
primarily expected impact - some EAT	**0**	**3**	**1**	**2**	**1**	**2**	**0**	**0**	9
expected impact / accident data	**0**	**3**	**0**	**1**	**3**	**1**	**5**	**5**	18
qualitative / mix	**2**	**3**	**3**	**4**	**3**	**3**	**1**	**1**	20
experience	**0**	**1**	**0**	**0**	**2**	**0**	**0**	**2**	5
Other	**2**	**0**	**2**	**0**	**8**	**1**	**2**	**0**	15

Que. N5. Will costs for RS measures imposed on road users be estimated?

	EU	No	Nl	De	It	Hu	Cz	Il	all
yes, generally	**0**	**1**	**4**	**0**	**2**	**1**	**3**	**0**	11
If costs are known	**4**	**4**	**1**	**0**	**1**	**1**	**0**	**0**	11
No	**1**	**4**	**0**	**6**	**9**	**3**	**2**	**4**	29
other / don't know	**1**	**1**	**1**	**0**	**0**	**0**	**2**	**0**	5

EAT applied for RS measures (Que. N6) and preliminary decisions (Que. N3) is mostly reported by the Northern European countries (Norway, Netherlands, Germany). It was only exceptionally applied in the Southern/Central countries (Italy, Hungary, Czech Republic, Israel) – in the Czech Republic the HDM-4 methodology has been used. A similar pattern is found for the estimation of costs of RS measures for road users, except that German interviewees reported that these costs are not estimated. (Que. N5 was only applied at the EU and national levels.)

5.5.3 Major reasons for not applying EAT

Que. N7. Major reasons why EAT are not always performed?	EU	No	Nl	De	It	Hu	Cz	Il	all	
emotional barriers	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	3	A
measure decided at the outset	**0**	**7**	**1**	**0**	**0**	**0**	**0**	**0**	8	B
EAT not applied anyway	**3**	**2**	**3**	**2**	**1**	**1**	**1**	**2**	15	B
lack of resources/tools	**3**	**3**	**0**	**1**	**5**	**3**	**4**	**2**	21	B
EAT not recommended/imposed	**0**	**1**	**1**	**0**	**2**	**0**	**6**	**3**	13	B
impact is unknown	**5**	**6**	**5**	**2**	**9**	**2**	**2**	**3**	34	C
safety valuation difficult/lacking	**0**	**0**	**2**	**1**	**6**	**0**	**0**	**1**	10	C
EAT disputed/non-trusted	**0**	**0**	**0**	**4**	**0**	**0**	**0**	**5**	9	B
measure small/cheap	**1**	**3**	**2**	**2**	**0**	**0**	**0**	**2**	10	B
EAT unfamiliar/unknown	**0**	**1**	**3**	**1**	**6**	**0**	**0**	**0**	11	B
€ of RS conflict other interests	**2**	**1**	**2**	**1**	**1**	**2**	**0**	**1**	10	D
other / don't know	**1**	**1**	**0**	**0**	**2**	**1**	**2**	**0**	7	

One question asked directly about the major reasons why CBA or CEA are not always performed for road safety measures (Que. N7). Various reasons were put forward by (each of) the interviewees, and we have attempted to classify these according to the predetermined typology (given by the extra column at the table's right-hand side).

We find that most of the reasons stated can be grouped under institutional (B) barriers. Among these, the most frequently mentioned were the lack of resources or tools to perform analysis and that EAT simply were not applied anyway or not recommended/imposed. The last reason was especially given by interviewees from Southern/Central countries.

Other institutional barriers that were mentioned included lack of knowledge about EAT or lack of trust in (agreement about) EAT. That small (low cost) RS measures are not considered for efficiency analysis may not constitute a real barrier, in the sense that the analysis should not "cost more than the measure". However, the institutional setting may impede broad scale analysis of classes of small measures (Gitelman et al. 2001, Gitelman and Hakkert 2003).

The reason that most of the interviewees mentioned was the fact that impacts are unknown – a technical barrier (C). Many specified that impacts were unknown for user-related RS measures, e.g., educational measures. Another technical barrier mentioned was the lack of (difficulty of obtaining) monetary values/valuations of reduced accident risk.

Relatively few mentioned barriers to the implementation of efficiency-based policy options (D) among the major reasons for not performing EAT. What was mentioned was the conflict between efficiency and other interests. This could be, although not necessarily, a vested interest barrier.

In the following sub-sections the other questions will be examined for a deepening/broadening of the barrier identification within each of the four barrier types.

5.5.4 Fundamental barriers to the use of EAT (A)

Que. N11. Is it helpful to value reduced fatalities/injuries in €?

	EU	No	Nl	De	It	Hu	Cz	Il	all
not helpful	**2**	**2**	**6**	**4**	**1**	**0**	**1**	**3**	19
helpful, but # of fatalities/injuries weigh most	**0**	**3**	**0**	**1**	**0**	**0**	**0**	**0**	4
helpful, but # of fatalities/injuries also weigh	**2**	**2**	**2**	**2**	**9**	**2**	**7**	**2**	28
helpful/advantageous	**2**	**7**	**2**	**2**	**8**	**5**	**2**	**2**	30
Other	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**1**	2

A majority of the interviewees found monetary valuation of reduced fatalities/injuries useful (Que. N11). But half of this majority stated that the numbers of fatalities/injuries prevented *per se* are weighted. Those not finding it useful were relatively most represented in Netherlands, Germany and Israel. It should be noted that responses were given without any specification of valuation methods, and do thus not necessarily refer to a unique mode of valuation.

Que. N13. Do you see ethical objections to valuation in € of reduced fatalities/injuries?

	EU	No	Nl	De	It	Hu	Cz	Il	all
Yes	**1**	**7**	**4**	**4**	**3**	**0**	**2**	**1**	22
No	**5**	**7**	**6**	**5**	**15**	**8**	**7**	**7**	60
Other	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	1

A majority also found that there are no (more) ethical objections to such monetary valuation (than to other principles of prioritising). Some of those pointing to a fundamental philosophical problem of valuing human lives, also clarified, simultaneously, that monetary valuation is necessary (Que. N13).

Que. N25. Should € values should count equally for mobility, noise and accident risks?

	EU	No	Nl	De	It	Hu	Cz	Il	all
Yes, sure	**2**	**1**	**1**	**1**	**3**	**1**	**0**	**1**	10
Yes, fairly sure	**0**	**1**	**2**	**0**	**0**	**1**	**0**	**0**	4
Yes, but unsure	**0**	**2**	**0**	**1**	**0**	**0**	**0**	**0**	3
Not sure / don't know	**3**	**1**	**1**	**4**	**3**	**1**	**1**	**1**	15
No, but unsure	**0**	**2**	**0**	**0**	**1**	**0**	**0**	**0**	3
No, fairly sure	**0**	**1**	**1**	**0**	**4**	**0**	**3**	**1**	10
No, sure	**1**	**6**	**5**	**3**	**7**	**5**	**6**	**5**	38

Three of the questions in the survey were close-ended (two or three categories) and more quiz-like. One of these dealt with prices/values in CBA involving road safety (Que. N25). It was asked if € values for safety reductions were 'the same' as € values for reduced time loss and reduced pollution levels, which is the common procedure of neo-classical economic analysis and CBA (Hanley and Spash 1993). More than half answered 'no'. A follow-up question also asked those answering 'yes' or 'no' how sure they were about their answer, and close to half of all respondents were actually sure about their 'no' answer. Although weighting can be included in CBA, especially distributional weights[2] – that may indirectly affect the relative valuation of, e.g., safety

[2] Some did state 'yes' conditionally on clarifying important philosophical issues of CBA, e.g., regarding assumptions concerning the marginal value of income (Brekke 1995, Hanley and Spash 1993).

versus mobility, the responses may indicate a rejection of principles of welfare economics.

Que. N15. Would "perfect CBA" make it defensible to set priorities strictly according to CBA?

	EU	No	Nl	De	It	Hu	Cz	Il	all
no	**0**	**0**	**4**	**0**	**2**	**0**	**3**	**1**	10
no, one should still weigh other considerations	**0**	**1**	**0**	**1**	**0**	**0**	**0**	**0**	2
no, one would still have ethical objections	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	2
no, one would still have other considerations	**2**	**6**	**1**	**1**	**1**	**0**	**2**	**1**	14
no, politicians would still decide CBA	**1**	**0**	**1**	**0**	**0**	**0**	**0**	**1**	3
yes, partly	**2**	**2**	**0**	**3**	**4**	**0**	**0**	**0**	11
yes	**0**	**0**	**0**	**1**	**5**	**4**	**2**	**1**	13
other	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	1

There is space for more use of EAT/CBA in decision making on road safety without reaching even the proximity of a technocratic application, i.e., implementing priorities more strictly according to CBA *without* political interference (ROSEBUD-WP1 2003). The interviewees were divided in their reaction to a question if it would be defensible to set road safety priorities strictly according to CBAs that would provide "monetary valuations of every possible impact of road safety measures" (Que. N15). Denying this could (although not obviously) constitute another indication of underlying reluctance against economic theory and/or CBA. Representatives from most countries made it clear that politicians in any case would/should (have to) bring in other considerations. The respondents from Southern/Central Europe (Italy, Hungary, Czech Republic), where EAT are less applied for bureaucratic prioritising, found it relatively more defensible to set priorities more strictly according to CBA. (This question was only applied at the national and EU levels).

Que. N23. Will more CBA make politicians superfluous?

	EU	No	Nl	De	It	Hu	Cz	Il	all
No	**1**	**1**	**1**	**2**	**3**	**4**	**2**	**2**	16
no, they will anyhow make overall judgment	**4**	**8**	**5**	**3**	**9**	**0**	**0**	**1**	30
Yes	**0**	**1**	**0**	**0**	**0**	**0**	**1**	**1**	3
Other	**1**	**0**	**0**	**1**	**0**	**1**	**4**	**0**	7

Very few believed more decision-making based on CBA would render the politicians superfluous (Que. N23). Thus, there may not exist any fear worth mentioning of an economist-technocratic dominance in road safety decision-making. This does not seem to be any important underlying reason for any fundamental barrier against an increased application of EAT.

5.5.5 Absolute *institutional barriers to the use of EAT (B)*

Que. N17. To which degree do politicians give instructions at odds with CBA?	EU	No	Nl	De	It	Hu	Cz	Il	all
push for "popular" measures	2	4	3	3	1	0	0	1	14
reject "unpopular" measures	2	3	3	2	0	2	1	1	14
approach RS opposed to CBA	2	2	4	3	1	3	2	2	19
interfere through steering documents	0	1	0	0	5	1	0	0	7
politicians do not interfere	0	2	0	0	4	1	0	3	10
other / don't know	0	2	0	1	7	1	7	1	19

Some institutional barriers can be considered as absolute – not readily movable through efforts following from the Thematic Network ROSEBUD. A majority of the interviewees claimed that politicians in one way or another may set instructions that are at odds with road safety prioritising based on CBA (Que. N17). This is reported to occur by setting aside CBA or re-weight its elements. Some directly specified that politicians either push for “popular” (not necessarily efficient) measures or reject (efficient but) “unpopular” measures. This was especially the case for respondents from Northern European countries.

Que. N10. Is obscured responsibility for performing CBA a hindrance for doing CBA?	EU	No	Nl	De	It	Hu	Cz	Il	all
CBA is irrelevant/non-obligatory	0	0	0	0	1	1	1	5	8
Yes	3	0	0	0	13	5	9	0	30
in some cases	2	2	0	3	1	0	0	0	8
No	1	12	0	5	2	2	0	2	24
Other	0	0	10	1	1	0	0	1	13

About half of the interviewees indicated that obscured responsibility for performing CBA could represent a hindrance for applying such efficiency analysis (Que. N10). As indicated, this seems especially to be the case in the Southern/Central countries.

Que. L4. Do you operate with a specific budget for safety measures?	EU	No	Nl	De	It	Hu	Cz	Il	all
yes, generally	0	3	3	1	0	1	0	2	10
yes, to some extent	0	1	1	1	0	0	1	2	6
No	0	0	0	1	0	1	2	0	4
Other	0	0	0	0	6	1	0	0	7

It was asked, only at the local/regional level, if the interviewee’s institution operated with a specific budget for safety measures (Que. L4). This was indicated to be the more widespread in Northern Europe and in Israel.

5.5.6 Relative *institutional barriers to the use of EAT (B)*

Que. N9. Are the current tools for performing CBA adequate?

	EU	No	Nl	De	It	Hu	Cz	Il	all
inadequate tools not relevant	0	0	1	0	0	0	1	1	3
tools generally not adequate	2	0	4	4	4	5	6	5	30
faulty extent	1	0	2	0	3	0	0	0	6
lack of guidelines/manuals/software	1	3	0	1	3	0	0	0	8
lack of courses/training	0	4	0	0	0	0	1	0	5
Adequate	0	4	1	3	3	2	1	0	14
other / don't know	2	3	2	1	5	1	1	2	17

A majority of the respondents found that current tools for performing CBA were inadequate (Que. N9). Some respondents specified the inadequacy as either lack of technical aids (guidelines/manuals/software) or lack of EAT know-how (courses/training).

Que. N24. Would prioritising according to CBA increase or decrease expected number of fatalities/injuries?

	EU	No	Nl	De	It	Hu	Cz	Il	all
Decrease, sure	1	2	1	2	3	3	2	0	14
Decrease, fairly sure	0	4	1	0	5	4	3	2	19
Decrease, but unsure	2	3	0	1	1	0	0	0	7
No change / not sure / don't know	3	2	7	4	7	1	5	5	34
Increase, but unsure	0	0	0	1	0	0	0	0	1
Increase, fairly sure	0	1	0	0	1	0	0	0	2
Increase, sure	0	2	1	1	1	0	0	1	6

Looking further into the EAT know-how, two other quiz-like questions asked about knowledge about (or attitudes towards) CBA. One of these considered the effect on road safety of implementing policy according to CBA (Que. N24). Elvik (2003) has shown how setting policy priorities according to CBA can greatly reduce the number of road accident fatalities and injuries. A large part of the interviewees did not believe this would change anything or they didn't know. Although more responded 'decrease' than 'increase', they do not constitute the majority of the respondents.

Que. N8. Will results from EAT have more influence if performed at an earlier stage?

	EU	No	Nl	De	It	Hu	Cz	Il	all
Yes, definitely	1	0	6	6	6	5	8	4	36
Yes, probably	3	5	0	2	8	1	2	1	22
depends on type of measure	0	1	2	0	1	0	0	0	4
no, probably not	2	6	1	0	1	0	0	0	10
no, definitely not	0	0	1	1	2	1	0	1	6
other / don't know	0	2	0	0	0	1	0	2	5

A large majority (⅔) found that results from EAT could be more influential if performed at an earlier stage of the decision-making process (Que. N8). Although not clearly specified by many, the weight given to EAT might seem to depend on the type of measure and the general setting for decision-making. This may also to some extent be regarded as a barrier to the implementation, since the question itself focussed the potential influence on implementation of results. However, although the

use of EAT could be taken as implicit in the question, some interviewees could have regarded the question as considering a change from non-use to use of EAT.

5.5.7 Technical barriers to the use of EAT (C)

Que. N4. Are impacts of RS measures sufficiently known during planning?

	EU	No	Nl	De	It	Hu	Cz	Il	all
no, mostly not	**0**	**6**	**0**	**1**	**12**	**3**	**3**	**3**	28
in some cases not	**2**	**6**	**2**	**0**	**2**	**3**	**1**	**1**	17
not for user-related measures	**1**	**1**	**4**	**5**	**1**	**0**	**0**	**1**	13
yes, physical measures	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	2
yes, mostly	**2**	**1**	**1**	**3**	**3**	**1**	**2**	**1**	14
other / don't know	**1**	**0**	**3**	**0**	**0**	**1**	**3**	**1**	9

A large majority of the respondents found that there is lack of knowledge about impacts of road safety measures (Que. N4), and this knowledge is needed for performing economic analysis. This further emphasises the results from the question about main reason for not applying EAT – the lack of knowledge about impacts is perhaps the single-most important barrier. Some specified user related measures, e.g., educational measures, as an example of road safety measures for which knowledge is lacking.

Que. N22. Are some RS measures less suitable for CBA?

	EU	No	Nl	De	It	Hu	Cz	Il	all
No	**3**	**2**	**4**	**0**	**4**	**7**	**2**	**2**	24
measures w/ uncertain impact	**3**	**7**	**5**	**7**	**6**	**1**	**0**	**3**	32
cheap measures	**0**	**3**	**0**	**0**	**4**	**0**	**1**	**1**	9
Yes	**0**	**1**	**0**	**0**	**0**	**0**	**3**	**1**	5
other / don't know	**0**	**1**	**1**	**2**	**4**	**0**	**4**	**1**	13

The lack of knowledge regarding impacts was also to some extent reflected in the responses to a question asking if some road safety measures are less suitable for CBA (Que. N22). More than ⅓ found that measures with uncertain impact (mostly specified as user-related measures) could be less suitable for CBA. All together, more than half of the interviewees found that some types of road safety measures could be unsuitable for CBA, and ignorance of impacts is the main reason for this.

Que. N20. Would it be useful to quantify CBA uncertainty?

	EU	No	Nl	De	It	Hu	Cz	Il	all
No	**2**	**2**	**0**	**2**	**2**	**1**	**2**	**2**	13
use sensitivity analysis	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	3
Possibly	**4**	**4**	**2**	**2**	**1**	**2**	**1**	**0**	16
degree of uncertainty, not quantify	**0**	**2**	**0**	**1**	**0**	**0**	**0**	**1**	4
Yes	**0**	**6**	**3**	**3**	**12**	**4**	**4**	**4**	36
other / don't know	**0**	**0**	**2**	**1**	**3**	**1**	**3**	**1**	11

Que. N21. Will presentation of CBA uncertainty impair CBA?

	EU	No	Nl	De	It	Hu	Cz	Il	all
No, definitely not	**2**	**0**	**3**	**0**	**4**	**5**	**4**	**2**	20
No, probably not	**1**	**4**	**2**	**3**	**3**	**1**	**0**	**2**	16
CBA could be used at pleasure	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	2
Possibly	**1**	**5**	**2**	**1**	**3**	**1**	**2**	**0**	15
Yes	**2**	**3**	**0**	**2**	**6**	**0**	**2**	**3**	18
other / don't know	**0**	**1**	**2**	**3**	**2**	**1**	**2**	**1**	12

Quite few of the interviewees reacted reluctantly to a proposal of clarifying uncertainty in CBA and attempting to quantify it (Que. N20). Close to half of them clearly approved of it. Most interviewees found it useful to try to quantify the uncertainty in CBA. (Among the Dutch it was pointed out that this could already be taken care of by sensitivity analysis.)

In the follow-up question about the possible impact of clarifying and presenting CBA uncertainty (Que. N21), a larger share of the interviewees saw the possibility that quantification of uncertainty could lead to (even more) reduced weight of CBA in the decision-making process.

Que. N14. Can we trust economic valuation of reduced fatalities/injuries?

	EU	No	Nl	De	It	Hu	Cz	Il	all
yes	**0**	**7**	**1**	**3**	**4**	**2**	**1**	**1**	19
yes, conditionally	**5**	**5**	**2**	**5**	**2**	**1**	**1**	**1**	22
No, data quality is too poor	**0**	**1**	**0**	**0**	**3**	**1**	**2**	**2**	9
No, methods are unreliable	**1**	**1**	**2**	**1**	**6**	**2**	**1**	**0**	14
other / don't know	**0**	**0**	**5**	**0**	**3**	**2**	**5**	**4**	19

Approximately half of the respondents stated trust in economic valuation methods, but several of these stated confidence with some conditions (Que. N14). Some specified non-trust as related to poor data quality, which may be more related to lack of reliable information about risk than to perceived methodological flaws. Others specified that methods are unreliable (which could point towards a validity issue or towards an uncertainty issue). It should be noted that the economic valuation was not specified, and that different perceptions and practices exist between decision makers and between countries.

Que. N26. Would it be more correct to include spill-over effects instead of safety impacts in CBA?

	EU	No	Nl	De	It	Hu	Cz	Il	all
No, sure	**1**	**9**	**0**	**0**	**2**	**1**	**2**	**1**	16
No, fairly sure	**0**	**1**	**1**	**1**	**3**	**2**	**2**	**0**	10
No, but unsure	**0**	**1**	**0**	**0**	**0**	**0**	**1**	**0**	2
Include both / not certain / don't know	**3**	**3**	**7**	**8**	**3**	**2**	**3**	**6**	35
Yes, but unsure	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	2
Yes, fairly sure	**0**	**0**	**1**	**0**	**3**	**2**	**0**	**0**	6
yes, sure	**2**	**0**	**1**	**0**	**5**	**1**	**2**	**1**	12

A similar procedure was applied to a question about foregoing accident reduction benefits in CBA (of infrastructure projects) and replacing it by estimated benefits due to regional spillover effects (Que. N26). Close to half of the interviewees either

declined to answer or proposed to include both effects. More answered ‘no’ than ‘yes’, many substantiating their ‘no’ by stating that safety and life saving is cardinal. Although regional effects, in terms of expected spillover effects, may constitute a decisive element for implementing an infrastructure project (Elvik 1995) – be it with propitious or adverse effects on road safety, these are not to be included in CBA. With respect to infrastructure or road safety measures that affect travel demand (travel volume), the relevant valuation is the change in consumers’ surplus that results from the change in travel (Elvik 1999).

5.5.8 Barriers to the implementation of cost-effective policy options (D)

Que. L14. Would it be necessary to have a mandatory quality check on CBA?

	EU	No	Nl	De	It	Hu	Cz	Il	all
No	**1**	**1**	**3**	**0**	**0**	**1**	**0**	**2**	8
yes	**5**	**2**	**0**	**2**	**0**	**2**	**1**	**2**	14
other / don't know	**0**	**1**	**1**	**1**	**6**	**0**	**2**	**0**	11

A slight majority answered affirmatively that it would be necessary to have a mandatory quality check on CBAs of road safety measures (Que. L14). This question was only asked at the regional/local and EU levels.

Que. N18. Could CBA gain more influence if presented differently?

	EU	No	Nl	De	It	Hu	Cz	Il	all
No	**2**	**5**	**3**	**3**	**5**	**3**	**3**	**2**	26
Possibly	**0**	**0**	**0**	**3**	**3**	**0**	**1**	**0**	7
yes, weighing number of saved lives	**0**	**3**	**0**	**1**	**2**	**1**	**0**	**0**	7
yes, trough better marketing	**1**	**1**	**0**	**0**	**1**	**0**	**0**	**1**	4
yes, by improving pedagogy	**1**	**4**	**5**	**0**	**2**	**0**	**0**	**0**	12
Yes	**1**	**0**	**1**	**2**	**2**	**1**	**3**	**1**	11
other / don't know	**1**	**1**	**1**	**0**	**3**	**3**	**3**	**4**	16

Approximately half of the interviewees believed CBA could gain more influence if results were presented differently (Que. N18). Suggestions for improvements included improved pedagogy or presenting the number of lives saved in addition to the CBA results. The issue of presentation of a CBA and its results can be regarded a relative barrier to the implementation of efficient road safety policy options.

Que. N19. Do politicians weigh numbers of fatalities/injuries more than €?

	EU	No	Nl	De	It	Hu	Cz	Il	all
no, they weigh both	**1**	**3**	**3**	**0**	**5**	**2**	**2**	**0**	16
Possibly	**2**	**3**	**1**	**2**	**2**	**3**	**0**	**1**	14
yes, "lives saved"	**1**	**2**	**1**	**0**	**1**	**0**	**0**	**2**	7
yes, definitely	**2**	**5**	**3**	**7**	**8**	**2**	**2**	**4**	33
other / don't know	**0**	**1**	**2**	**0**	**2**	**1**	**6**	**1**	13

Approximately half of the interviewees answered affirmatively that politicians weigh the numbers of fatalities or injuries prevented more than monetary values of ‘statistical lives’ and ‘statistical injuries’ (Que. N19). In addition, several found this to be possible (providing responses like “perhaps” or “yes, probably”). Although the prevention of fatalities or injuries does not by itself generate efficient priorities for road safety measures, the importance given to saved lives and limbs could probably strengthen the case for efficient road safety measures.

5.6 Qualitative summaries of responses

5.6.1 EU

The interviews at the EU level were performed in October and November 2003. The six interviewees represented various EU organisations. Most (⅔) of these interviews were performed personally, while the rest (⅓) was performed via telephone. The interviews had a duration of approximately 1 – 2 h. Most interviewees stated that the questionnaire was interesting and that the questions were helpful and target-oriented.

The interviewees on European level mostly were familiar with the use and the methodology of efficiency assessment tools and generally had no problems in answering the questions. However, for some (institutions without implementing function) the introductory questions about actual use of EAT were felt as not being practical. Some also considered the questions N25 and N26 as difficult to understand or being “too technical”.

Some general features of the interviews at the EU level:

- Those institutions who have an implementing function are mostly using EAT for decision-making.
- Several mentioned political reasons (e.g., acting under public pressure, political influence of interest groups) as one major reason why EAT are not always performed for road safety measures.
- Many also referred to costs of applying EAT as a main barrier.
- Methodological deficiencies and the complexity of EAT (e.g., no consideration of specificities, inappropriate measures, manpower requirements) were also mentioned by many among major reasons for not always applying EAT.
- Most of the interviewees think that the current tools (software, guidelines etc.) for performing CBA of road safety measures are not adequate and/or accessible. But even when the tools are considered to be adequate and/or accessible it is seen as a problem that the tools can be used without knowing the methodological background (e.g., welfare principles) of CBAs (which might lead to mistakes).
- Many of the interviewed European decision makers see the lack of clarity regarding responsibility for performing CBA as a hindrance for doing such analyses.
- Most of the interviewees do not see any ethical objections to the monetary valuation of reduced risk for injuries and deaths on roads.
- Most of the interviewees prefer (a mandatory) quality check on CBA of road safety measures and transport developments, e.g., as a peer-review. This is seen as a useful controlling mechanism and a means to counteract the potential for manipulation.
- All interviewees think that it happens often that politicians set instructions for prioritising of road safety measures that are odds with priorities from CBA. But this is not seen as a problem, but as a necessity. According to the interviewees politicians have to filter those measures that fulfil overall political requirements that cannot be represented in EAT. They have to take care that, e.g., the ‘geographical equity’ of investments in Europe is ensured, that interest groups will be regarded in decision-making and integration goals will be achieved.
- At the European level EAT are seen as only one instrument in the decision making process. The majority of the interviewees think that it would be possible to set priorities for road safety measures strictly according to CBA, but it is also made clear that this cannot replace political decision making (“politicians have to choose those measures that fit best in the overall political process”).
- The interviewees are indifferent as to whether the presentation of the uncertainty in the results from CBA could lead to disregard of its results. According to the interviewees, on the expert level there will not be any lack of trust when uncertainties are presented. But on the public and also on the political level the presentation of uncertainties can lead to disregard of the results of CBAs.
- The interviewees on the European level mostly do not see any road safety measures that are less suitable for CBA. They think that technically and methodologically CBAs can be used for all kind of measures. But in some cases it will economically not make sense to use EAT (“effort would exceed the benefit”). Those interviewees who think that there are situations where EAT cannot be used, mention educational and behavioural measures as cases in point.

5.6.2 Norway

In Norway 10 interviews were conducted at the national level, including one pilot interview, and 4 interviews at the local/regional level. Two persons on the initial interviewer list declined when contacted, claiming that they were not currently working on safety issues and/or were too busy. Both referred us to colleagues whom they meant were better suited, and these persons were included in the sample. The length of the interviews varied between 40 minutes and 75 minutes, most of them close to 45. All national interviews were conducted during the month of June 2003, except the pilot that was conducted in May. The local/regional interviews were all carried out in October 2003. For the national interviews the interviewer was assisted by a colleague to take notes.

The interviewees were mostly from the Public Roads Administration (one was a researcher with former experience from the Public Roads Administration), but also from the Ministry of Transport and Communications (all at the bureaucratic level), the Police Administration, and from two larger municipalities. They represented a mix of economists, engineers and legal practitioners – the first two groups had most experience in using or evaluating EAT.

In general the questionnaire worked very well. All the interviewees showed much interest. Only a few remarked that the topic was complicated – these were responsible for safety assessment and safety measures but not the economic assessment of these. For those at the municipal level EAT were actually not relevant, mostly claimed to be due to inappropriate tools for estimating impacts of road safety measures. However, these realities and complications did not seem to reduce the enthusiasm for the survey and the Thematic Network ROSEBUD.

For measures related to vehicle regulations and traffic control economic analysis was less applied, compared to physical measures on roads (and within larger road investments). Nearly half of the interviewees stated that there was a lack of interest/resources for performing economic analysis in their institution or unit of the institution. At the municipal level even CEA was scarcely applied. A majority found that the current tools for performing CBA were not adequate.

The attitudes towards economic analysis were generally positive. It was seen as a necessity, although most of them saw ethical objections and preferred to present results in terms of numbers of fatalities and injuries prevented, not just the monetary numbers. Most of the respondents would like to see more weight (increased values) put on reduced accident risks. Some also requested inclusion of (perceived, subjective) security in CBA, in addition to (objectively-measured) safety. Most of the respondents did not find that the input to decision-making about road safety would be improved *without* economic analysis. Everybody had trust in the economic valuation behind a CBA, although some respondents with reservations.

The interviewees acknowledged the democratic practise of political decision-making, but many lamented a little the politicians' pressure, following interest group lobbying and media focus. By yielding to lobbying politicians could endorse safety measures that were either presumed to be popular, swift to implement, or easy to visualise, but sometimes with diffuse or unknown effect, or with dubious economic efficiency.

Approximately half of the interviewees held that CBA could gain weight in decision-making if the analyses and results were presented in another manner – that CBA's

influence partly depends on communication and promotion. For CBA of road safety measures the interviewees thought that the presentation also should include information about the numbers of fatalities and injuries prevented. Most respondents thought 'saved lives' was a stronger argument than economic benefits of life saving.

5.6.3 Netherlands

In the Netherlands, 6 interviews were executed at the national level and 4 at the local/regional level. At each level one refusal was registered; the one at the national level giving no reason, and the one at the local/regional level claiming to know too little of the subject. The length of the interviews varied between 50 minutes and 75 minutes. One national interview was executed in the first week of June, four in the first two weeks of July, and the last in the end of September. This sample included politicians, in addition to bureaucrats of the Ministry and a consultant. The local/regional interviews were all carried out in November 2003.

All respondents gave their full cooperation to the interview, and the interviews worked out well. However, some questions were not always felt to be clear enough. For the national survey the interviewer chose not to ask question N10, and questions N25 and N26 were not always clear to the interviewees. The order of the questions was also changed, re-arranging the questions around some main subjects. For both the national and local/regional surveys the interviews were recorded on tape.

There was one judgment all Dutch respondents agreed about:

- Arguments that were considered as equally important as the outcomes of a CBA – or more important – were public support, 'emotions', administrative deals, image, political feeling, legal arguments, and political commitment. E.g., recent accidents and the popularity of measures can influence the policy directly. The interviewees stated that the world is more complex than the outcomes of CBAs suggest. ("Welcome to the real world." "Better CBAs will not result in better political choices.")

Further, at the national level all respondents agreed about the following:

- CBA was regarded as only a tool in the decision making process, helping to structure the thinking about projects with a systematic comparison of different policy options. The reasoning itself was considered more important than the outcome. ("CBA is more an art than a science.")
- The outcome of a CBA was assessed as ambiguous, being given as one of the reasons why a CBA can never replace politicians. The more ambiguous, the more the CBA outcomes can be twisted in the desired way. ("The outcomes are a battlefield between the various institutes.")
- No objections were raised against monetary valuation of human lives, although all respondents thought one should have to show both numbers of casualties prevented and monetary valuations.
- It was held that there should be a better tuning between the (compulsory) Environmental Impact Assessment and CBA, both in time and in contents.
- A decent quality check for CBAs seemed to be desirable for all respondents. The outcomes cannot be verified by decision-makers, they have to trust the analysts. Furthermore, the interviewees found that the assumptions behind the analyses should always be published, which is not always the case now. It was also stated that those who perform CBAs do not seem to be open for critics. ("Scientists should have so much sense of honour that they would let validate their CBAs by themselves.")

At the local/regional level all respondents held that:

- In provinces and regions the use of CBA's or cost and effect information is in general scarcely out of the egg. There is a large need for this kind of information, but detailed information about the own region and information about not-infrastructural projects is hard to find.
- CBA's are hard to explain to citizens, the outcomes do not always match with the observed problems in reality.
- Monetary valuation of accidents is not desired on the provincial/regional level. The figures are too abstract and give a "cold" impression of the policy. Politicians cannot "sell" these figures to the public.
- The provinces and regions do not feel any responsibility for the execution of CBA's and the delivering of costs and effect information. They expect the national government to develop these figures.

- The provinces/regions trust the figures about costs and effects; a quality check is not directly necessary.

5.6.4 Germany

In Germany 6 interviews were executed at the national level and 3 at the local/regional level. For the national-level survey two persons contacted refused the interview, referring to two others who were subsequently included in the sample. The length of the interviews varied between approximately 60 minutes and 120 minutes. One interview at the national level was executed in the middle of May 2003 as a self-administered pre-test; the rest were performed as personal interviews during August 2003, including researchers, bureaucrats – from the Ministry and Road Safety Council, and a representative of a research institute for insurance companies. The local/regional interviews were performed, in November 2003 and January 2004.

The interviewees were mostly familiar with the methodology of efficiency assessment tools and generally had few problems in answering the questions. At the national-level survey some questions caused problems for those interviewees who did not have practical experience with CBAs (especially questions N20-21 and N24-26; these questions had the wording improved/facilitated in the final draft of the national-level questionnaire, and were further improved for the local/regional and EU surveys).

Decision makers on the national level in Germany often work with educational user-related measures. Infrastructure measures will mostly be decided on the regional or local level.

Some general features of the interviews at the national level:

- The users of monetary valuation were less sceptical to these methods than non-users.
- Most of the interviewees said that CBAs should not be the only decision criterion for the implementation of road safety measures.
- The lack of knowledge and methodological problems were the most frequently mentioned barriers to the usage of monetary valuation – this was mentioned by half of the interviewees.
- The results of monetary valuation were considered to be trustworthy if done by an official (neutral) organisation.
- All interviewees said that educational measures are less suitable for monetary valuation than other measures (infrastructural, vehicle-related, etc).
- Most of the interviewees thought that politicians decide on the implementation of road safety measures mainly according to political interests (party politics etc).

Some general features of the interviews at the local/regional level:

- CBA is rarely used at the local or regional level for implementing road safety measures. It will be used for road infrastructure investments (with road safety as a side effect). Smaller measures generally are not assessed with monetary evaluation methods. But the authorities have implemented a “profitability check” for measures (based on costs and impacts of the measures).
- Most local and regional authorities have only small budgets for road safety measures. Bigger measures have to be granted apart from the budget.
- In general the local and regional authorities are satisfied with the current assessment process of road safety measures and do not feel the need to extend the usage of CBA (within their area of responsibility). They bring forward the argument that the effort will be too big e.g. for smaller road safety measures.
- They all think that the current tools for performing CBAs are not sufficient.
- The local and regional authorities agree that politicians put more weight on the number of fatalities and injuries prevented than on the monetary valuation of these impacts (for publicity reasons, physical impacts can better be "sold” in the public). They are convinced that the economic evaluation of measures does not greatly influence the decision-making of politicians. They believe, that politicians are lead by public opinion, prevailing topics and interests.
- All of the interviewees agree that an implementation of road safety measures strictly based on results of cost-benefit analyses will not imply a decreased expected number of injuries and fatalities on roads, but an

unchanged number of accidents. The accidents might only differ e.g. in their type and severity to the situation before.

5.6.5 Italy

In Italy 12 questionnaires were collected at the national level, while 6 were executed at the local/regional level. Each of these lasted approximately 40-70 minutes. At the national level the survey was based on personal interviews and carried out during September and October 2003. In the local/regional case some (4) interviews were based on self-administration, during July 2003, and some (2) were conducted personally, during October 2003. In the self-administration case the questionnaire was sent to the interviewees by e-mail, and some of them used the phone for specific requests of explanation.

The national sample included representatives from the Ministry of Transport – among whom two consultants working on the National Road Safety Plan, focus groups working on Road Safety, public operators (e.g. national highway operators), and a representative of the police administration.

All the interviewees showed interest in the questionnaires and the Rosebud project. Some interviewees pointed out that the questionnaire was probably too long and needed too much time to be filled in. (Sometimes brief answers have been given.)

Some general features of the interviews carried out in Italy were:

- CBA had not yet been applied by the interviewees, with just some few exceptions. It was outlined that the reason of this fact is related to the uncertainty in the definition of the parameters and estimates of effects of road safety measures. Moreover, several interviewees pointed out that the lack of data related to road injuries is the reason of why CBA and CEA are usually not performed; some of these highlighted that these tools are not applied because of the lack of a specific competence or that these tools should only be applied at a national level by the Transport Ministry.
- Almost the whole sample agreed that performing CBA and CEA at an earlier stage of the decision-making process would have a greater impact on final political decisions.
- A large part of the interviewees were confident that carrying out extensive research, in order to provide monetary valuation of every possible impact of road safety measures, will allow to define a set of priorities strictly according to CBA results.
- Very few raised objections against monetary valuation of human life. Several respondents answered that monetary valuation of the impacts is helpful for road safety measure evaluation; and several respondents pointed out the fact that will be useful to show both the number of fatalities prevented and monetary valuations (because of the impacts it has on citizens).

Analysing the interviews, some main points deserve to be mentioned: in Italy CBA and CEA are still not part of decision makers' cultural and technical background, and not having a clear definition on responsibilities seems to have hindered its spread among the experts. At present, the analyses performed are characterized by a detailed costs analysis while impacts are only estimated in a qualitative way. There is a lack of knowledge on the impacts of road safety measures, and this represents a major constraint to the use of efficiency assessment tools.

5.6.6 Hungary

At the national level 5 persons were interviewed, and at the local/regional level 3 persons delivered filled-in questionnaires. The interviews took from 35 to 90 minutes. For the national level preliminarily questionnaires were sent to selected target persons. These were selected with respect to the stage of decision-preparation, decision-making, profession, political hierarchy, or implementation phase they were representing. Then face-to-face interviews were arranged at agreed dates for those five who accepted interviews. These interviews were conducted from mid July until

mid September. At the local/regional level the three questionnaires were e-mailed for self-administration to “number one” leaders of county management organisations upon preliminary agreement. These were collected during November. The week after the questionnaire's delivery, further collation was realised by phone. Ambiguities were cleared up, and if some questions or difficulties arose, further amendments were made. (It was also agreed to have a questionnaire filled-in by a representative of a county police office, but this person could not fill-in answers, presumably because no road safety measures are initiated at the county level.)

Some general features of the interviews at the national level:

- EAT were known and appreciated but rarely used.
- The main barriers to its use were unavailability of data (on impacts) and financial restrictions (lack of resources).

Regarding the local/regional level, the county level road management organisations deal with the operation, maintenance and development of the local roads. In their work, they have the possibility to use CBA in decision-making. The interviewees were aware of the method and as far as possible they used it. Full-scale application was especially impeded by the lack of money, equipment and information. Substantial information – real actualised accident losses – is not available, and therefore CBA results are disputable.

5.6.7 Czech Republic

In the Czech Republic 7 filled-in questionnaires were obtained at the national level (one of which was a pilot interview and one was actually conducted in Slovakia), and 3 filled-in questionnaires were delivered at the local/regional level. Originally questionnaires were sent by e-mail for self-administration to approximately 30 people. Only the 10 people from this group who were contacted by phone did send the questionnaires back. The respondents applied between 30 and 75 minutes to answer the questionnaire, most of them close to 60. The survey was conducted during August 2003.

The respondents at the national level represented both the Ministry of Transport and the Road and Motorway Directorate, and also private expertise, NGO and research. At the local/regional level the respondents were from the regional and local authorities and from city government.

The respondents represented decision makers at various levels. Only members of Road and Motorway Directorate had some experiences with CBA or CEA, but mostly only related to large infrastructure projects. Almost no economic analyses related to safety measures have been made up to now. The professional background of the respondents was primarily engineering.

In general the ROSEBUD project was very welcomed. All the interviewees showed much interest. Only a few remarked that the topic was too complicated. This was probably due to the fact that CBA or CEA in the process of road safety planning in the Czech Republic has been rather rare up to now. (Some interviewees asked for deeper explanation of some specific questions, especially N16).

General description of the answers:

- Most of the interviewees stated that there was a lack of interest/resources for performing economic analysis in their (unit of the) institution. A majority found that the current tools for performing CBA were not adequate, or that these are not clear enough.

- The attitudes towards economic analysis were generally positive. It was seen as a necessity, although most of them saw ethical objections and preferred to see numbers of fatalities and injuries prevented following the monetary numbers. Many interviewees mentioned higher preferences for safety measures that were either presumed to be popular, swift to implement, or easy to visualise.
- More than half of the interviewees held that CBA could gain weight in decision-making if the analyses and results were presented well. For CBA of road safety measures the interviewees thought that the presentation should also include a specification of the number of lives saved and injuries prevented. Most respondents thought saving lives was a stronger argument than economic efficiency of life saving. A lot of people also mentioned that CBA/CEA is not meant to be the only criterion for the final decision.

5.6.8 Israel

There were 4 interviewees at the national level and 4 at the local/regional level. Each interview was between 45 to 90 minutes. At the national level one pilot interview was performed in May 2003 and the three main interviews were performed between mid July and mid August 2003. The interviews at the local/regional level were conducted in November 2003.

At the national level all interviewees had senior to very senior positions in public government. Most of them were decision-makers responsible for road infrastructure improvements, dealing solely with the physical infrastructure. A representative of the Road Safety Authority worked more with publicity but also with general budget issues.

At the local/regional level all the interviewees were in senior positions at the professional level of a local/ regional authority. Two of these represented traffic departments of local levels that are actually responsible for the development of road safety improvements, whereas the other two represented traffic departments at the regional levels that perform examinations of the projects, asking for a financial share of the Ministry of Transport. All had engineering background, dealing with the physical road infrastructure, mostly at the stage of planning, but also at the stages of performance and maintenance of roads (a function of supervision). All interviewees indicated that safety issues comprise a significant part of their activity.

All the participants were co-operative and presented their opinions freely, and all were well versed in decision-making based on economic principles. Regarding the local/regional level the respondents were familiar with a common procedure for economic evaluation of large transport projects, and they were well informed about the latest developments in the road safety field, including research projects performed in the country. Some interviewees at the national level felt compelled to go in some length into their road safety experience. At the local/regional level all had 15-25 years experience in the field of road traffic and safety improvements. They explained the current practice of evaluation of road safety measures and interpreted their answers to the questionnaire in light of the current practice. All provided reasonable arguments for the non-use of CBA for safety measures at the local/regional level.

Some general features of the interviews at the national level:

- Limitations in the quantitative knowledge on the effectiveness of road safety measures, especially in the non-engineering fields but also in engineering improvements, were felt as a major bottleneck in implementing CBA in safety.
- Safety considerations were perceived as a major aspect of decision-making on transportation projects, but these considerations do not enter in a quantified form.
- Decision-making on transportation projects was regarded a complex process that was not only based on CBA.

- There was no widespread belief that politicians are trying to influence the decision-making process.
- None of the interviewees had a problem with the concept of an economic value associated with the loss of life and realised that this was a necessary requirement for rational decision-making.

Some general features of the interviews at the local/regional level:

- Road accidents and safety improvements are a significant part of the total activity of transport and traffic divisions, especially at the local level. Safety treatment is interpreted as a complex of steps, including accident analysis, identification of problematic locations, selection of measures, and examination of warrants for the application of measures.
- The local authorities are highly dependent on the central budget. The function of the local authority is mainly in selecting relevant treatments for specific sites and providing detailed plans for their implementation. These plans are examined at the regional level and, when approved, provide a basis for asking for financial support from the Ministry of Transport. (The current share of the Ministry of Transport as opposed to the local budget is 70% to 30%.) Costs of all the projects approved compose the "safety budget" of the authority for the next year. The economic evaluation of any treatment planned includes a cost statement only, whereas the benefits are discussed at a qualitative level. The expectation of benefits is based on professional experience and intuition.
- Formal CBA is not performed, for a number of reasons.
    - CBA of safety impact is not required by the Ministry of Transport;
    - The lack of tools for the performance of CBA, e.g. values of safety effects, costs of accident injury/ fatality, a procedure to be followed;
    - Most of the local projects are not costly and, therefore, in most cases, the benefits are expected to be higher than the costs.
- Besides measures of a "safety budget", which should be coordinated with the Ministry of Transport, there are low cost safety measures (e.g. signing and marking, prohibition of parking) and measures, which are originally intended for an improvement of traffic flow but also can have a safety impact (e.g. installation of traffic signals). In both cases, CBA of safety effects is not customary, as it is not required by the current procedures.
- In general, safety considerations are perceived as a major aspect of decision-making on transportation projects, but safety considerations are not handled in a quantifiable way.
- Decision-making on transportation projects is considered as a complex process and cannot be based only on CBA. For example, CBA is based on average values of safety effects and average values of lives, whereas, on the local level, great importance is given to site-specific conditions. Small accident numbers is another major problem, associated with the estimates performed for the local level.
- In general, the politicians do not intervene in the decision making process on safety measures.
- None of the interviewees had a problem with the concept of an economic value associated with the loss of life and, on the contrary, considered this as a necessary element in rational decision making. Most of them indicated a need for well-based accident costs to perform reasonable economic evaluations of safety projects.

The decision makers at the local/ regional levels do not see barriers of a philosophical nature for the application of the efficiency assessment tools. Most barriers are procedural (relate to the organization of policy making) and technical (relate to the assessment tools as such).

6 Assessing the relative importance of barriers

6.1 The significance of the interviewees' statements

Based on the quantitative and qualitative presentations in the preceding sections we will try to assess the relative importance of the various barriers to the use of efficiency assessment tools in road safety policy. It is recognised that such an assessment may not be an easy task. One way to go about it is to sum-up the quantitative results based on cues of the responses. But, one should bear in mind that the samples are relatively small convenience samples, and concluding from these answers should be done with care. Still, many of the respondents were leaders

of institutions deciding on the process for electing and prioritising road safety measures. Hence, summing-up their answers should shed some more light on which barriers are the most constraining for the application of EAT in Europe. This assessment is based on the total number of respondents, at the national, local/regional and EU levels (*n*=83).

We will make a distinction between *main* barriers, based on the reasons stated to the direct question about main barriers to the use of EAT (Que. N7), and *underlying* barriers, based on the responses to any other question. Although such a distinction is debatable, it is upheld for the following reasons: In Que. N7 the respondent is asked, in an open-ended manner, to provide any type of main barrier to the use of EAT. In the other questions the identification of barriers is clearly framed, thus providing an indication of the situation for, e.g., a technical or institutional issue/constraint, but not its importance compared to any other issue/constraint. Still, even if the so-called underlying barriers are based on framed questions, they may indicate decisive barriers to the use of EAT. In some cases a respondent may not be able to come up with every important (or *the* most important) reason in an open-ended question, while a framed question may facilitate such identification.

6.2 The most constraining barriers

6.2.1 Relative importance of all barrier types

First of all we provide a distribution of the answers to the direct question about the main reasons why EAT are not applied (Que. N7). These answers were distributed according to the main typology of barriers, and these are summed-up in Figure 4. 60% of the reasons given (accepting several reasons from each respondent) could be classified as type B – “institutional” – (according to our principal typology). A large part of the mentioned institutional barriers can be classified as absolute. Also a large share, 31%, was of type C – “technical”. All together the relative barriers would sum to ⅜. Relatively few respondents mentioned reasons related to types A or D, obtaining only 2% and 7%, respectively. It should be stressed again that this question (and the survey) was posed as why efficiency assessment is not performed, thus focusing on the planning process – not the implementation process.

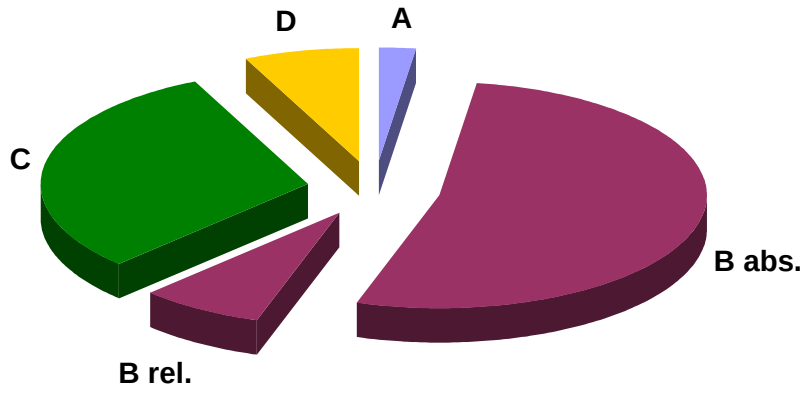


Figure 4: Distribution of responses to direct question about main barriers to the use of EAT (Que. N7).

In the following we sum-up the responses to this main barrier question, within each of the four groups, and we sum-up responses to the other more specific (framed) questions that can provide assessments of underlying barriers. Some types of barriers will be expanded based on the responses to the surveys. We also summarise relative versus absolute barriers, and finally we sum-up differences between nationalities and decision levels (national versus local/regional).

6.2.2 Barriers of a fundamental nature (A)

Only one type of answer was grouped under the main philosophical barriers to the use of EAT. This was based on answers to question N7 that (political) decision makers had some sort of "emotional approach" (2% of all answers to N7). This could imply a rejection of the principles of welfare economic (A1) and/or the efficiency criterion (A2) and/or monetary valuations (A3). However, this is not a clear cut indication of a fundamental barrier to the use of EAT.

Delving into possible underlying fundamental barriers, there was no other specific question included to assess overall acceptance or rejection of the principles of welfare economics (A1). However, the evaluation of interviewees' knowledge of the foundations and implications of CBA could indicate relatively limited insight into these principles – or limited acceptance. Some responses to these questions, especially about the equality of a € calculated for reduced accident risk versus a € calculated for reduced time loss (N25), may indicate rejection of a basic principle of welfare economics.

Rejecting economic efficiency as a relevant criterion of desirability (A2) could follow from rejecting the principles, but one could probably reject some principles but support an alternative efficiency criterion (although such alternative may not be classified as "economic"). The answers to the survey do not give us a well-founded basis for assessing this. However, not finding it defensible to apply CBA for

prioritising of road safety measures when assuming that all relevant impacts are included in the analysis (Que. N15), may indicate a rejection of the efficiency criterion. Still, a negative reaction could be due to reluctance against "economist technocracy" (Randall 1987).

There was some reluctance to the usefulness of monetary valuation of reduced accident risk (Que. N11). A considerable number of respondents found such valuation un-helpful. This can be taken to represent a rejection of monetary valuation of risk reductions (A3). However, it should be remarked that finding EAT non-helpful could possibly be due to external elements, e.g., lack of effectiveness data. The reluctance raised in N11 was most pronounced among Dutch respondents. Seeing ethical objections to monetary valuation (Que. N13), equally widespread among respondents as finding it un-helpful, could also indicate such rejection. But, several respondents (e.g., the majority of the Norwegians) followed-up such an answer by stressing that such valuation still is necessary. Thus, we find the answers regarding the usefulness of methods a better, although non-perfect indicator.

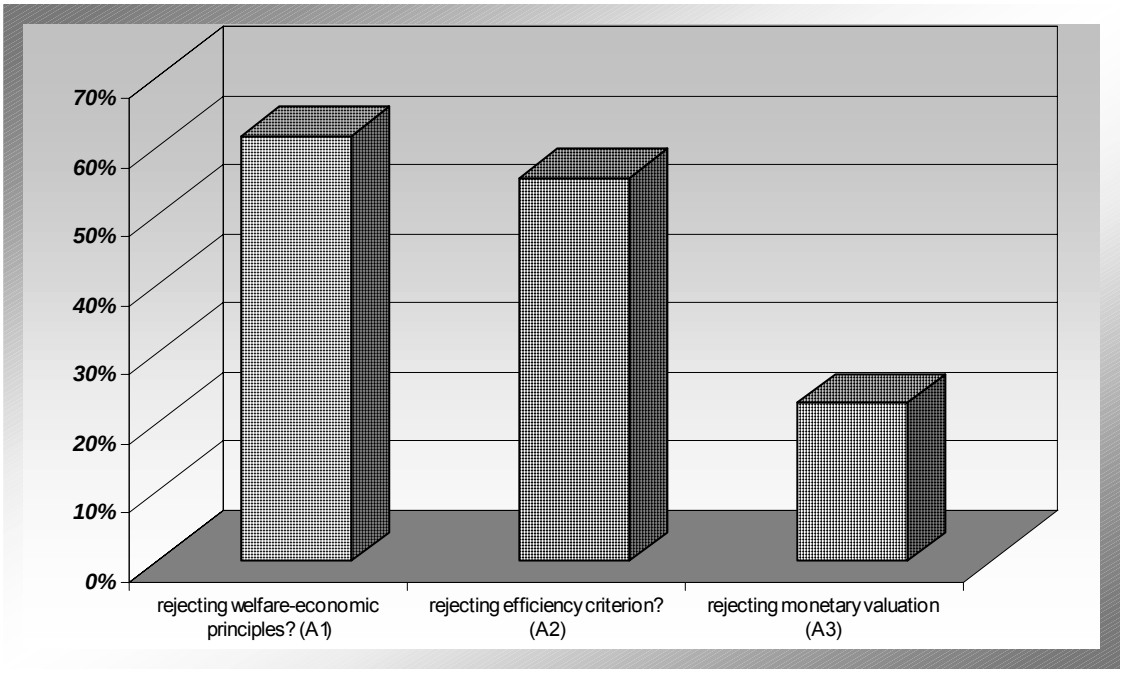


Figure 5: Underlying philosophical barriers to the use of EAT/CBA (A).

Figure 5 sums up the sub-types of possible underlying fundamental/philosophical barriers. The indications based on answers to these questions may point to a non-negligible underlying rejection of EAT, especially CBA. And, although with a somewhat slight basis in our material, the rejection may be based more on objections to the basic principles of CBA (A1, A2), than objections to monetary valuation as such (A3).

*6.2.3 Barriers related to the organisation of policy making (*B*)*

First of all, several of the predetermined barriers related to the institutional aspects were not directly indicated by the respondents. Neither lack of consensus on relevant policy objectives (B1), nor formulation of policy objectives inconsistent with EAT (B2), priorities given to policy objectives unsuitable for EAT (B3), nor horse trading (B4),

nor un-funded mandates and excessive delegation of authority (B6), nor abundance of resources (B7) were mentioned in the direct question about barriers to EAT (Que. N7). They were not clearly indicated in other questions either. As indicated, the typology was developed according to the political point of view in decision-making as well as the bureaucratic point of view.

For the indicated institutional barriers we find it useful to make a clearer distinction between absolute and relative barriers (in addition to the division between main and underlying barriers). Regarding the main reasons for not performing EAT (Que. N7), most of these can be considered as absolute. Political opportunism (B5) was pointed out by several as a main reason. Many also emphasised scarcity of resources (B8). Lack of resources was actually among the most commonly stated main reasons for not applying EAT in the Southern/Central European countries. From the same geographical area reference was also made to the lack of recommendations for using EAT (B11). The institutional barriers mentioned can be regarded as absolute, in the sense that deeper institutional or system changes may be warranted – which is beyond the scope of the Thematic Network ROSEBUD. Figure 6 sums-up these main absolute institutional barriers. It seems to indicate that, overall, political opportunism may be just as peremptory a barrier as lack of resources.

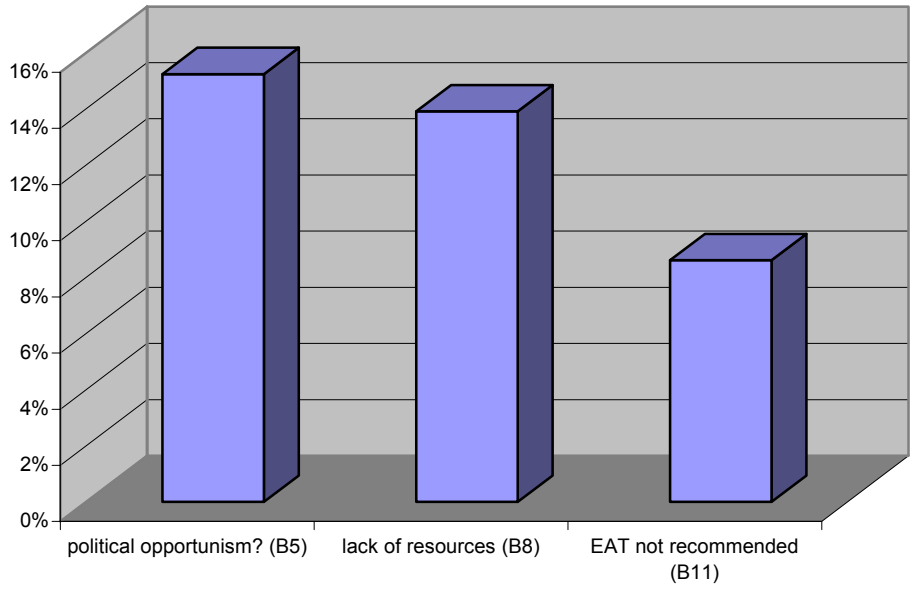


Figure 6: Main absolute institutional barriers to the use of EAT/CBA (B).

Among main institutional barriers that can be considered relative, only one has been found. Some respondents mentioned the difficulty of performing CBA among the main barriers (indicated by 7% of all answers to Que. N7) which can be taken as indicating “lack of workable EAT know-how” (B13). It is perhaps fruitful to distinguish workable EAT know-how from profound know-how. Standard analysis can be performed without delving down to the philosophical depths, especially if adequate tools for economic analysis are available.

Heading to the indicated underlying barriers from responses to the other questions, the absolute barrier of political opportunism (B5) was indicated by several, especially

many from the Northern European countries, claiming that politicians pushed for popular road safety measures (Que. N17). Added to these absolute institutional barriers may also be “lack of responsibility” (B10), indicated by what was perceived as obscured responsibility for performing CBA (Que. N10). Based on the responses at the local/regional level there was also some indication of lack of resources (Que. L4). These underlying absolute institutional barriers are displayed in Figure 7.

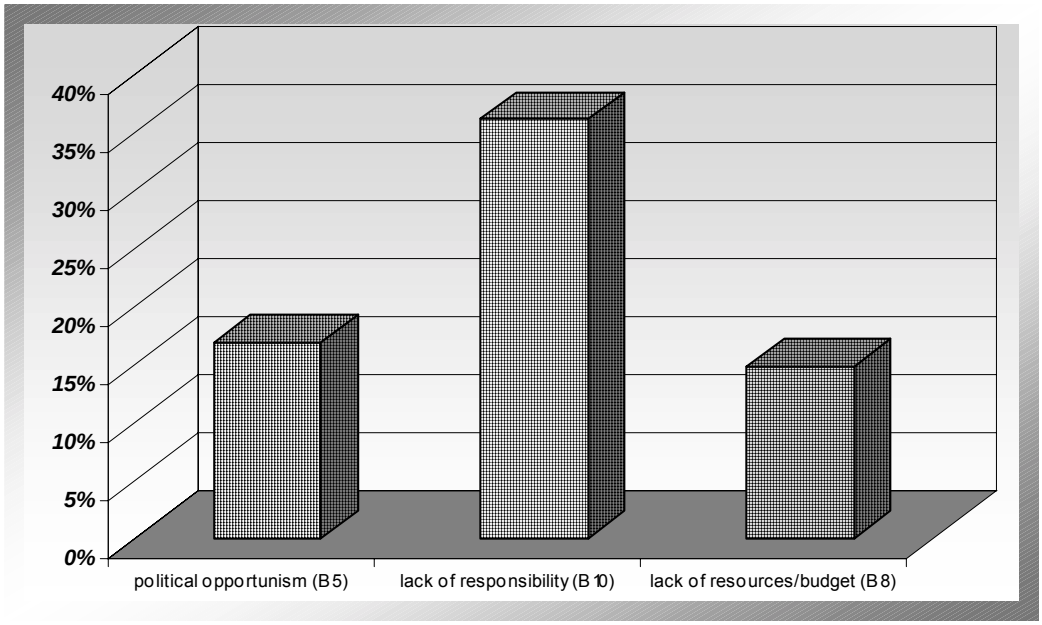


Figure 7: Underlying absolute institutional barriers to the use of EAT/CBA (B).

Other underlying institutional barriers alluded to by the interviewees can be regarded as more relative – possible to alter by improvements in the design, support and promotion of EAT. The first of these can be termed “inadequate tools” (B12), mentioned by more than half of the interviewees in the question addressing this issue (Que. N9). A “wrong timing of CBA” (B9) in the decision-making process was indicated by as much as ⅔, according to the affirmative responses that CBA would be more influential in actual policy if performed earlier in the process (Que. N8). Another possible barrier is related to lack of more profound EAT knowledge, although in this case it may be difficult to distinguish knowledge from attitude. The lack of profound knowledge may not represent an important barrier to economic analysis of transport and cost assessment of safety measures, but it may constitute an obstacle to a benefit-cost approach to safety, since the valuation of road safety stretches the subject of economics much farther than the ordinary cost or market approach. Based on the combined responses to Que. N24-26 it can be presumed that a large part of transport/safety bureaucrats/experts disregard (or disagree with) some profound issues of EAT, especially CBA and valuation of public goods. We have termed this “lack of profound EAT know-how” (B14), but we stress that this to a large extent may represent lack of approval rather than lack of knowledge, and thus could be strongly related to fundamental barriers. The utterances by interviewees regarding relative institutional barriers are summed up in Figure 8. Inadequate tools seems to be an extensive barrier to the use of EAT in road safety decision making.

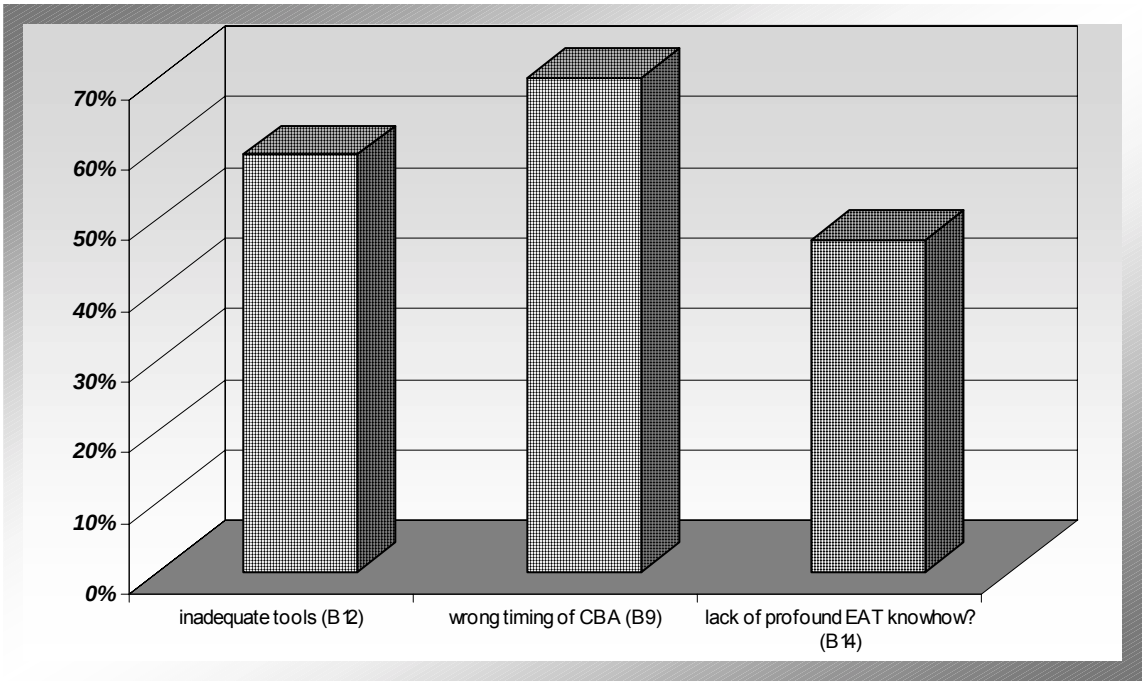


Figure 8: Relative underlying institutional barriers to the use of EAT/CBA (B).

6.2.4 Barriers related to efficiency assessment tools as such (C)

Among the main reasons for not applying EAT (Que. N7), lack of knowledge about relevant impacts (C1) was pointed out by many. Lacking monetary valuation (C2) was primarily indicated by Italian respondents, either that such safety values were not established or that it was difficult to express safety effects monetarily. Indivisibilities (C3) was not directly pointed to by the respondents. These main technical barriers are displayed in Figure 9.

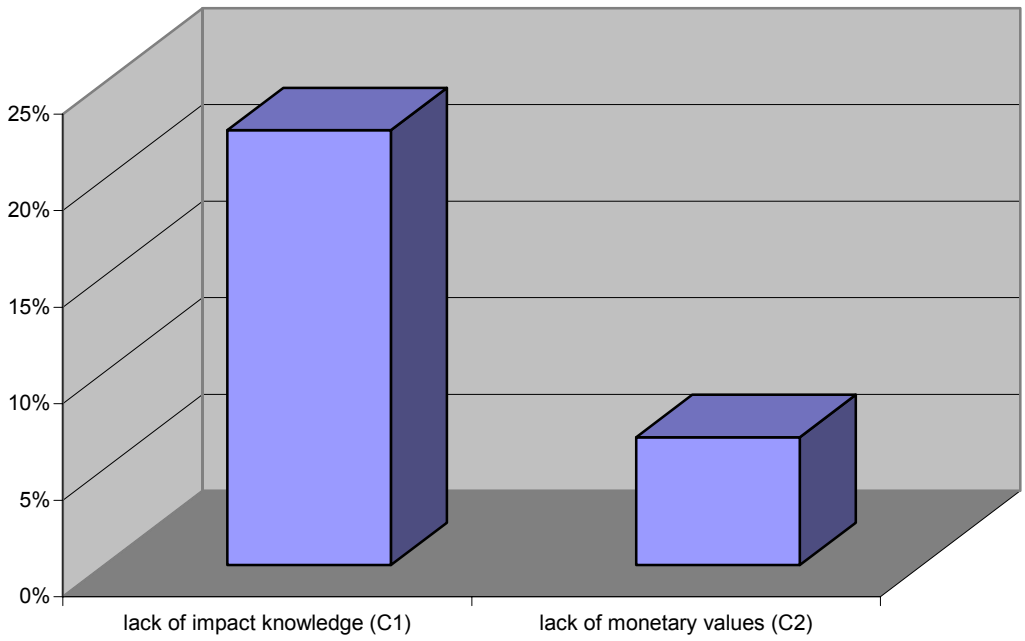


Figure 9: Main technical barriers to the use of EAT/CBA (C).

Regarding underlying technical barriers from the other questions, the lack of impact knowledge (C1) is repeated and extended. As much as ¾ of the respondents stated that impacts of road safety measures are not sufficiently known during planning, especially as far as user related measures are concerned, like educational measures, or campaigns, and enforcement (Que. N4). Nearly as many found that some road safety measures are unsuitable for CBA – also presumably due to lack of knowledge about effects of certain measures (Que. N22). Inadequate treatment of uncertainty (C4) may be indicated from the response that such uncertainty should be clarified and, eventually, quantified (Que. N20). Indicating lack of trust in valuation, or denoting valuation unreliable, may be related to the uncertainty issue, but also to a methodological validity issue. We therefore include another sub-group designed as "lack of reliability" (C5). Some respondents expressed directly the poor data quality as a reason for not trusting valuation methods (Que. N14). This was mentioned by respondents from Southern/Central Europe. To the same question others expressed directly that the valuation methods were unreliable, as a reason for not trusting them. This last reason could to some extent be related to fundamental critique rather than technical, but it is still retained as a technical barrier presumably resulting from technical deficiencies in the applied methodology. The expressed technical/inherent barriers are summed-up in Figure 10. As displayed, lack of impact knowledge seems to be a decisive barrier. The inadequate treatment of uncertainty may also constitute an important underlying barrier.

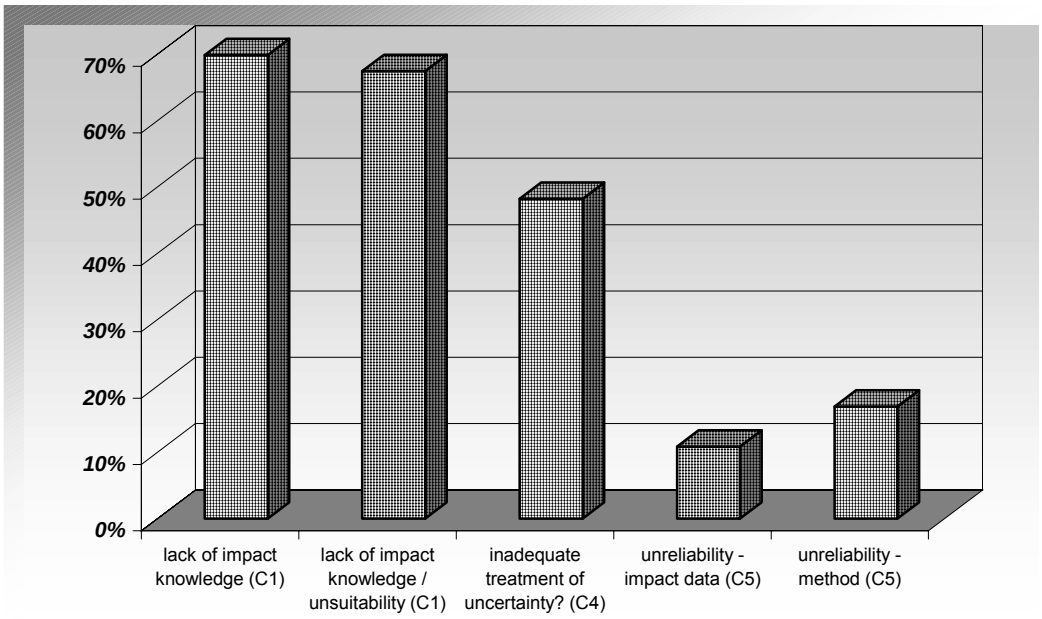


Figure 10: Underlying technical barriers to the use of EAT/CBA (C).

6.2.5 Barriers related to the implementation of cost-effective policy options (D)

Neither social dilemmas (D1) nor lack of power (D2), nor lack of incentives (D4) were directly specified by the interviewees. The only predetermined barrier to the implementation of effective options indicated among the main barriers is interest conflicts (indicated by 7% of all answers to N7), possibly vested interest (D3).

Interest conflict, or possible vested interests (D3), was also indicated as an underlying barrier, in responses to the question about interference from politicians in road safety policy development (Que. N17). Several respondents indicated that politicians could impede implementation of efficient measures that were deemed “unpopular”. Other responses to the same question may be considered as indicating barriers in-between B and D. Social dilemmas (D1) could possibly be an underlying motivation of popularity seeking by politicians (listed under B). When some of the transport/safety bureaucrats/experts express limitations trough directives and governing documents, it is also mostly to be considered as institutional barrier to the use of EAT, rather than lack of power to implement an efficient measure. We have chosen to disregard a further analysis of these statements.

The predetermined barriers under D can all be regarded as absolute barriers. However, the survey also included a question that may indicate an underlying relative barrier to the implementation of CBA-prescribed safety measures. What we denote “non-persuasive CBA info” (D6) may constitute such an important underlying relative barrier to implementation. This assessment is based on the responses to the question if CBA results would be given more weight in prioritising if presented in another manner (Que. N18).

A last possible barrier to be put under underlying barriers to the implementation is “lack of impartial quality check” (D7). This was based on the question about the need for a mandatory quality check of CBA of safety measures by an independent body (Que. L14). This may be closely related to methodological distrust and dispute, but also a belief about possible interest conflicts combined with possible influences trough servile/dishonest analysts. This can be considered an absolute barrier. Figure 11 displays the extent of the underlying barriers to the implementation of efficient policy options.

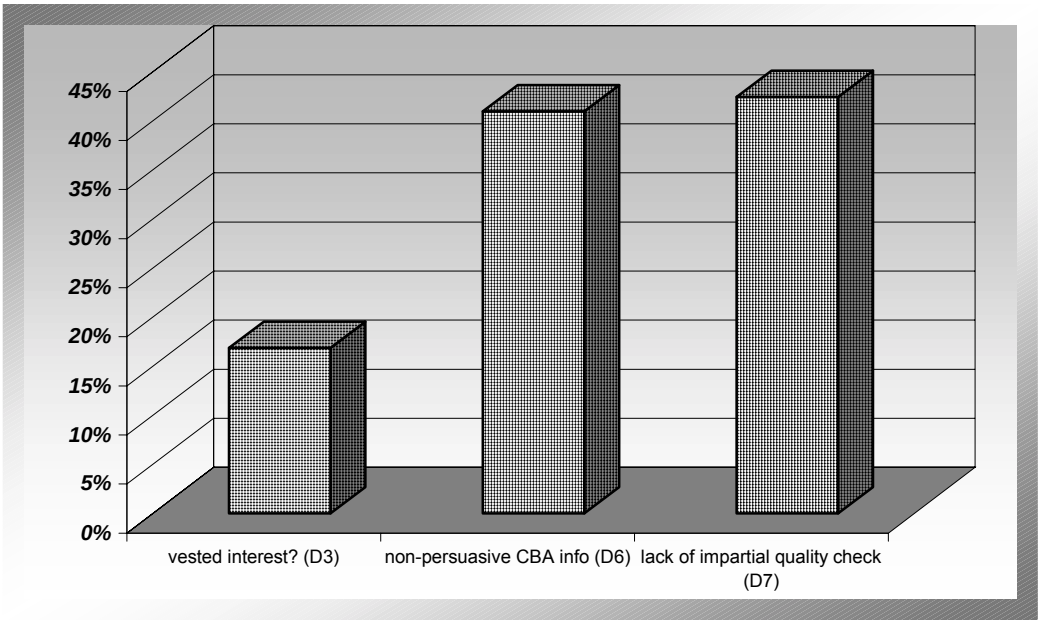


Figure 11: Underlying barriers to the implementation (D).

6.3 Effects of weighting

A simple weighting procedure was performed by

- first levelling the sample weights (i.e., applying the largest sample, the Italian sample, as a basis for levelling-up the other samples), and
- then weight with respect to the respective country's population (or another similar criteria, e.g., representatives in the EU Parliament).

In general it should be stressed that such weighting by population size,[3] giving relatively much more influence to (especially) single German responses and (also) Italian responses, still do not alter considerably the overall pattern or ranking of responses. We will illustrate this by re-drawing the figure of the main barriers:

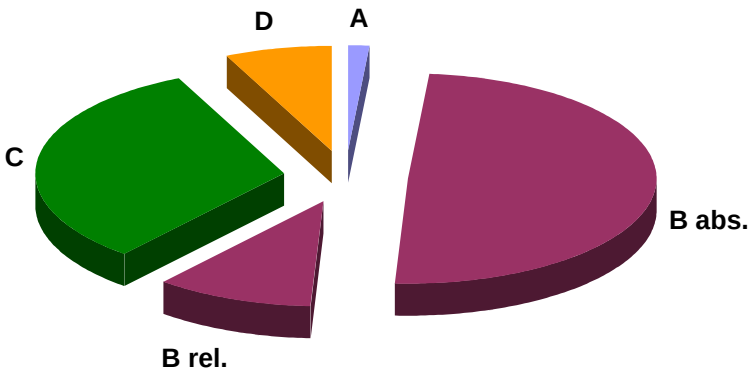


Figure 12: Weighted distribution of responses to direct question about main barriers to the use of EAT (Que. N7).

As can be seen from comparing Figure 12 to Figure 4, the weighted distribution (by population size) provides nearly identical representation of the responses to Que. N7 as the non-weighted case. We will therefore stay on with the non-weighted responses.

6.4 Barriers to the *use* vs. barriers to the *implementation*, and *absolute* vs. *relative* barriers

Overall, barriers to the *use* of EAT in the transport/safety planning process (A, B, C) may have appeared as more pronounced among the main barriers than barriers to the *implementation* (D). This may to some extent follow from both the choice of questions and from the judgment of the answers. Except from the presentation issues, the questionnaire mainly focused on the planning – policy development phase, since it was primarily directed towards bureaucrats and experts. The use of EAT for transport planning and safety measures has been more common in the

[3] The EU responses were weighted as the largest EU country – Germany.

Northern European countries, and neoclassical methods for valuation of reduced accident risk have primarily been applied in The Netherlands and Norway, among the sampled nationalities. The conflict of interest and political horse trading in the implementation process, in Norway, have been identified and described by, e.g., Ravlum and Stenstavold (2001) and Nyborg and Spangen (1996). Some of the answers classified under e.g. institutional barriers to the use of EAT, e.g., political opportunism (popularity seeking), are clearly related to the implementation barriers. Further, as indicated in Figure 3 under section 4.6, also some of the technical barriers, like uncertainty and dispute/unreliability, could hinder the implementation of policy options that a given CBA has concluded are efficient.

When comes to the dimension of *absolute* versus *relative* barriers, the focus of the Thematic Network ROSEBUD, and to some extent this survey under Work Package 2, is primarily on those barriers that can be influenced/altered – the relative ones. Although the difference between absolute and relative is not clear-cut, we have tried to distinguish between them in this summing-up assessment. The technical and several of the institutional barriers are deemed as possible to reduce. Even some barriers to the implementation may be possible to influence.

The identified *main* relative barriers to the application of EAT for road safety measures were mostly technical and institutional. They indicate a need for improved tools to perform CEA and, especially, CBA in relevant institutions, and they indicate a need for more research and improved estimates regarding the effects of measures (especially user-related measures) and improved estimates for monetary values.

Also for the identified *underlying* relative barriers the lack of adequate tools to perform efficiency analysis is standing out. But they also indicate some scope for promoting and propagating EAT in safety planning and decision-making.

6.5 Differences between countries / decision levels

Some differences between countries and decision levels have been accentuated in the qualitative summaries. In this section some of these differences will be re-stated and specified. To obtain some decent number in each group of countries we merge Norway, the Netherlands and Germany in “Northern” – also including the EU respondents (mostly of German origin), and we merge Italy, Hungary, the Czech Republic and Israel in “Southern/Central”. We recognise that the Israeli responses in some cases show more similarity with the Northern group, and in some cases may show differences from all the European countries.

Although the EU group consisted mostly of respondents from Northern Europe (Germany), EU representatives clearly represent the whole EU decision level, not their country of origin’s national decision level. Thus, both this issue and the fact that they refer to a distinct decision level argue against including them in the comparison between the Northern and Southern/Central regions. For these comparisons the sample sizes will be 33 (Northern) plus 44 (Southern/Central) equal 77.

Regarding the comparisons between decision levels the EU group is, strictly speaking, too small for comparisons with the national-level and the local/regional-level. But it has still been included for what we may term illustrative purposes.

6.5.1 The use of EAT

Figure 13 displays the stated use of EAT by the respondents at the different decision levels. Actually, there are no differences in regular use of EAT for road safety assessments between the decision levels. The only difference may be relatively more use of CEA instead of CBA at the local/regional level. There is an indication of slightly less use of EAT for preliminary assessment of road safety measures at the local/regional level.

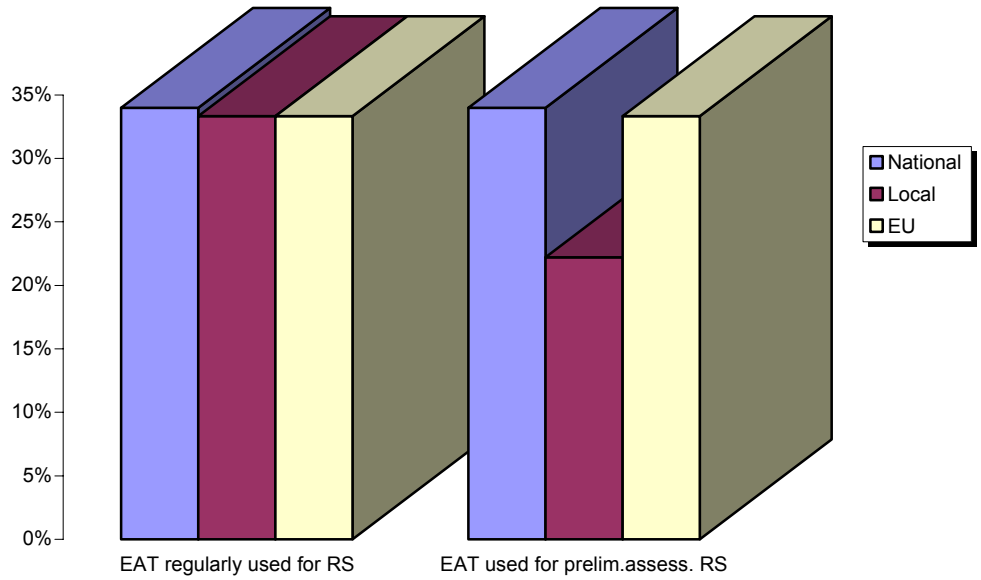


Figure 13: The use of EAT – comparing decision levels.

Figure 14 displays a similar comparison of stated use of EAT between the two geographical groups. In this case the differences are clearer. In the Northern European countries there is more regular use of EAT for road safety assessments, more use of EAT for preliminary assessment of road safety measures, and a more regular user cost estimation when new laws are considered.

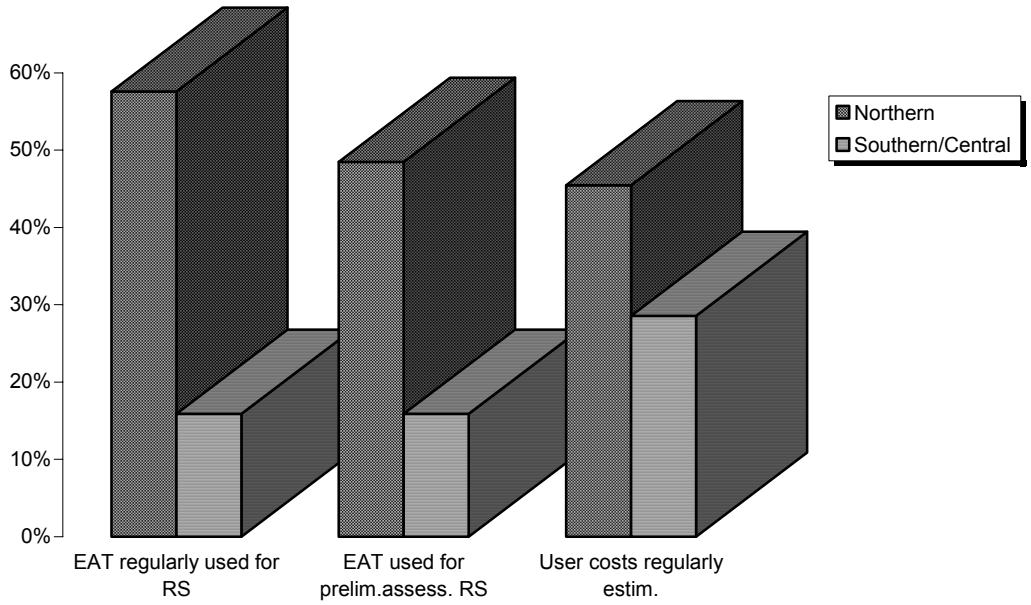


Figure 14: The use of EAT – comparing geographical groups.

6.5.2 The absolute barriers

Figure 15 displays a comparison of the main absolute barriers between decision levels. A stronger push for popular measures (political opportunism) and more conflict of interest (vested interests) are found at the local/regional level (and, possibly, the EU level) compared to the national level. The stated lack of resources seems more or less to be felt equally pressing at both the local/regional and national levels.

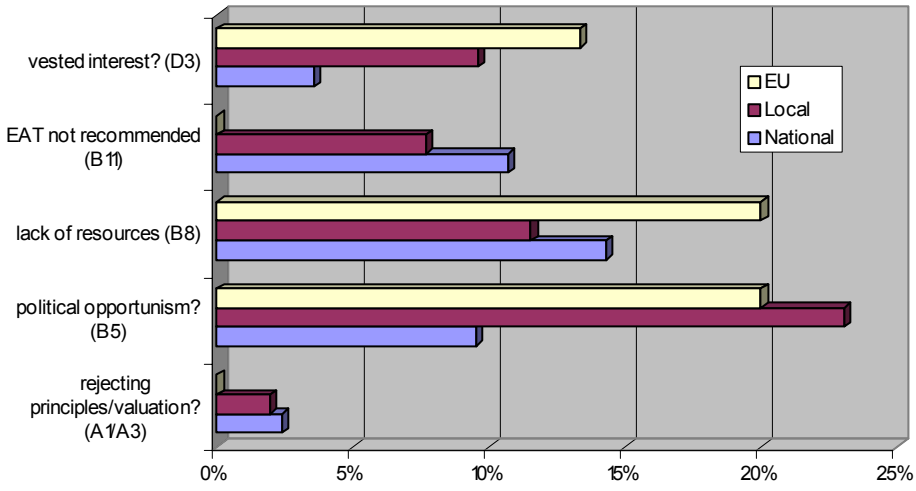


Figure 15: Main absolute barriers – comparing decision levels.

Figure 16 shows the comparison of main absolute barriers between the geographical groups. Except for political opportunism, the institutional barriers seem stronger in the Southern/Central countries, while in the Northern the barriers to the implementation have been more stressed. In those countries where EAT are least applied, it is not surprising that basic institutional barriers ("EAT not recommended" and "lack of resources") are indicated as main barriers. In those countries where EAT is more regularly applied in the decision-making process, the main barriers seemingly relate to politicians' push for other than the efficient measures or opposition to some of those deemed efficient.

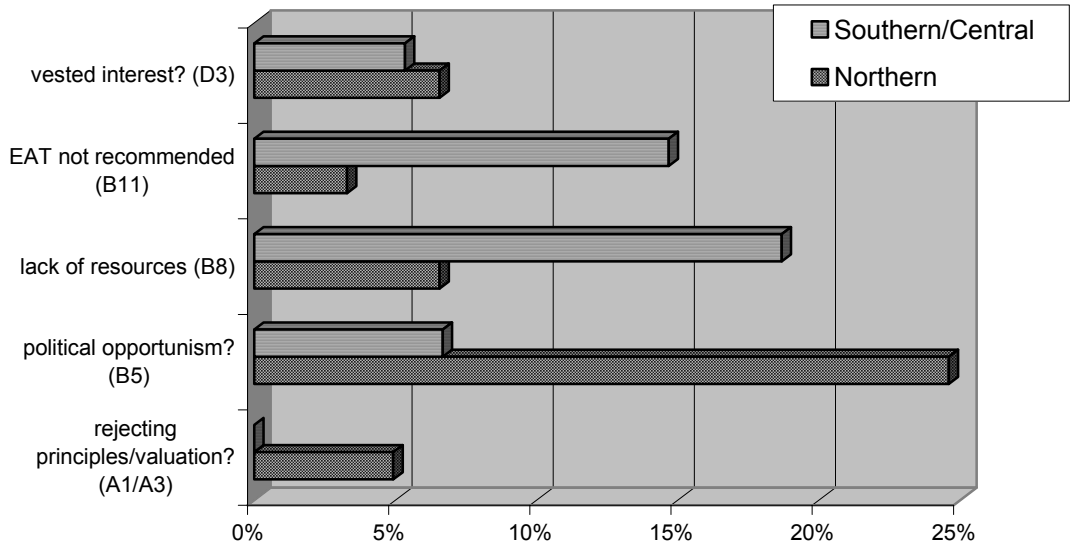


Figure 16: Main absolute barriers – comparing geographical groups.

Figure 17 displays the comparison of the indicated underlying absolute barriers between decision levels. Again the overall pattern of responses at the national and local/regional level are quite in accordance. But also in this case there seems to be a somewhat stronger element of political opportunism at the local/regional level.

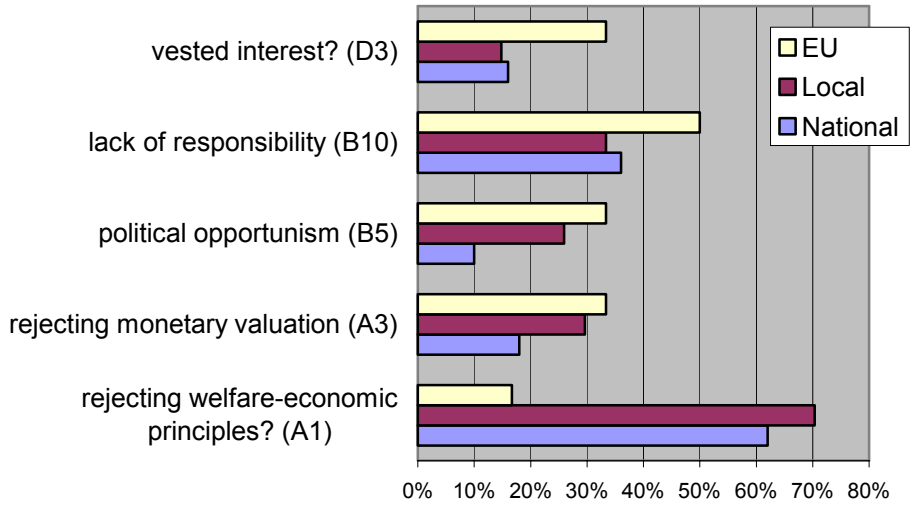


Figure 17: Underlying absolute barriers – comparing decision levels.

Figure 18 provides the same comparison of underlying absolute barriers between the geographical groups. Again the basic institutional barrier of lacking responsibility for initiating efficiency analysis is much more prominent in the Southern/Central countries, while political opportunism is relatively more emphasised from the Northern. There may also be some slight differences with respect to fundamental barriers, although the differences go both ways.

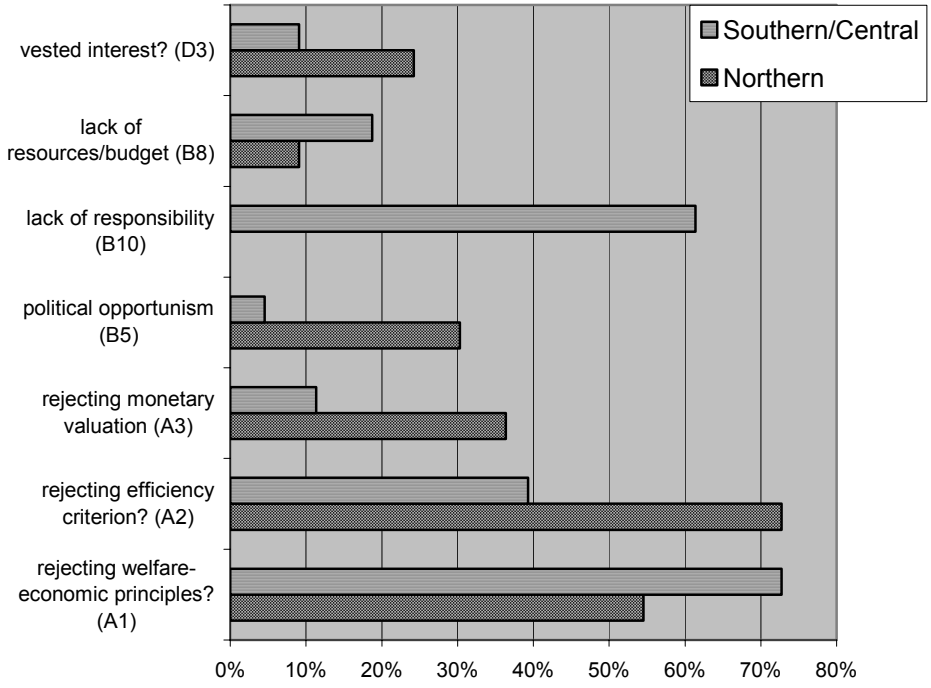


Figure 18: Underlying absolute barriers – comparing geographical groups.

6.5.3 The relative barriers

Figure 19 displays a comparison of the main relative barriers between decision levels. There are no differences worth mentioning between the national and the local/regional level when it comes to main relative barriers. At all decision levels the main relative barrier seems to be the lack of knowledge about the effects of many (potential) road safety measures.

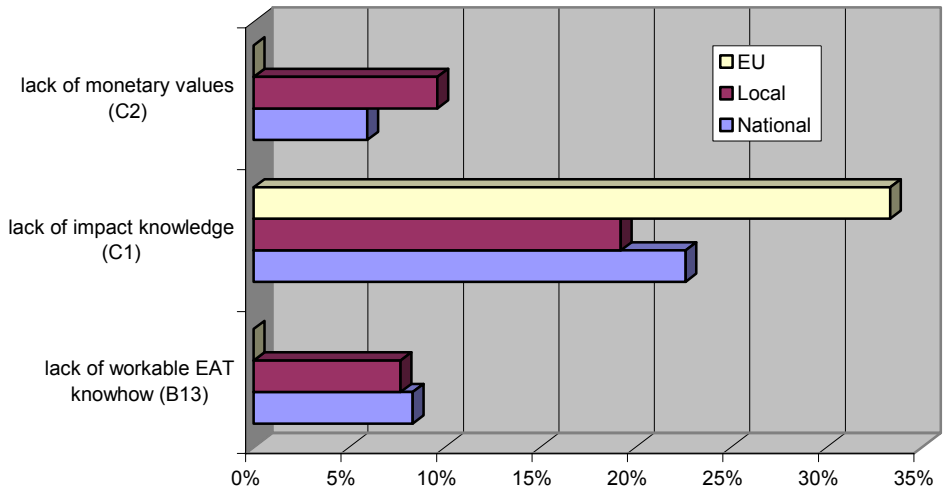


Figure 19: Main relative barriers – comparing decision levels.

As Figure 20 indicates there are not very clear differences between the two geographical groups either, when comes to the main relative barriers. However, the lack of monetary values seems to be felt as a relatively more important technical barrier in the Southern/Central countries. For both groups the lack of impact knowledge is the main relative barrier.

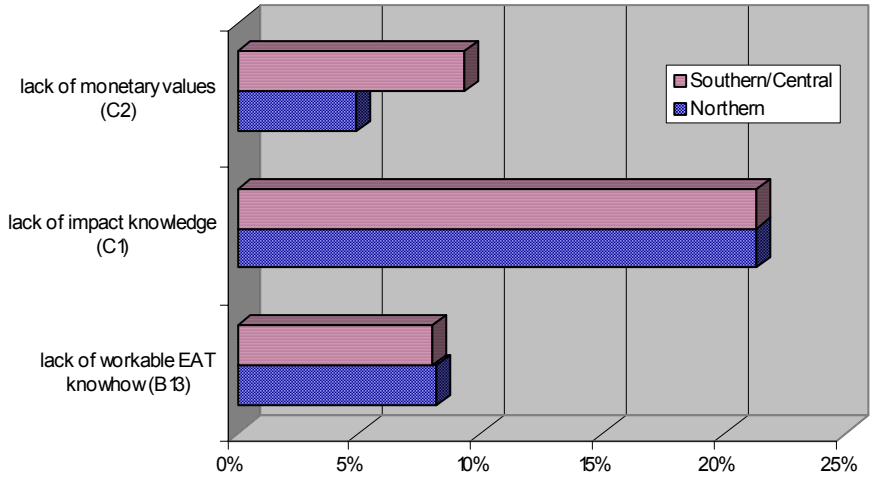


Figure 20: Main relative barriers – comparing geographical groups.

There no clear differences between the national and local/regional decision levels with respect to underlying relative barriers, as shown by Figure 21. Possibly the lack of adequate tools may be slightly more impeding at the local/regional level than at the national. The lack of impact knowledge is stated almost identically.

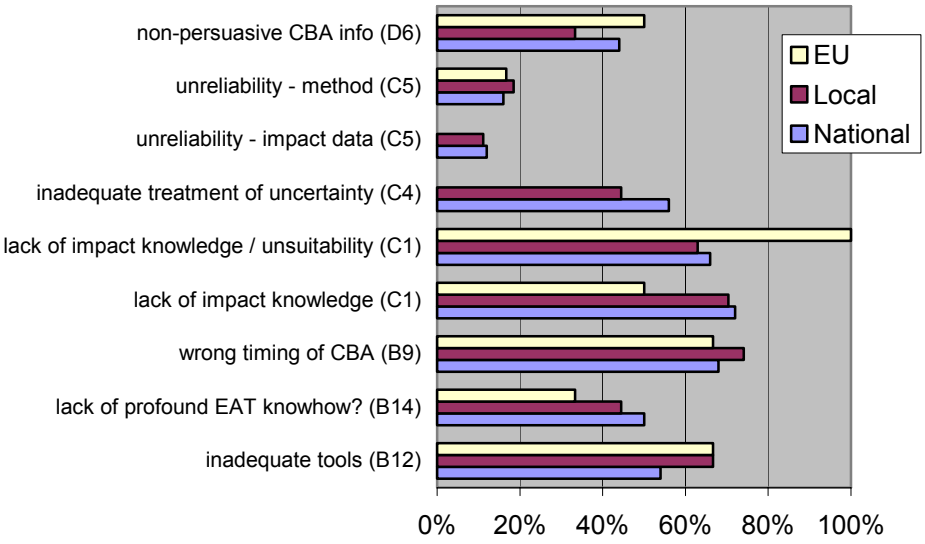


Figure 21: Underlying relative barriers – comparing decision levels.

Figure 22 displays the comparison of underlying relative barriers between the two geographical groups. Unsuitability of CBA for some road safety measures – presumably due primarily to lack of impact knowledge – was relatively more often indicated in the Northern group. They also put more stress on the information about (presentation of) CBA results. Inadequate treatment of uncertainty was relatively more pronounced by the Southern/Central group.

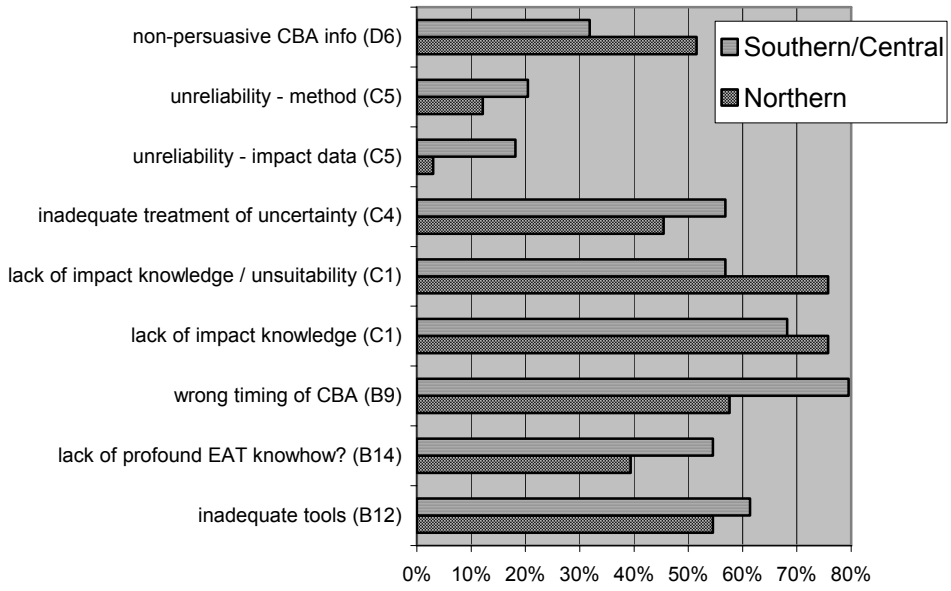


Figure 22: Underlying relative barriers – comparing geographical groups.

7 Concluding remarks with some ideas for overcoming barriers to the use of efficiency assessment tools

This report has endeavoured to identify barriers to the use of efficiency assessment tools (EAT) in road safety policy. After an initial description of EAT (CEA and CBA) and policy-making models a typology of barriers has been specified, distinguishing between philosophical (A), institutional (B) and technical barriers (C) and barriers to the implementation (D). Also the dimension of absolute (practically immovable) versus relative (probably movable) barriers has been stressed. Although the policy-making models and the barrier typology were primarily developed for political decision-making, we have tried to apply and adopt it to a more bureaucratic decision-making.

The theoretical-methodological approach guided the development of a questionnaire for surveying (mostly bureaucratic) decision-makers in six European countries plus Israel. All together 83 persons responded to the questionnaire, nearly ⅔ of these representing the national (state) level, about ⅓ the local/regional level, and some few representing the common EU decision-making level. Half of the full sample was leading their relevant (transportation or road safety) department, while the other were mostly middle managers and senior consultants/researchers. Nearly all of them either made decisions on the priorities of road safety measures or developed methodologies for road safety assessment. About ⅓ based these priorities or methodologies on EAT. Thus, it seems reasonable to say that the sampled individuals are influential in road safety policy formulation and initial prioritisation and decision-making (while only a couple of them were politicians – involved in the final stage, the implementation). It should also be reiterated that (only) 14% were

economists – half of the sample were engineers and the rest representing (other) social sciences, law and planning.

In responses given to a question about the major reasons why cost-benefit analyses or evaluations of cost-effectiveness are not always performed for road safety measures, the larger share of the reasons stated could be classified as indicating institutional barriers. Also, nearly ⅓ of the reasons could be classified as technical (methodological) barriers – pointing to the lack of impact knowledge and, to a lesser extent, monetary values. Adding the small share of *relative* institutional barriers – the lack of workable EAT know how (in the institution), all responses indicating relative barriers sum to nearly 40%.

The main difference between Northern and Southern/Central Europe concern absolute barriers, and is connected to the differences in actual use of EAT in road safety policy. In Southern/Central countries the absolute barriers involve basic institutional barriers in the very initial parts of the decision-making process, i.e., related to the non-recommended use of EAT or obscured responsibility for applying EAT and the lack of resources/tools. In Northern countries the main absolute barriers materialise mostly at the stage between institutional (political opportunism) and implementation (conflicts of interest).

The differences between the national and local/regional decision levels seem less pronounced, except that political opportunism and conflicts of interest constitute a stronger barrier at the local/regional level. Although EAT are indicated to be used just as much at the local/regional as at the national level, except for preliminary analysis, a closer look at the responses indicates that the use of CBA versus CEA is lower at the local/regional level (and also that the cost assessment more often is performed together with purely qualitative judgments).

Responses to other questions, yielding what we have termed underlying indications of barriers, support and detail some of the main indications. At the technical side there is still a distance to go for an improvement of knowledge about the impacts of road safety measures. Such knowledge is decisive for the application of EAT – economists value measurable changes. Also the economic methodology and economic valuation *per se* need to be enhanced and standardised, according to the respondents' indications of unsuitability, uncertainty and unreliability related to impacts and methodologies. Even now, in the new millennium, a wide range of monetary approaches to transport and road safety assessment are applied (de Blaeij et al. 2004, Sælensminde 2002, Trawén et al. 2002). While specific value components may very well differ between European countries, due to income differences and differences in preferences, the methodology as such should not. To put it bluntly, it is important to clarify what economics is and what it is not – and such recognition will basically help standardising the procedures across Europe. Some responses could indicate that road safety decision makers are unsteady on such deeper knowledge of economics.[4]

[4] There is a reason to suppose that a standardisation of economic methodology applied to road safety assessment would improve the position of EAT. The standardisation should be firmly rooted in mainstream (neoclassical) economics – the economic theory that is taught in every leading OECD university and represents the core positive and normative theory of OECD economic systems. Economics and economists do not form a fully uniform mass, there are controversies related to several aspects of theory and method, e.g., the CBA. However, it is important to find the baseline of neoclassical economics, that will clarify that economics is neither square-

An interesting feature was also indicated for the possible relative barrier related to the institutional timing of the use of EAT in the decision-making process. We have pointed out that there are two opposite considerations for the timing: EAT should not enter the stage before a broad survey of potentially effective road safety measures has been performed, so as to ensure that every relevant measure is included. However, what has been indicated by the majority of respondents is the second consideration – that EAT should still enter the stage as early as possible for the purpose of weighing more heavily in the final stages of the decision-making. This relative institutional barrier should be regarded in connection with an indicated relative barrier at the implementation stage – the presentation of the efficiency assessment results. Half of the respondents either found it possible or sure that results from CBA would be given more weight in prioritising if presented in another manner. Those specifying an improved manner pointed out improved marketing/pedagogy and stating the number of saved lives. The latter was also uttered as response to another question. Although the CBA result, the benefit-cost ratio, does not display the saved lives and limbs, it is important to clarify in the presentations that the monetary benefits of road safety measures primarily mirror the reduction of grief and pain.

Work Package 2 (WP2) of the Thematic Network ROSEBUD took over the baton from WP1 that listed a large number of CBA and CEA of all types of road safety measures, including the more complicated user-related measures (ROSEBUD-WP1 2003). WP1 has documented that economic assessment is possible, successfully applied in some countries, and that it provides important information for decision-making. The WP2 leg of the relay race has then been to identify barriers to the use of CBA and CEA for the prioritisation of road safety measures. We pass the baton further to WP3 that shall bring it from barriers to possible solutions to overcome the barriers.

Aiming at reducing or removing barriers to the use of EAT in road safety policy does not imply a technocratic position that CBA and CEA should dictate public policy – with the politicians as somewhat superfluous masters of ceremonies executing the rubber-stamping of the irrefutable truths from the economic analyses. No, not at all, in democratic systems politicians are elected to represent societies' will, and they are in position to follow the priority result from the EAT or come up with something else. The alternative to politicians representative rule is not CBA/CEA, giving a monetary expression of individuals'/households' will (preferences), but referendum – with "one man one vote" instead of "one € one vote". Yet, a basic raison d'être of ROSEBUD is the recognition of too little use of EAT in European road safety policy. Actual road safety policy is assessed to be inefficient, and it does not at all seem to be a lack of economic argument that impedes a more vigorous effort on analysing and implementing measures that will reduce the number of deaths and injuries on our roads (Elvik 2003).

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headed profit calculation nor technocratic rationality exercise. CBA compare economic values, based solely on individual/household preferences, for a specific (policy) change, either if it is expressed (and measured) for increased mobility, increased safety, decreased noise, decreased air pollution, specific new devices in trams or in cars, or for any other change in a market or non-market good that is affected by the specific change.

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9 Appendix – Questionnaires

9.1 Common questionnaire introduction

First of all, this is an interview about opinions, not a knowledge test. The correct answer is the answer that represents your opinion or personal knowledge as accurately as possible. At the end of the interview you will get the opportunity to return to some questions or mention issues that you think the questions did not include. Individual responses are confidential. No names will be presented, but type of profession, type of affiliation and nationality will be included in analysis.

The purpose of this interview is to learn more about the use of formal methods for impact assessment in planning and priority setting for road safety measures. By formal methods for impact assessment we mean estimations of the impact of road safety measures and estimations of the cost effectiveness and benefit-cost ratio of these measures. The impact of safety measures is their percentage effect on the number of accidents or injured and killed road users. Cost effectiveness denotes how many accidents or injuries or fatalities are prevented per € it costs to implement the measure. Cost-benefit ratios are the results of cost-benefit analyses, whereby one estimates all relevant benefits in € and compare these with the costs of the measure. Relevant benefits will often comprise impacts on mobility and the environment in addition to impacts on road safety.

We are interested in learning about the use of formal impact assessment and efficiency analyses of road safety measures and what could hinder the use of such analyses.

9.2 Questions at national level (final draft of 04.06.03)

N1. In what way are you actually involved in the use of formal impact assessment and efficiency analysis of road safety measures?

N2. Have you, yourself, applied or evaluated cost effectiveness and cost-benefit analysis in the decisions on road safety measures?

N3. What method is applied for making preliminary decision on the introduction of safety measures within your administration's responsibility?

N4. Are the impacts of road safety measures sufficiently known to permit estimation of expected effects during planning of such measures?

N5. Will the costs of road safety measures imposed on road users be estimated when new legislation is proposed?

N6. Cost-benefit analyses are regularly performed for larger road investments. To what extent are cost-effectiveness analyses or cost-benefit analyses performed for other road safety measures within your administration's responsibility?

N7. In your opinion, what are the major reasons why cost-benefit analyses or evaluations of cost-effectiveness are not always performed for road safety measures?

N8. Will the results from cost-benefit analysis and cost-effectiveness evaluation have more influence on final political decisions if they are performed at an earlier stage of the decision-making process?

N9. In your opinion, are the current tools for performing cost-benefit analyses of road safety measures adequate? By tools we mean the resources available in terms of soft ware, guidelines, courses, et cetera?

N10. Is obscurity about the responsibility for performing cost-benefit analysis of road safety measures a hindrance for doing such analyses?

N11. In cost-benefit analysis all relevant impacts are valued in €. In your opinion, is this helpful for road safety, or is it better only to estimate impacts in terms of numbers of fatalities and injuries?

N12. How could better decisions be made by abstaining from a monetary valuation of the impacts on road safety?

N13. Do you see any ethical objections to valuation in € of reduced risk for injuries and deaths on roads, and in case you do, could you please state what such objections might be?

N14. In your opinion, can we trust current economic valuations of reduced risk for accidents and injuries on roads, and if not, why?

N15. Imagine that extensive research had been made, providing monetary valuations of every possible impact of road safety measures, applying the best available methods. Would this, in your opinion, make it defensible to set priorities for road safety measures strictly according to cost-benefit analyses?

N16. If not even the best imaginable analyses are felt to provide an adequate basis for formally setting priorities for road safety measures based on the results of cost-benefit analyses, what might be the reason for such an position?

N17. To which degree do the political leaders, that is, the minister and the other political representatives in the Ministry, set instructions for prioritising of road safety measures that are at odds with priorities from cost-benefit analysis; and how are such instructions justified?

N18. If results from cost-benefit analyses are given limited weight in prioritising; do you think this would change if the results were presented in another manner?

N19. Do politicians put more weight on the number of fatalities and injuries than on the monetary valuation of these impacts?

N20. In your opinion, should one, to a larger degree, clarify that results of cost-benefit analyses are uncertain; and would it be useful to quantify this uncertainty?

N21. If the uncertainty in the results from cost-benefit analyses is presented, do you think this could lead to a disregard of the results from cost-benefit analyses?

N22. In your opinion, are there types of road safety measures that are less suitable for cost-benefit analysis than other measures; and, in that case, why?

N23. Some politicians claim they would be superfluous if policy is based on results from cost-benefit analyses. Do you share this view?

N24a. If the implementation of road safety measures were strictly based on results of cost-benefit analyses, do you think this would imply an increased, decreased, or unchanged number of expected injuries and fatalities on roads?

N24b. How sure are you about your answer?

N25a. In cost-benefit analyses of road investments, do you think a € value shall count equally for reduced time loss for leisure, reduced noise, reduced risk of accidents and reduced time loss for business?

N25b. How sure are you about your answer?

N26a. Do you think it would be more correct to include regional impacts in cost-benefit analyses, beyond reduced time loss for business, for example employment and other spillover effects, instead of valuation of road safety impacts?

N26b. How sure are you about your answer?

N27. Finally, what is your profession?

N28. And, what is your educational degree?

N29. Do you have any further comments on the questions or related issues?

FOR THE INTERVIEWER TO REGISTER:

Affiliation (what ministry, road administration or other): _____

Position (level in hierarchy): _____

9.3 Questions at local/regional level (final draft of 15.10.03)

L1. In what way are you actually involved in the use of formal impact assessment and efficiency analysis of road safety measures?

L2. Have you, yourself, applied or evaluated cost effectiveness and cost-benefit analysis in the decisions on road safety measures?

L3. What method is applied for making preliminary decision on the introduction of safety measures within your administration's responsibility?

L4. Do you operate with a specific budget for safety measures?

L5. Are the impacts of road safety measures sufficiently known to permit estimation of expected effects during planning of such measures?

L6. Cost-benefit analyses are regularly performed for larger road investments. To what extent are cost-effectiveness analyses or cost-benefit analyses performed for other road safety measures within your administration's responsibility?

L7. In your opinion, what are the major reasons why cost-benefit analyses or evaluations of cost-effectiveness are not always performed for road safety measures?

L8. Will the results from cost-benefit analysis and cost-effectiveness evaluation have more influence on final political decisions if they are performed at an earlier stage of the decision-making process?

L9. In your opinion, are the current tools for performing cost-benefit analyses of road safety measures adequate? By tools we mean the resources available in terms of soft ware, guidelines, courses, et cetera?

L10. Is obscurity about the responsibility for performing cost-benefit analysis of road safety measures a hindrance for doing such analyses?

L11. In cost-benefit analysis all relevant impacts are valued in €. In your opinion, is this helpful for road safety, or could better decisions be made by abstaining from monetary valuation of the impacts on road safety?

L12. Do you see any ethical objections to valuation in € of reduced risk for injuries and deaths on roads, and in case you do, could you please state what such objections might be?

L13. In your opinion, can we trust current economic valuations of reduced risk for accidents and injuries on roads, and if not, why?

L14. Do you think it would be necessary to have an obligatory quality check on cost-benefit analyses of road safety measures and transport developments, performed by an organisation that is independent of those performing the cost-benefit analyses?

L15. To which degree do the political leaders of the region/county/municipality set instructions for prioritising of road safety measures that are at odds with priorities from cost-benefit analysis; and how are such instructions justified?

L16. If results from cost-benefit analyses are given limited weight in prioritising; do you think this would change if the results were presented in another manner?

L17. Do politicians put more weight on the number of fatalities and injuries than on the monetary valuation of these impacts?

L18. In your opinion, should one, to a larger degree, clarify that results of cost-benefit analyses are uncertain; and would it be useful to quantify this uncertainty?

L19. If the uncertainty in the results from cost-benefit analyses is presented, do you think this could lead to a disregard of the results from cost-benefit analyses?

L20. In your opinion, are there types of road safety measures that are less suitable for cost-benefit analysis than other measures; and, in that case, why?

L21a. If the implementation of road safety measures were strictly based on results of cost-benefit analyses, do you think this would imply an increased, decreased, or unchanged number of expected injuries and fatalities on roads?

L21b. Could you please shortly explain your answer, and state how sure you are about your answer?

L22a. Imagine a cost-benefit analysis of a road investment. It includes € values of both reduced time loss for business, reduced time loss for leisure, reduced noise, in addition to reduced risk of accidents. Do you think the € values for these different impacts should be weighted differently or do you think a € for one impact should count equally as a € for another impact?

L22b. Could you please shortly explain your answer, and state how sure you are about your answer?

L23a. Imagine another cost-benefit analysis of a road investment, in a non-central region, involving the same values of reduced time loss for business, reduced time loss for leisure, reduced noise, and reduced risk of accidents. Do you think the economic analysis should skip noise and accident risk, and present these as non-economic benefits of noise-suppression and saved lives; and instead include in the cost-benefit analysis regional impacts beyond reduced time loss for business, for example employment and other spill-over effects?

L23b. Could you please shortly explain your answer, and state how sure you are about your answer?

L24. Finally, what is your profession?

L25. And, what is your educational degree?

L26. Do you have any further comments on the questions or related issues?

FOR THE INTERVIEWER TO REGISTER:

Affiliation (which regional/municipal organisation): _____

Position (level in hierarchy): _____

9.4 Questions at EU level (final draft of 15.10.03)

E1. In what way are you actually involved in the use of formal impact assessment and efficiency analysis of road safety measures?

E2. Have you, yourself, applied or evaluated cost effectiveness and cost-benefit analysis in the decisions on road safety measures?

E3. What method is applied for making preliminary decision on the introduction of safety measures within your administration's responsibility?

E4. Are the impacts of road safety measures sufficiently known to permit estimation of expected effects during planning of such measures?

E5. Will the costs of road safety measures imposed on road users be estimated when new legislation is proposed?

E6. Cost-benefit analyses are regularly performed for larger road investments. To what extent are cost-effectiveness analyses or cost-benefit analyses performed for other road safety measures within your administration's responsibility?

E7. In your opinion, what are the major reasons why cost-benefit analyses or evaluations of cost-effectiveness are not always performed for road safety measures?

E8. Will the results from cost-benefit analysis and cost-effectiveness evaluation have more influence on final political decisions if they are performed at an earlier stage of the decision-making process?

E9. In your opinion, are the current tools for performing cost-benefit analyses of road safety measures adequate? By tools we mean the resources available in terms of soft ware, guidelines, courses, et cetera?

E10. Is obscurity about the responsibility for performing cost-benefit analysis of road safety measures a hindrance for doing such analyses?

E11. In cost-benefit analysis all relevant impacts are valued in €. In your opinion, is this helpful for road safety, or could better decisions be made by abstaining from monetary valuation of the impacts on road safety?

E12. Do you see any ethical objections to valuation in € of reduced risk for injuries and deaths on roads, and in case you do, could you please state what such objections might be?

E13. In your opinion, can we trust current economic valuations of reduced risk for accidents and injuries on roads, and if not, why?

E14. Do you think it would be necessary to have an obligatory quality check on cost-benefit analyses of road safety measures and transport developments, performed by an organisation that is independent of those performing the cost-benefit analyses?

E15. Imagine that extensive research had been made, providing monetary valuations of every possible impact of road safety measures, applying the best available methods. Would this, in your opinion, make it defensible to set priorities for road safety measures far more strictly according to cost-benefit analyses?

E16. To which degree do the political leaders, that is, the political representatives in the European Commission or European Parliament, set instructions for prioritising of road safety measures that are at odds with priorities from cost-benefit analysis; and how are such instructions justified?

E17. If results from cost-benefit analyses are given limited weight in prioritising; do you think this would change if the results were presented in another manner?

E18. Do politicians put more weight on the number of fatalities and injuries than on the monetary valuation of these impacts?

E19. In your opinion, should one, to a larger degree, clarify that results of cost-benefit analyses are uncertain; and would it be useful to quantify this uncertainty?

E20. If the uncertainty in the results from cost-benefit analyses is presented, do you think this could lead to a disregard of the results from cost-benefit analyses?

E21. In your opinion, are there types of road safety measures that are less suitable for cost-benefit analysis than other measures; and, in that case, why?

E22. Some politicians claim they would be superfluous if policy is based on results from cost-benefit analyses. Do you share this view?

E23a. If the implementation of road safety measures were strictly based on results of cost-benefit analyses, do you think this would imply an increased, decreased, or unchanged number of expected injuries and fatalities on roads?

E23b. Could you please shortly explain your answer, and state how sure you are about your answer?

E24a. Imagine a cost-benefit analysis of a road investment. It includes € values of both reduced time loss for business, reduced time loss for leisure, reduced noise, in addition to reduced risk of accidents. Do you think the € values for these different impacts should be weighted differently or do you think a € for one impact should count equally as a € for another impact?

E24b. Could you please shortly explain your answer, and state how sure you are about your answer?

E25a. Imagine another cost-benefit analysis of a road investment, in a non-central region, involving the same values of reduced time loss for business, reduced time loss for leisure, reduced noise, and reduced risk of accidents. Do you think the economic analysis should skip noise and accident risk, and present these as non-economic benefits of noise-suppression and saved lives; and instead include in the cost-benefit analysis regional impacts beyond reduced time loss for business, for example employment and other spill-over effects?

E25b. Could you please shortly explain your answer, and state how sure you are about your answer?

E26. Finally, what is your profession?

E27. And, what is your educational degree?

E28. Do you have any further comments on the questions or related issues?

FOR THE INTERVIEWER TO REGISTER:

Affiliation (which European organisation): _____

Position (level in hierarchy): _____