



Cost–benefit analysis of road safety measures: applicability and controversies

Rune Elvik *

Institute of Transport Economics, PO Box 6110, Etterstad, N-0602, Oslo, Norway

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Abstract

This paper discusses the applicability of cost–benefit analysis as an aid to policy making for road safety measures. A framework for assessing the applicability of cost–benefit analysis is developed. Five main types of criticism of cost–benefit analysis are identified:

1. rejecting the basic principles of cost–benefit analysis as not applicable to road safety,
2. excluding some types of issues from the scope of calculation of costs and benefits,
3. setting policy objectives that are not amenable to cost–benefit analysis,
4. rejecting the need for maintaining a separation between policy objectives and policy programmes as required for cost–benefit analysis, and
5. rejecting, or denying the possibility of ever obtaining, acceptably valid and reliable economic valuations of the consequences of alternative policy programmes.

It is concluded that rejecting the basic principles of cost–benefit analysis is a difficult position to defend, since these principles are simply a re-statement in economic terms of very general principles of rational choice. These principles are part of the normative basis of all formal techniques designed to aid policy making as well as the democratic system of government. Everybody, including those who advocate the use of cost–benefit analysis, agree that some issues are unsuitable for cost–benefit analysis, in particular those that involve basic human rights and fairness in distribution. There may, however, be disagreement with respect to the perception of a specific policy issue in terms of whether it is mainly about rights and fairness or mainly about the effective use of policy instruments to solve a social problem. Politicians may be tempted to set policy objectives that are ill suited for cost–benefit analysis, but this does not imply that cost–benefit analysis makes unreasonable assumptions. Perhaps the most important issue for the applicability of cost–benefit analysis is whether people in general have sufficiently well ordered preferences for economic valuations based on these preferences to make sense. © 2000 Elsevier Science Ltd. All rights reserved.

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1. Introduction

Cost–benefit analysis has been applied for many years to set priorities for road safety measures. Its application goes at least 25 years back (Trilling, 1978), but has remained controversial (Hauer, 1994). Jochsch (1975), in an early appraisal of the applicability of cost–benefit analysis to road safety measures, concluded that there were so many problems in estimating both costs and benefits that one should not rely on cost–benefit analysis to decide whether road safety

measures ought to be introduced. His objections did not, however, question the basic principles of cost–benefit analysis. Critics like Hauer (1991, 1994) and Haukeland (1994) have been more fundamental and reject the basic principles of cost–benefit analysis as put forward in the field of welfare economics to be applicable in the field of road safety. They state that the very idea of putting a monetary value on human life does not make sense and is ethically unacceptable.

The implications for the applicability of cost–benefit analysis of various types of criticism against its use depend on the nature of the arguments made. If one rejects the basic principles of cost–benefit analysis, then the technique cannot be applied at all. If, on the other

* Tel.: +47-22573800; fax: +47-22570290.

E-mail address: rune.elvik@toi.no (R. Elvik).

hand, one thinks that the economic valuation of a certain non-marketed good is too uncertain, then more research is called for to obtain a more precise valuation. This paper attempts to clarify the implications for the applicability of cost–benefit analysis of various types of criticism made against it. By doing so, the paper also tries to clarify the assumptions that must be made for the use of cost–benefit analysis to make sense. The context for the discussion is the application of cost–benefit analysis to road safety measures. The main questions discussed in the paper are:

1. How can the applicability of cost–benefit analysis to a specific topic be determined?
2. What are the implications of various types of criticism against the use of cost–benefit analysis for its applicability?

The outline of the paper is as follows. Following a brief presentation of how most textbooks introduce cost–benefit analysis, a framework for discussing its applicability is proposed. This framework forms the basis for a discussion of the implications of various types of criticism levelled against cost–benefit analysis. The discussion is concluded with an assessment of how adequate current cost–benefit analyses of road safety measures in Norway are as a basis for deciding on their use. Some alternatives to cost–benefit analysis are briefly discussed.

2. Cost–benefit analysis as presented in textbooks

Most textbooks in cost–benefit analysis and applied economic welfare theory (Dasgupta and Pearce, 1972; Sassone and Schaffer, 1978; Sugden and Williams, 1978; Boadway and Bruce, 1984; Mishan, 1988; Gramlich, 1990; Johansson, 1991; Hanley and Spash, 1993; Williams and Giardina, 1993; Layard and Glaister, 1994) contain examples of such analyses, intended to show their basic logic. In general, the problems used to illustrate cost–benefit analysis in textbooks share the following characteristics:

1. They involve public expenditures, often investments. Projects are sometimes financed by direct user payment, but more often by general taxation.
2. There are multiple policy objectives, often partly conflicting and requiring tradeoffs to be made. It is assumed that policy makers want solutions that realise all policy objectives to the maximum extent possible.
3. One or several of the policy objectives concern the provision of a non-marketed public good, like less crime, a cleaner environment or safer roads.
4. It is assumed that an efficient use of public funds is desirable, since these funds are scarce and alternative uses of them numerous.

These, then, are the main characteristics of problems that economists regard as well suited for cost–benefit analysis. Applied welfare economics supplies the basic principles of cost–benefit analysis. There are four main principles: Consumer sovereignty, welfare maximisation, valuation of goods according to willingness-to-pay, and neutrality with respect to distributive outcomes. The principle of consumer sovereignty, briefly stated, means that welfare is defined in terms of how consumers choose to spend their income between commodity bundles. The right of consumers to choose how to spend their income is respected. The strength of consumer preferences for the provision of public goods is measured by the amount of money that consumers are willing to pay for these goods. Various techniques have been developed to assess willingness to pay for non-marketed goods. It is beyond the scope of this paper to discuss these techniques in detail.

The objective of cost–benefit analysis is welfare maximisation. To determine whether a project increases welfare or not, cost–benefit analysis relies on the Pareto-criterion. This criterion states that welfare is increased when a change makes at least one person better off and nobody worse off. In practice, many public projects will make some people better off and others worse off. Hence, the Pareto criterion is not very practical. Most economists therefore subscribe to a less demanding criterion of welfare maximisation, stating that welfare is increased when a potential Pareto improvement occurs. A project satisfies this criterion when those who benefit from it can compensate those who lose from it (in utility terms) and still retain a net benefit (in utility terms). In practice, a project is regarded as satisfying this criterion when benefits are greater than costs. There is, however, no requirement that actual compensation of those who lose takes place. Cost–benefit analysis is neutral with respect to distributive outcomes. What counts is the aggregate size of benefits and costs, not how these impacts are distributed between various groups of the population.

3. A framework for assessing the applicability of cost–benefit analysis to assess road safety measures

In order to sort out various objections to cost–benefit analysis with regard to their implications for the use of this technique, a framework for assessing the applicability of cost–benefit analysis has been developed. This framework is displayed graphically on Fig. 1.

The framework identifies five stages in assessing the applicability of cost–benefit analysis to a certain problem. These stages are:

1. Assess the basic principles of cost–benefit analysis.
2. Determine the type of issue to be decided.

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