European Commission

Cost Benefit Analysis 2016

Summary

European Road Safety Observatory
www.erso.eu

Transport

Cost Benefit Analysis - Summary

What is cost-benefit analysis?

Cost-benefit analysis (CBA) is a formal analysis of the impacts of a measure or programme, based on welfare economics, designed to assess whether the advantages (benefits) of the measure or programme are greater than its disadvantages. Unlike other tools of efficiency assessment, CBA involves monetary estimates of both costs and effects/benefits of a measure. Thus, in the road safety context, it may be useful for prioritizing various road safety measures or programmes, particularly different accident severities or additional impacts (on mobility, environment, etc.) are taken into account, or trade-offs of road safety against other policy objectives need to be considered.

Principles of cost-benefit analysis

Consumer sovereignty

Consumer sovereignty is the principle that the choices made by consumers with regard to how to spend their income are respected.

Valuation of goods according to willingness-to-pay

The value of improving road safety is indicated by the willingness-to-pay for reduced risk of injury. Assessing willingness-to-pay for non-market goods like road safety is a complex task, and special methods should be applied (e.g. estimation of marginal utility) to overcome theoretical objections, such as that rich people can afford to pay more for road safety than the poor.

Pareto-optimality as the criterion of welfare maximisation

Potential Pareto-improvement criterion is satisfied when those who gain from a measure can compensate those who lose from it (in utility terms), while still retaining a net benefit.

Neutrality with respect to income distribution

The fourth principle of cost-benefit analysis is that it remains neutral with respect to the distribution of benefits and costs among groups of the population (or groups of road users), provided of course that benefits in total exceed costs.

Why do cost-benefit analysis of road safety measures?

The main reason for doing CBAs of road safety measures is to help develop policies that make the most efficient use of resources, i.e. that produce the largest possible benefits for a given cost. CBA seeks to identify the cheapest way of improving road safety. Road safety policy analyses carried out in several countries showed that major improvements in road safety can be accomplished by implementing cost-effective safety measures.

Cost Benefit Analysis - Summary

What is the relationship between cost-benefit analysis and Safe System approach?

The ethical principle of the Safe System approach that rules out trading-off human lives against other commodities can be considered as not consistent with the principles of CBA. One should, however, not necessarily conclude that both concepts are incompatible, for the following reasons:

- Safe System approach provides an incentive for giving high priority to the most cost-effective road safety measures. To identify the most cost-effective road safety measures, some form of cost-benefit analysis needs to be made.
- Safe System aims to stimulate technological innovation that may result in the development of new and more cost-effective road safety measures. Such technological innovation can make measures cost-effective in the future, even if they are not regarded as cost-effective today.
- The two concepts can be considered complementary, considering uncertainty in the CBA approach. A broad range of CBA outcomes is usually indicated, where the "optimal" level of accepted traffic fatalities is likely to be. As a policy guideline, a broad range is clearly less demanding and motivating, and difficult to communicate, while a simple ideal like Vision Zero and the Safe System approach is much more suitable.

What is the best monetary valuation of road safety?

When conducting CBAs of road safety measures, the following cost categories are usually examined:

- Medical costs: costs resulting from the treatment of casualties, e.g. costs of hospital stays, rehabilitation, medicines and adaptation.
- Production loss: loss of production and income resulting from the temporary or permanent disability of injured, and the complete loss of production of fatalities.
- Human costs: immaterial costs of suffering, pain, sorrow, loss of life or quality of life.
- Administrative costs: the costs of police services, fire services, law courts and administrative costs of insurers.
- Property damage: damage to vehicles, freights, roads and personal property.
- Other costs: congestion, vehicle unavailability and funeral costs.

The monetary valuation of human costs requires an estimate of the economic value of a statistical life. There are two main approaches for eliciting the value of a statistical life: stated preference methods and revealed preference methods. Several different estimates can be found in relevant literature: 4,88 million US$ (2005, adjusted) in a review by OECD (2012), 1 - 2 million Euros in a recommendation of the European Commission (2009), 2,6 million Euros (Netherland, 2009), 2,4 to 3,6 million US$ (2012, adjusted) in high income countries etc.

Can the results of cost-benefit analyses be generalised across countries?
The evaluation of CBA results for specific road safety measures across countries indicates that in some cases the results appear to be valid in many countries, while in other cases there are large differences. The lesson is that cost-benefit analyses should be performed in every country and that one should not uncritically assume that the results of a cost-benefit analysis made in one country apply to another country.

Can road safety policy be based strictly on cost-benefit analyses?

The following reasons prevent basing road safety policy strictly on CBAs:

- Lack of power of the authority to introduce certain road safety measures.
- Scarcity of resources available for the programme's implementation
- Social dilemmas when a road safety measure is cost-effective from a societal point of view but not from the point of view of a certain group of road users, e.g. in lowering speed limits benefits are external from the driver's point of view and are not experienced as a personal gain.
- Competing criteria for priority-setting, referring to the size of effects on road safety and to the distribution of safety effects between different groups of road users. E.g. policymakers usually prefer measures that would result in a large fatality reduction over more cost-effective measures of a smaller scale; also, measures improving pedestrian or cyclist safety are preferable over measures that benefit motorists, even if the latter are more cost-effective.

Notes

1. Country abbreviations

	Belgium	BE		Italy	IT		Romania	RO
	Bulgaria	BG		Cyprus	CY		Slovenia	SI
	Czech Republic	CZ		Latvia	LV		Slovakia	SK
	Denmark	DK		Lithuania	LT		Finland	FI
	Germany	DE		Luxembourg	LU		Sweden	SE
	Estonia	EE		Hungary	HU		United Kingdom	UK
	Ireland	IE		Malta	MT			
	Greece	EL		Netherlands	NL		Iceland	IS
	Spain	ES		Austria	AT		Liechtenstein	LI
	France	FR		Poland	PL		Norway	NO
	Croatia	HR		Portugal	PT		Switzerland	CH

2. This 2016 edition of Traffic Safety Synthesis on Cost Benefit Analysis updates the previous versions produced within the EU co-funded research projects SafetyNet (2008) and DaCoTA (2012). This Synthesis on Cost Benefit Analysis was originally written in 2008 and then updated in 2012 by Rune Elvik, TØI and in 2016 by Victoria Gitelman, Technion Israel Institute of Technology.

3. All Traffic Safety Syntheses of the European Road Safety Observatory have been peer reviewed by the Scientific Editorial Board composed by: George Yannis, NTUA (chair), Robert Bauer, KFV, Christophe Nicodème, ERF, Klaus Machata, KFV, Eleonora Papadimitriou, NTUA, Pete Thomas, Un. Loughborough.

4. Disclaimer

5. Please refer to this Report as follows:

European Commission, Cost Benefit Analysis, European Commission, Directorate General for Transport, October 2016.


E
R
S
O
European
Road
Safety
Observatory
www.erso.eu