

Cost-Benefit Analysis (main concepts)

Methodology

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Cost-Benefit Analysis in Decision-Making

- There is an on-going process in the EU, which seeks to ensure a sustainable development. The road towards sustainable development involves better integration of economics into environmental decision-making, in particular through the use of economic techniques for the appraisal of projects and policies.
- A technique central to this effort is cost-benefit analysis (CBA). This tool is going to be important in Romania as the country is advancing towards EU integration and more and more environmental projects will have to be carried out with the support of the European Union.
- In order to make sound policy decisions, policy-makers need **information about the benefits and costs of alternative options for addressing a particular environmental problem**. CBA can provide policy makers with valuable information for proper decision and policy making.

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Cost-Benefit Analysis in Decision-Making (II)

1. **The CBA is a tool, which judges projects according to a comparison between the complete range of costs and benefits.**
2. Least-cost policies to achieve a policy target:
 - To find first-best outcomes: Maximize social benefit, taking into account both environmental and market impacts
 - To find cost effective outcome: Minimize market cost to achieve environmental objective
3. For each project at least three alternatives could be considered:
 - the **do nothing** alternative;
 - the **do minimum** alternative;
 - the **do something** alternative (or reasonable alternative).

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Main steps in CBA

1. CBA setup
2. Cost estimation
3. Benefit estimation
4. Calculating indicators
5. Analysing indicators
6. Risk assessment

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I. CBA setup

The first step is to consider questions in the following areas:

1. **Purpose of the project: What is the problem or goal that the project is intended to address? What are its intended benefits?**
 - Project description: What will be done? Where? When? How? By whom?
 - Purpose of the analysis: Will the analysis be used to determine if the project should be undertaken? Will it be used to determine which of a group of projects should be selected or which should have highest priority?
 - Appropriate level of effort for the analysis: Given the cost of the project, how much effort should be devoted to benefit-cost analysis and which aspects should receive the most attention?
2. **For whom are benefits being sought? Who will incur the direct and indirect costs?**
 - Base case: What will happen if there is no project?
 - Alternatives to be considered: Through what other means could the desired benefit be achieved?
 - Project schedule: When will costs be incurred? When will benefits be realized?
 - Geographic scope of the analysis: What area will be affected by the project? By its alternatives?
 - Time period of analysis: Over what period of time should projects be evaluated

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II. Estimating Costs

"**COSTS**" are defined as the resources, such as land, labor, and material, expended on the project by the entity providing it.

- Costs are generally easier to measure than benefits and easier to value, because they represent goods or services that are usually traded for money, such as labor, land, and materials. Typical costs of a project are:
 - Initial costs:
 - Site acquisition;
 - planning, design,
 - engineering, and construction
 - Continuing/running costs
 - Rehabilitation costs
 - "End of project" costs

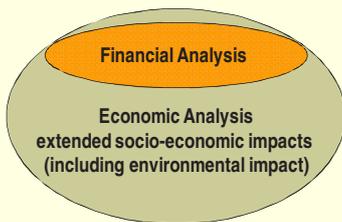
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III. Estimating Benefits

- The benefits of a project are commonly defined as direct revenue and/or reductions in costs.
- Benefits are defined as all of the effects of the project/program on its users or the society at large, even those effects that are negative (sometimes referred to as disbenefits). Benefits and disbenefits are measurable and have economic value.

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Financial and Economic CBA



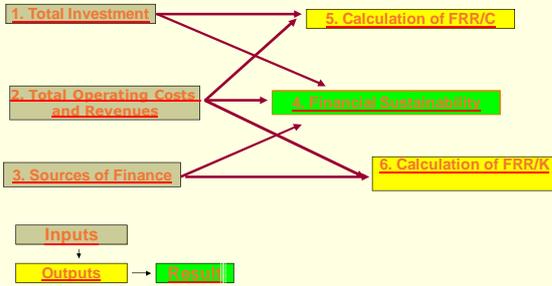
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Financial CBA

- The purpose of the financial analysis is to use the project's cash flow forecasts in order to calculate suitable return rates, specifically the financial internal rate of return on investment and own capital and the corresponding financial net present value.
- **This analysis provides essential information on inputs and outputs, their prices and the overall timing structure of revenues and expenditures.**
The financial analysis is made up of a series of tables that:
 - collect the financial flows of the investment, broken down by total investment, operating costs and revenue;
 - sources of financing; and
 - cash flow analysis for financial sustainability.
- The financial analysis should finally result in two tables summarising the cash flows:
 - one for investment returns (capacity of operating net revenues to sustain the investment costs, regardless of the way in which they are financed);
 - the other for the calculation of the returns on equity capital where is considered the financing schemes used
- It gives the rate of return of the project considering its financial burden, regardless its investment costs.

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Structure of a Financial Analysis



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Economic CBA (I)

- The economic analysis appraises the project contribution to the economic welfare of the region or country. It is made on behalf of the whole society (region or country) instead of just the owner of the infrastructure like in the financial analysis. Moving on from the data of the financial analysis (the performance of the investment regardless of its financial sources), the economic analysis, by mean of the definition of appropriate conversion factors for each of the inflow or outflow items, which includes benefits and social costs not considered by the financial analysis.
- The logic of methodology allowing the transfer from financial to economic analysis consists of the transformation of market prices used in the financial analysis into accounting prices (that amend prices distorted by market imperfections) and of the consideration of externalities leading to benefits and social costs unconsidered by the financial analysis as they do not generate actual money expenditures or income (for example environmental impacts or redistributive effects).

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Economic CBA (II)

The economic analysis, therefore, is performed in three phases:

- Phase 1: **taxes/subsidies and other transfers corrections;**
- Phase 2: **externalities corrections;**
- Phase 3: **conversion of market prices into accounting prices** to include also social costs and benefits (determination of conversion factors).

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Externalities corrections

- In the context of CBA, the environmental impact should be properly described and appraised, possibly with recourse to state of the art qualitative-quantitative methods. Multicriteria analysis is often useful in this framework.
- This would imply giving, if possible, a conventional accounting value to environmental costs.
- These may be very crude estimates: however they may capture at least the most relevant environmental costs.

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Polluter Pays Principle

PPP is one horizontal objective of EU policies

The new General Regulation of the Structural Funds, the revised Cohesion Fund Regulation and the new pre-accession instrument ISPA include provisions to apply the Polluter Pays Principle to the operations of the Funds.

The Technical Paper sets out proposals for practical modalities to be applied to the co-financing of infrastructure operations by these Funds.

The Polluter Pays Principle implies that those who cause environmental damage should bear the costs of avoiding it or compensating for it. Therefore public financing of environmental policy is to be avoided in most cases, as it should be financed by the polluters themselves as far as they can be identified.

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Technical Paper: Application of the Polluter Pays Principle Differentiating the rates of Community assistance for Structural Funds, Cohesion Fund and ISPA infrastructure operations

- a system should be promoted through the differentiation of rates of assistance, whereby the environmental costs related to the treatment of pollution and/or preventive actions are borne by those who cause the pollution;
- the application of the polluter-pays principle must be compatible with the goals of economic and social cohesion;
- its development should be progressive and concern the range of infrastructure sectors covered by Community funding;
- it should take into account the social acceptance of charging;
- it should take into account Treaty provisions related to the careful and rational use of resources, especially water and energy

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In the case of Environmental Projects

Article 15 of Directive 75/442/EEC (as amended) on waste management requires

Member States to have in place a system of charges for waste disposal: 'In accordance with the polluter pays principle, the cost of disposing of waste must be borne by:

- the holder who has waste handled by a waste collector or by an undertaking as referred to in Article 9 and/or
- the previous holders or the producer of the product from which the waste came'

In relation to water, the Water Policy Framework Directive makes reference to water charges and should, once fully implemented in the Member States, create a legal basis for charges covering pollution costs. Article 9(1) of the common position (...):

'Member States shall take account of the principle of recovery of the costs of water services, including environmental and resource costs, having regard to the economic analysis conducted according to Annex IIIa, in accordance in particular with the polluter pays principle. Member States may in doing so have regard to the social, environmental and economic effects of recovery as well as the geographic and climatic conditions of the region or regions affected'

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Transport

The Commission presented a White Paper (COM(1998) 466) entitled 'Fair Payment for Infrastructure Use' as one of the follow ups to the 1995 Green Paper "Towards fair and efficient pricing in transport".

It aims to set an overall framework for transport infrastructure charging and a timetable for action.

The underlying principles for the Community approach are that the user should pay for use of infrastructure and that charges should be related to marginal social costs.

These are variable costs that reflect the cost of an extra vehicle using the infrastructure including 'external costs' such as congestion, pollution and accidents.

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CBA - PPP

- The problem is how to include externalities into economic decisions (CBA - Economic Analysis)
- One major issue is that environmental goods have no market prices
- Only monetary items could be included in CBA

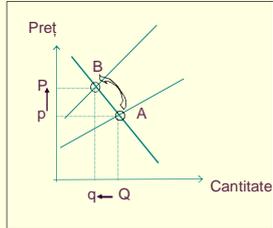
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Internalization of the external costs (Pigouvian solution)

Arthur Cecil Pigou (November 18, 1877 – March 7, 1959) was an English economist, known for his work in many fields and particularly in welfare economics.

Pigou is responsible for the famous distinction between private and social marginal products and costs and the idea that governments can, via a mixture of taxes and subsidies, correct such market failures - or "internalize the externalities".

Pigouvian taxes, taxes used to correct negative externalities, are named in his honor.



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