Training Programme CBA

Basic elements of CBA

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Translating facts into vision

Content

- About CBA
- Key characteristics of CBA
- Alternative methods
- Main steps of CBA

What is CBA?

- CBA: a standard economic evaluation technique
- Private investments: CBA shows all costs and benefits to the investor only
- Public investments: CBA shows all costs and benefits for the whole society
- Benefits include: user benefits, efficiency effects, environmental effects, etc.

Why should we apply CBA?

- In order to investigate the impact of a major public investment a (new airport or waste treatment) or policy change (pricing policy, environmental rules) on the welfare of the general public and on specific actors.
- As part of a project application, i.e. EU funding

CBA characteristics
The costs and benefits

- Monetary values of the consequences of an intervention
- Cost and Benefits together reflect the changes in individual and social welfare that result from implementing alternative interventions
- Incremental approach -> comparing a base case with a project case

CBA characteristics
The costs and benefits

Financial
- Preparation cost
- Investment cost i.e. during construction
- Operational cost during the life cycle
- Operational revenues during the life cycle
- Compensation of effected persons

Impacts
- Direct effects
- Indirect effects

CBA characteristics
Type of effects

Direct Effects:

1. Effects that have an impact on the owner, operator or user of the intervention, e.g. infrastructure *(i.e. travel time)*
2. Externalities, the uncompensated direct impacts of an intervention on non-users, that are a direct result of the intervention (again example infrastructure) realized or the use thereof *(i.e. environmental impacts)*

Indirect Effects:
all consequences that are not direct

CBA characteristics
Example of effects in infrastructure

Roads
Railways
Waterways



CBA characteristics
Example of effects in infrastructure

Direct Effects
- Faster Connections / Shorter Travel Times
- More Reliable Connections
- External, Traffic noise

Indirect Effects
- Economic Effects
  → Lower Cost of Transportation → Lower Product Prices
  → Better Accessibility → Higher Land Prices

CBA characteristics
The time element

- Cost and benefits are spread in time
- Discount rate: the rate at which future values are discounted to the present. Roughly equal to opportunity cost of capital
- Timing can strongly influence the outcome of the CBA
- Timing of interventions differs per sector

CBA characteristics
The time element-CBA Guide-averages

	Average time horizon	Number* of projects
Energy	24.7	9
Water and environment	29.1	47
Transport	26.6	127
Industry	8.8	96
Other services	14.2	10
Average total	20.1	289

CBA characteristics
The time element-CBA Guide-proposed

Projects by sector	Average time horizon
Energy	25
Water and environment	30
Railways	30
Roads	25
Ports and airports	25
Telecommunications	15
Industry	10
Other services	15

CBA characteristics
Monetarisation

- All effects (costs and benefits) need to be described in monetary terms
- Sometimes this is quite a challenge! For example: valuation of environmental effects or valuation of person killed in road accident (in the absence of a market price)
- Some effects in qualitative terms as PM post

CBA characteristics
Alternatives

- Choose the optimal situation that remains Base case
- Not "doing nothing…"
- Best is to when investment does not take place
- Again: incremental approach

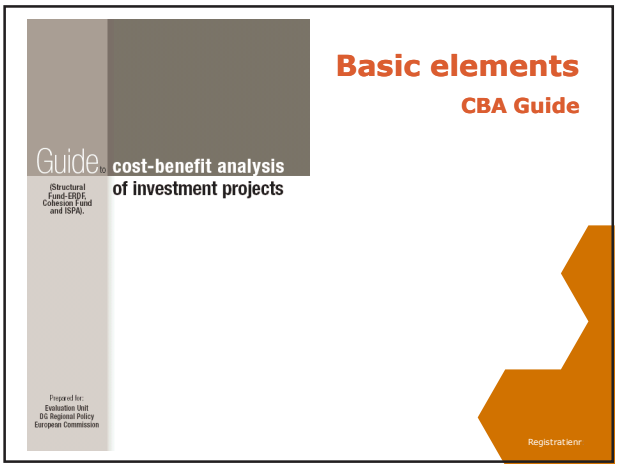
Alternative methods

Cost effectiveness analysis (CEA) when policy goals are fixed (more security, less noise levels): the cheapest way to reach those goals

Multi Criteria Analysis (MCA): compares alternatives by giving (arbitrary) weights to the benefits

CBA - an objective and transparent approach:

- all impacts are included
- No- double counting
- Impacts are comparable in money terms
- Impacts may also be in a qualitative way



Basic elements

CBA Guide

Registratienr:

Main steps in CBA

EC Guide to CBA

1. Objectives definition
2. Project identification
3. Feasibility and options analysis
4. Financial analysis
5. Economic analysis
6. Multicriteria analysis
7. Sensitivity and risk analysis

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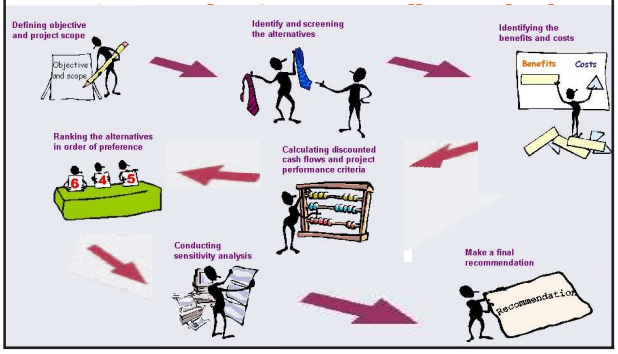
Registratienr:

Many alternatives to the same principles



Objective defintion-1
Step 1 EC Guide to CBA

- What are the socio-economic benefits that can be attained with the project implementation?
- In simple words: why should we want/do this?

Objective defintion-2
Step 1 EC Guide to CBA

Important to avoid some frequent errors:

- Vague statement that the project will promote economic development or social welfare is not a measurable objective
- Per-capita GDP within a given region is a measurable social objective, but only very large projects (interregional or national scale) may have a measurable impact on it; only in such cases it may be worthwhile trying to forecast

Project identification
Step 2 EC Guide to CBA

- The object is a clearly identified unit of analysis, according to the CBA principles and (in case of EC funding) are in line with definitions as set in regulations
- Financial thresholds as defined in the regulations are respected:
  - Structural Funds/ERDF: 50 mEURO
  - CF: 10 mEURO
  - ISPA: 5 mEURO

Feasibility and options analysis-1

Step 3 EC Guide to CBA

- Is there sufficient evidence of the project's feasibility?
- Are alternative options considered?
  - Do nothing
  - Do minimum
  - Do something

Feasibility and options analysis-2

Step 3 EC Guide to CBA

- Are alternative options considered?
  - Do nothing
  - Do minimum
  - Do something

Financial analysis-1

Step 4 EC Guide to CBA

- For a company or other entity (not society as a whole)
- The purpose of the financial analysis is to use the project's cash flow forecasts in order to calculate financial net present value (FNPV)
- Cash flow overview:
  - Total investment
  - Operating costs and revenues
  - Sources of financing
  - Analysis for financial sustainability

Financial analysis-2

Step 4 EC Guide to CBA

Tab. 3.4 Table for the financial analysis

		Years									
	1	2	3	4	5	6	7	8	9	10	11
Service revenues		5000	5000	5000	5000	5000	5000	5000	5000	5000	5000
Heat sales		1360	1360	1360	1360	1360	1360	1360	1360	1360	1360
Electricity sales		1660	1660	1660	1660	1660	1660	1660	1660	1660	1660
Sales	0	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000
Residual value											22000
Total revenues	0	8000	8000	8000	8000	8000	8000	8000	8000	8000	30000
Skilled labour		120	120	120	120	120	120	120	120	120	120
Non skilled labour		400	400	400	400	400	400	400	400	400	400
Raw materials		100	100	100	100	100	100	100	100	100	100
Intermediate goods		1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
Energy for plants		500	500	500	500	500	500	500	500	500	500
Other costs		500	500	500	500	500	500	500	500	500	500
Total operating costs	0	3020	3020	3020	3020	3020	3020	3020	3020	3020	3020
Land	5000										
Buildings	17500										
Equipment	27500										
Total investment costs	50000	0	0	0	0	0	0	0	0	0	0
Total expenditures	50000	3020	3020	3020	3020	3020	3020	3020	3020	3020	3020
Net cash flow	-50000	4980	4980	4980	4980	4980	4980	4980	4980	4980	26980
Financial internal rate of return (FRR/C) of the investment						5.64%					
Financial net present value (FNPV/C) of the investment						1862					

Economic analysis

Step 5 EC Guide to CBA

- Basis is financial analysis
- Now: project contribution to economic welfare of the country, on behalf of the whole society
- Corrections:
  - Externalities
  - Fiscal corrections
  - From market to accounting prices
- Economic rate of return (ERR)
  - ERR often higher that FRR

Multicriteria analysis

Step 6 EC Guide to CBA

- Mechanism to compare alternatives based on a range of criteria (not necessary in monetary terms):
  - Setting objectives; e.g. environmental protection
  - Defining appraisal criteria; e.g. level of noise
  - Impact analysis
  - Apply weights for the defined criteria
  - Score aggregation

Sensitivity and risk analysis
Step 7 EC Guide to CBA-Sensitivity

- Aims to identify the project's critical variables
- Project variables vary according to a given percentage change and observing the subsequent variations in both financial and economic performance indicators
- The Guide then suggests considering as "critical" those variables for which a 1% variation (positive or negative) gives rise to a corresponding variation of 5% in the NPV's base value.

Sensitivity and risk analysis
Step 7 EC Guide to CBA-Risk

- Probability with which this change may occur.
- By assigning appropriate probability distributions to the critical variables, probability distributions for the financial and economic performance indicators can be estimated.
- Performance indicators: expected values, standard deviation, coefficient of variation, etc.