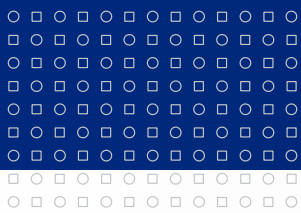


Headlines from your country: What happened around the world last week?





“It is best to think of the cost-benefit approach as a way of organizing thought rather than as a substitute for it.”

— Michael Drummond



Lecture content

- Cost-benefit analysis (CBA) is an analytical tool to evaluate (not only!) public projects.
- By implementing CBA, one systematically identifies, organizes, and compares the negative and positive effects of a project, in order to support decisions on its endorsement, or to compare it to one or more alternatives.
- **This lecture covers the theory and practice of performing CBA.**



PLEASE NOTE!

Cost-Benefit Analysis (CBA) is an analytical tool for judging the economic advantages or disadvantages of an investment decision by assessing its costs and benefits in order to assess the welfare change attributable to it.



Cost-Benefit Analysis

Cost-benefit analysis (CBA) is the implicit or explicit assessment of the benefits and costs (i.e., pros and cons, advantages and disadvantages) associated with a particular choice.

Benefits and costs may be :

- monetary (pecuniary) or
- non-monetary (non-pecuniary, "psychic").





For private decisions, such as going to a movie on Saturday night, we are often not aware of any internal process of consideration of costs and benefits, but behave as though we do.

An individual will choose an action if:

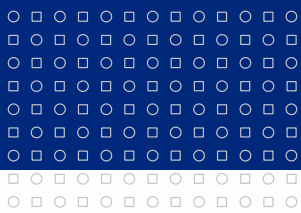
$$\text{Benefits (B)} > \text{Costs (C)}$$

or

$$\text{Net Benefits (NB)} = \text{B} - \text{C} > 0$$

Group activity: private decision making





Joan will smoke if $B > C$.

For Joan, **B's** are: taste/oral satisfaction, relaxation, diet control, and improved work performance.

C's are: expense, health consequences, value of time spent, discomfort/inconvenience of "smoking-allowed areas", and disapproval of others.

For the continuous choice of how many cigarettes to smoke, Joan will smoke the number of cigarettes which yield the greatest net benefits.



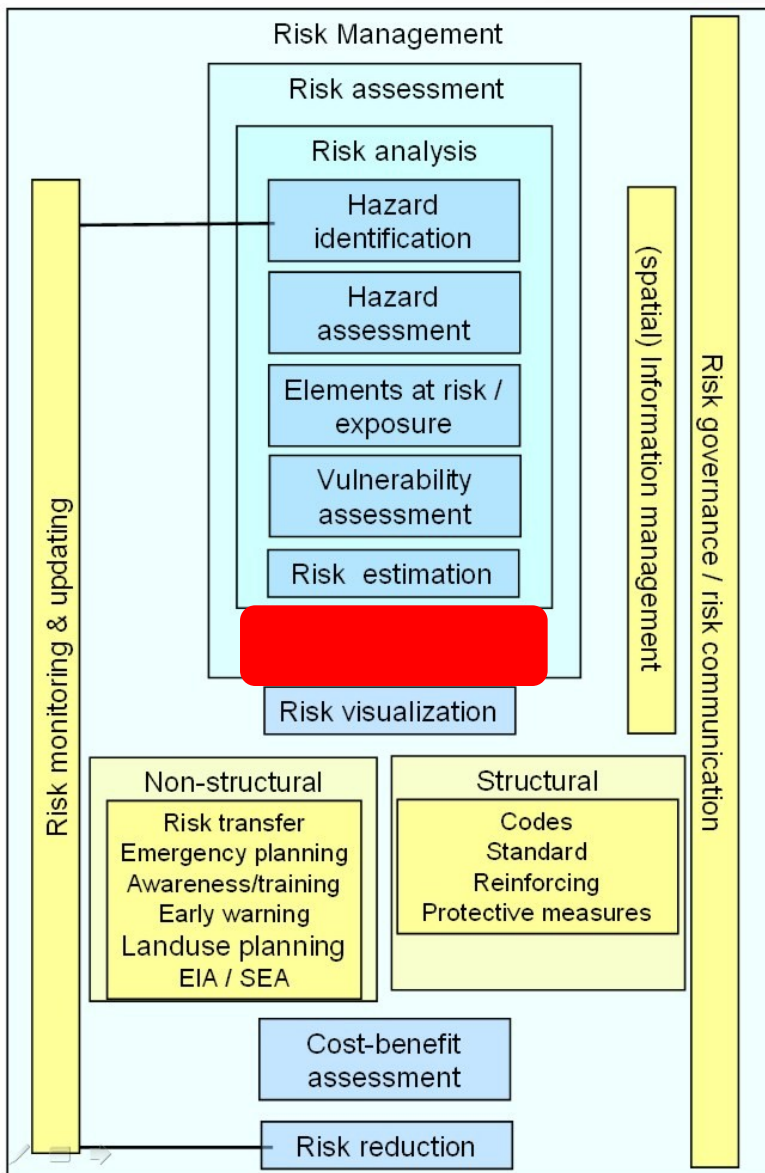
CBA is most commonly used for ***public decisions*** – policy proposals, programs, and projects, e.g., dams, bridges, traffic circles, riverfront parks, libraries, drunk driving laws, and anything else the government might fund.

CBA can be used to rank alternative projects as well as evaluating the social value of one particular project.

Intro to CBA



- ☒ **Cost Benefit Analysis (CBA)** is used to compare costs and benefits of a one specific measures or a set of alternative measures over a period of time for a. CBA assesses the measure(s) mainly on the basis of the efficiency criterion. It requires the monetization of all the effects. The effects that cannot be expressed in monetary terms will be usually described in their original unit of measurement.
- ☒ **Cost Effectiveness Analysis: (CEA)** has most of the features of CBA, but does not require the monetization of either the benefits or the costs (usually the benefits). CEA does not show whether the benefits outweigh the costs, but shows which alternative has the lowest costs (with the same level of benefits). CEA is often applied when the norm for a certain level of safety has been set. CEA analyzes which types of solution is the 'cheapest' given a certain level of safety standard.
- ☒ **Multi Criteria Analysis (MCE)** is a tool that allows comparing alternative measures on multiple criteria. In contrast to CBA, MCE allows the treatment of more than one criterion and does not require the monetization of all the impacts. MCE results in a ranking of alternatives.



Term	Definition
Risk analysis	The use of available information to estimate the risk to individuals or populations, property, or the environment, from hazards. Risk analysis generally contains the following steps: hazard identification, hazard assessment, elements at risk/exposure analysis, vulnerability assessment and risk estimation.
Risk assessment	The process of risk analysis and risks evaluation
Risk control or risk treatment	The process of decision making for managing risks, and the implementation, or enforcement of risk mitigation measures and the re-evaluation of its effectiveness from time to time, using the results of risk assessment as one input.
Risk management	The complete process of risk assessment and risk control (or risk treatment).

Basic CBA steps

1. Define scope of the project
2. Identify the type of costs and benefits
3. Put monetary values on costs and benefits
4. Compare costs and benefits
5. Calculate profitability indicators/decision criteria
6. Sensitivity analysis
7. Make recommendations



What do we need to know of both scenarios?

1. The costs of both scenarios (investment and annual)
2. The investment period
3. The benefits (i.e. annual risk reduction) of both scenarios
4. The life time of the investment
5. Discount rate

CBA SCENARIOS



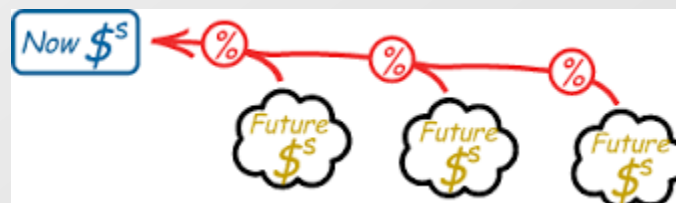
Present Value

Future, as well as present, benefits and costs must be included in the analysis.

But costs and benefits that accrue in the future are worth less than costs and benefits today.

Economic agents and society as a whole will maximize the present value of expected net benefits.

Money today is worth more than money in the future
WHY?!



Net present value

- ⇒ We need to take into account that the same amount of money in the future will be less valuable today.
- ⇒ We will need therefore to calculate the so-called **net present value (NPV)**
- ⇒ Techniques for comparing values at different points in time
- ⇒ In CBA mainly concerned with **Discounting**
- ⇒ for better understanding first: **Compounding**

Compounding

- suppose amount of \$ 100 on bank account
- interest 10%
- after 1 year ?
- After 2 and 3 years ?

start:	100
after 1 year:	$100 + 10 = 110$
after 2 years:	$110 + 11 = 121$
after 3 years:	$121 + 12.1 = 133.1$

Discounting

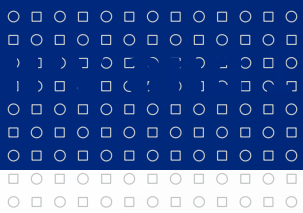
- ❏ the reverse of compounding
- ❏ it looks from the future back to the present and asks:

“what is the present value of a known future amount ?”



Group activity: compounding & discounting





Criterion

Decision rule

accept

reject

NPV

NPV > 0

NPV < 0

IRR

**IRR >
interest rate**

**IRR <
interest rate**



Strengths: Cost-Benefit Analysis

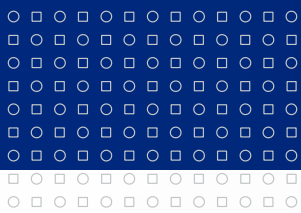
- ❖ Systematic way of thinking and analysis
- ❖ Focus on use of scarce resources
- ❖ Strong methodological basis
- ❖ Monetary measurement provides comparison
- ❖ Appeal to policy makers



Limitations: Cost-Benefit Analysis

- One approach to assess the efficiency of (structural) risk reducing measures
- Take care of uncertainty of all parameters used
 - Estimated values of objects at risk
 - Probabilities of the hazard
- Take care of all aspects NOT considered:
 - Social effects
 - Environmental effects
 - Indirect effects
- Discounting favours present generations
- One single outcome hides assumptions and value judgements





Thank you for your attention!

