Evaluation of CBA Experience and Key Issues

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Managing Authority for SOP Environment
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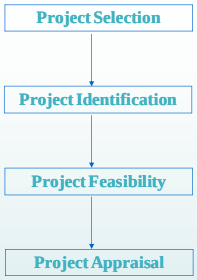
Objectives of CBA

- To ensure that the optimal option is selected (*economical analysis*)
  - the project meets a real demand
  - optimum use is made of scarce resources
  - the project is designed in a cost effective manner
  - the project will be sustainable over time
- To determine the funding gap of the selected option and to calculate the eligible expenditure (*financial analysis*)
  - according to article 55(2) of regulation 1083/2006
- To assess the robustness of the selected project option (*risk analysis*)
  - To identify the risks at an early stage with a view to take mitigation measures

Context: CBA – Part of Project Preparation



CBA – Part of the Project Feasibility

Demand Analysis

Variables that determine effective demand

- The price customers have to pay (price elasticity)
- Service levels that are provided
- Alternatives for households
- Legal requirements
- Levels of income (income elasticity)

Define Options and Least Cost Analysis

- First ensure optimum use of existing facilities!
- Then define the gap between demand and (potential) current output of the facilities
- Define technical and non-technical options (conceptual design level)
- Normally based on alternative ways to produce the same output
- Type of alternatives considered (growth/do nothing, one/several treatment sites, treatment locations, discharge locations, treatment technologies)
- Financial assessment mode for comparison (Investment, O&M, NPV) and
- Economic comparison; environmental and social benefits

Financial and Economic Analysis

- Based on Incremental Demand and Preferred Technical Option (Base Case)
- Purpose is to estimate the net benefits of a project based on the difference between the "with" and "without" project situation
- In financial prices: from the entity's point of view
- In economic prices: from a nations' point of view
- Steps include
  - Identify the costs and revenues of a project
  - Calculate the net benefits
  - Calculate the Net Present Value (NPV) or Internal Rate of Return (IRR)
  - Compare with Financial/Economic Opportunity Cost of Capital

Incremental Approach

- Situation without Project Scenario
  - Realistic hypothetical demand
  - O&M costs, tariff & revenues
  - working capital
  - cash-flow
  - possible improvement, etc.
- Situation with Project Scenario
  - Expanded service and enhanced performance due to investment and capacity building, etc.
- Tabular comparison of indicators with & without project showing "positive" or "negative" impact
  - demand
  - O&M fixed and variable costs
  - losses
  - collection rates etc.

Assess Project Sustainability

Ensure that project benefits will sustain throughout the lifetime of the project

- Are the costs of the services affordable for the beneficiaries?
- Is the enterprise able to generate sufficient revenues to cover for all costs (including debt servicing)?
- If there are subsidies, can the government sustain these over time?
- Is the entity able to properly operate and maintain the project facilities?
- Assess institutional sustainability
- Assess environmental sustainability

Institutional and Environmental Analysis

Institutional Analysis

- Is the project entity able to manage the project and to operate and maintain the facilities?
- Is the project entity willing to take the necessary measures to ensure the succesful implementation of the project (e.g. tariff increases, legal measures)?
- Does the project entity have the necessary authority to successfully complete the project ?

Environmental Assessment

- Assess the environmental impact and risks of the project and propose possible mitigative measures
- Ensure that potential problems are identified, early addressed and dealt with (e.g. MIMBY syndrome, Natura 2000)

Risk and Sensitivity Analysis

- Define how to measure the success of the project (often by taking (E)NPV or (E)IRR)
- Sensitivity analysis: identifies quantitatively those key parameters with the greatest impact on the project viability and results (must be quantitative)
- Risk analysis: estimates the probability of changes in key input variables and their impact on the main financial indicators (should ideally be quantitative)
- Calculate whether or not the project remains successfull under adverse conditions, and/or
- Calculate the “switching value”
- Propose measures to mitigate the risk.

Affordability

1. **Price of water service:** per m^3 (investment, O&M)
2. **Affordability (%):** (price x volume) / household net income for the whole county and priority municipalities
3. **Keep price below 4% of the lowest income deciles**
   - mitigation strategy: reduced quantity, cross-subsidisation, government subsidy, others)

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Investment Plan

1. Investment by type of investment, agglomeration, and phase including re-investment [real and nominal terms]
2. Foreign and local cost elements
3. Overall O&M cost profile (unit cost tables)
4. NPV (entire system up to target horizon of 30 years)

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Key Issues of Application Forms

1. Overall presentation (style, clarity)
2. Completeness of information and details provided
3. Accuracy of financing calculation & financial & economic indicators
4. Sensitivity and risk documentation

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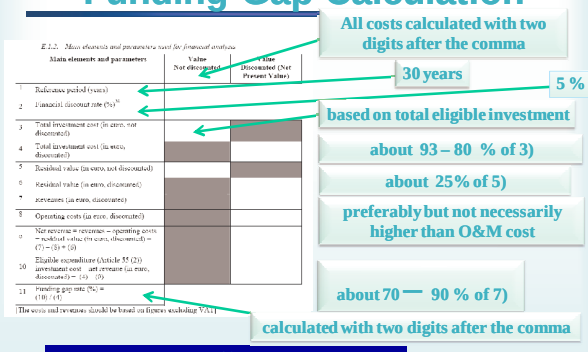
Funding Gap Calculation



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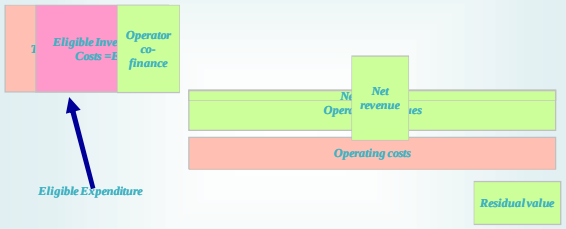
Eligible Expenditure Calculation



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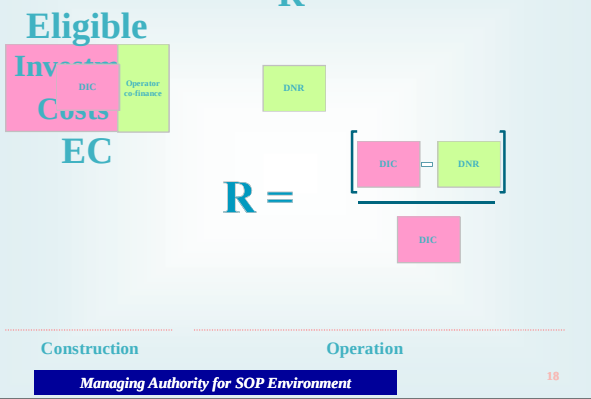
Calculation of Funding Gap "R"



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Calculation of EU Grant

Grant = Eligible (Investment) Costs (EC) × (DIC − DNR) / DIC × CRpa[1)]

[1)] CRpa= Co-Financing Rate per priority axis
85 % for CF (water); 80 % for ERDF (waste)

Construction Operation

Funding Gap Example

E.1.2 Main elements and parameters used for financial analysis

	Main Elements and Parameters		Value Not discounted	Value Discounted (NPV)
1	Reference period (years)	30		
2	Financial discount rate (%) - real	5.0%		
3	Total investment cost (in euro, not discounted)		61,649,998	
4	Total investment cost (in euro, discounted)			46,828,502
5	Residual value (in euro, not discounted)		12,279,417	
6	Residual value (in euro, discounted)			2,841,180
7	Revenues (in euro, discounted)			41,030,621
8	Operating costs (in euro, discounted)			41,030,621
9	Net revenue (in euro, discounted) = (7) - (8) + (6)			2,841,180
10	Eligible expenditure [Art 55 (2)] (in euro, discounted) = (4) - (9)			43,987,322
11	Funding gap rate (%) = (10) / (4)	93.9%		

Questions: What is unusual about this example?
Is it possible to raise the funding gap to 100%?

State or Local Budget Cannot Contribute to Non-Funding Gap

Item	Initial	Revised
Total Eligible Investment for Cluj-Salaj (€ million)	194.8	194.8
Funding gap (%)	83.1	88
ROC Contribution (€ million)	25.2 (12.9%)	23.5 (12.1%)
Grant (€ million)	137.5	145.6

Main Financial Indicators

***Financial Net Present Value (FNPV)*:**
discounted value of project cash-flows (costs and revenues) over time

***Financial (Internal) Rate of Return (FRR)*:**
discount rate for which the PV of project revenues equals the PV of investment costs (FNPV=0)

Financial Indicators in Application Form

F.1.3. Main results of the financial analysis

	Without Community assistance (FRR/C) A		With Community assistance (FRR/K) B	
1. Financial rate of return (%)		FRR/C		FRR/K
2. Net present value (euro)		FNPV/C		FNPV/K

/ C means: looking at the project as a whole

/ K means: looking at the project from the perspective of the Member State (or the "national capital", i.e. ignoring the EU grant)

Recommended values

- **FNPV/C: must be negative for infrastructure (i.e. non state-aid) projects**
- **FRR/C: must be less than discount rate (5% real discount rate requested in WD4)**
- **FNPV/K: must be higher than FNPV/C (by definition) but may still be negative**
- **FRR/K: must be higher than FRR/C (by definition) but not excessive (not higher than 6%)**

Example

E.1.3 Main results of the financial analysis

	Main Elements and Parameters	Without Community assistance FRR/C	With Community assistance FRR/K
1	Financial rate of return (%)	-4.6% (FRR/C)	31.9% (FRR/K)
2	Net present value (euro)	-41,196,032 (FNPV/C)	3,787,558 (FNPV/K)

Questions: Would you accept an application form with these values?

Why / why not?

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More Examples

Which of the following public infrastructure projects would you reject for EU support?

1. **FNPV = - €20m, FRR/C = -1.8%, FRR/K = 3.1%**
2. **FNPV = - €15m, FRR/C = 2.5%, FRR/K = 5.2%**
3. **FNPV = €0.5 m, FRR/C = 5.2%, FRR/K = 15%**

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Objective and Criteria of Economic Analysis

Objective: Test whether a project yields a greater net economic output than other next best investment opportunities in the national economy represented by the social discount rate

Criteria:

***Net Present Value*:** discounted value of economic net benefits is positive **(ENPV>0)**

***Economic Internal Rate of Return*:** project's economic internal rate of return exceeds rate of next best alternative

(EIRR > Social Discount Rate = 5.5%) *(12% - 18%)*

Benefit / Cost ratio: economic benefits to costs ratio of the project is clearly above one *(B/C>1) (1.2 – 1.8)*

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Approach of Economic Analysis

EC Guide to CBA of investment project, 2002

Document the net economic output of the project by adjusting its financial net value to (i) add the cost and benefit of social externalities and (ii) correct to "accounting values" market prices distorted by taxes, social transfer and subsidies

- Phase 1: correct taxes, subsidies, and other transfers;
- Phase 2: add externalities;
- Phase 3: conversion of market prices into accounting prices.

More Examples

Which of the following public infrastructure projects would you accept for EU support?

A. FNPV = - €20m, FRR/C = -3.5%, FRR/K = 3.1%, ENPV = - €0.5m, ERR = 5.0%

B. FNPV = - €14m, FRR/C = -1.9%, FRR/K = 5.2%, ENPV = €18m, ERR = 7.5%

C. FNPV = €0.5m, FRR/C = 5.5%, FRR/K = 15%, ENPV = €35m, ERR = 9.8%

Sensitivity Analysis Approach (WD4)

- ➔Testing the impact of a 1% change in input parameters on key indicators (FRR/C, FNPV/C, ERR, ENPV)
- ➔Minimal scope of input parameters to be tested: investment costs, operating costs, operating revenues, external project benefits
- ➔Those that lead to a more than 5% change are considered "critical variables"

Sensitivity Analysis Approach (WD4)

- Identification of "switching values", which are the values of the tested input variables that would lead to an economic and/or financial NPV of 0
- Intended to provide additional information to clarify what input variables have the most critical influence on the project's financial parameters

Risk Analysis

Provide a framework for contingency allocation

- Determine the probability of individual inputs having given values
- Calculate the probability that key outputs will have given values
- Link this calculation to the calculation of the grant
- List all the key variables and assumptions

Thank you for your kind attention!

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