

# **| Cost Benefit Analysis (CBA)**

# Definition

- Cost-benefit analysis enables cities, provinces, governments - of course companies - to take evidence-led decisions about the total costs and benefits of taking a particular course of action. It provides a systematic way of identifying and evaluating the cost and potential benefits of different options.
- It is a powerful, efficient tool in commercial transactions, business decisions, and project investments.

- Performing a Cost/Benefit Analysis is basic to all financial decision-making.
- We each do it consciously or unconsciously every day for every action we take or purchase we make.
- Major expenditures of public funds require a more formal process.

# CBA - Different methodologies

9 steps*	4 steps**	5 steps***
<ul style="list-style-type: none"><li>• Specify the set of options</li><li>• Decide whose costs and benefits count</li><li>• Identify the impacts and select measurement indicators</li><li>• Predict the impacts over the life of the proposed regulation</li><li>• Monetize (attach € values to) impacts</li><li>• Discount future costs and benefits to obtain present values</li><li>• Compute the net present value of each option</li><li>• Perform sensitivity analysis</li><li>• Reach a conclusion</li></ul>	<ul style="list-style-type: none"><li>• Establish a Framework for Your Analysis</li><li>• Identify Your Costs and Benefits</li><li>• Assign a € Amount or Value to Each Cost and Benefit</li><li>• Tally the Total Value of Benefits and Costs and Compare</li></ul>	<ul style="list-style-type: none"><li>• Identify the scope – likely a project, initiative, program or service offering</li><li>• Determining the costs</li><li>• Determining the benefits</li><li>• Compute calculations of the cost-benefit analysis</li><li>• Compare the cost and benefit results with a what-if analysis</li></ul>

- \*Adapted from Boardman et al. (2010) \*\* Harvard Business School (2022) \*\*\* Anami, McCoy (2020)

- In local government, the benefit is the maximizing public welfare versus maximizing profit in business.
- Broader and more complex.
- Must estimate the value of benefits and costs that are indirect and intangible.
- At its essence, it is a one-to-one comparison of the combined benefits versus the combined costs of pursuing a course of action or public policy.
- Realistically determining the costs and benefits is the challenge in government.

- A public project is desirable when the present value of its estimated flow of benefits, discounted at the community's cost of capital, equals or exceeds the project's cost.
- **Why discount?**
- For monetized flows to be directly comparable in a CBA, those costs or benefits incurred in the future need to be discounted back to current Euro terms.
- Individuals prefer a Euro today to a Euro in the future.
- Inflation is another reason that a Euro in the future is worth less than a Euro now. A Euro in the future buys fewer goods.

- **Discount rate:**
- According to Annex III to the Implementing Regulation on application form and CBA [cost-benefit analysis] methodology, for the programming period 2014–2020 the European Commission recommended that for the social discount rate 5% is used for major projects in Cohesion countries and 3% for the other Member States.

- **Money**
- Opportunity cost of using cash on hand or cash reserve  
Interest or investment potential  
Funds not available for other projects
- Financing: Local loans, state loans, bond issue, Interest rates,  
Availability of money to borrow, Statutory limits, Administrative  
costs, **Funding through donations (EU, IMF, WB)**
- Tools/Considerations  
Net Present Value determination  
Bond Rating  
Financial Trend Analysis



# CBA - Costs

- **Opportunity**
- What could you do with money if didn't spend it on this project
- What other public need will not be fulfilled if this project is undertaken
- **Time**
- What is the cost in time
  - Staff time
  - Elected officials' time
  - Information technology time
  - Other equipment time
  - Other projects postponed time

# CBA - Costs

- **Personnel/Equipment**
- In addition to time cost:
  - Will you need to hire additional personnel?
  - How much wear & tear on equipment?
  - What new equipment will be needed?
  - Insurance costs
  - Fuel costs

- **Maintenance costs**
- Direct and indirect expenses of upkeep, repairs, replacement, and all maintenance activities.
- **Operating costs**
- Expenses which are related to the operation of a business, or to the operation of a device, component, piece of equipment or facility.  
Costs of resources used by an organization just to maintain its existence.

- **Public Reaction**
- A political reality for elected officials is that public reaction to pursuing or not pursuing a project, policy, or course of actions must be considered
- How the public perceives the cost in tax Euros can be more important than the financial considerations

- **Intangibles**
- Those costs which cannot readily be assigned a monetary value
  - Loss of historic value
  - Change of appearance
  - Decreased economic development opportunity
  - Loss of green space

# CBA - Benefits

- **Monetary profits**
- Income over the economic life of the investment:
- Park and ride facility – Parking Fees
- Museum – Entrance Fees
- Economic Park – Rental Income, Taxes ...
- ...

# CBA - Benefits

- Increase in public safety or accessibility
- Increased capacity
- Increased recreational opportunities
- Increased economic development opportunities
- Improved quality of life
- More efficient operations
- Lower/Higher taxes

# CBA - Other Considerations

- Depreciation/amortization
- Other regulations
- Precedent
- Sensitivity analysis
- Risk assessment
- Worst/best case analysis
- Impact evaluation
- Theory of Change (What-if analysis)
- Base case (“do nothing” or “business as usual” option)



# CBA – Theory of Change

- The costs and benefits of a proposed policy/initiative/project properly relate to changes compared to what would have happened in the absence of the policy/initiative/project.
- That is, it is necessary to compare the world without the change to the world with the change.
- It is inappropriate to merely calculate incremental costs and benefits compared with the status quo, unless no further changes would have eventuated in the absence of the project.

# CBA - Example

- A City is considering establishing an industrial park to spawn economic development and jobs.
- The City wants to determine if the benefits of such an action will outweigh the costs.
- The City decides to perform a Cost-Benefit-Analysis to help facilitate the decision.

# Example – Costs (Money)

- Land costs = € 30,000 per hectares
- Hectares needed = 20 hectares
- Total Land Costs = € 600,000
  
- Infrastructure costs (streets, lights, water & sewer) = € 1.2 million
  
- Investment building = € 350,000
  
- Total industrial park costs = € 2,150,000

# Example – Costs (Opportunity)

- Industrial park Euro cost could be invested at a rate of 2.7% Annual Percentage Rate for ten years for a total interest earned of € 580,500.
- Industrial park Euro cost could be used to rebuild 11 kilometers of streets.
- ...

# Example – Costs (Time)

- 230 hours of staff time.
- Three workshops and a public hearing to consider project.

# Example – Anticipated Benefits

- For planning purposes, it is assumed:
- Each hectares of the park will produce an additional € 1 million in taxable property improvements within ten years at an average rate of € 12.00 for a benefit of € 550,000 in increased property taxes.
- Each hectare of industrial park land is expected to produce an average of ten new jobs paying an average wage of € 15 per hour for an annual income of € 31,200 each. Assuming all hectares are filled and jobs created within ten years, the park would increase the local economy by € 7,800,000 per year.

# Example – Conclusion

- Based on the grossly optimistic benefit expectations for the industrial park, the financial benefits would greatly outweigh the costs of establishing the park.
  - Benefits = € 8,350,000
  - Costs = € 2,150,000
- In this analysis, building an industrial park is a great idea.

# Example – Reality

- Industrial parks NEVER fill as fast as projected so average trends must be considered along with holding costs.
- The overall national and international economy trends will greatly affect the realistic results.
- An average wage of € 15.00 may be overly optimistic.
- Intangibles may also have an affect.



# Example – More Likely Scenarios

5 hectares of the park will be fully developed within 10 years. This would produce only an additional € 137,500 in property tax income

10 hectares of the park will be fully developed within 10 years. This would produce only an additional € 275,000 in property tax income

Hectares will likely produce an average of 7 jobs each with an average wage of € 12,00 = input to the local economy of € 873,600

Hectares will likely produce an average of 8 jobs each with an average wage of € 13,00 = input to the local economy of € 2,163.000

Costs = € 2,150,000  
Ten year benefits = € 1,011,100

Costs = € 2,150,000  
Ten year benefits = € 2,448.000

In this scenario, building the industrial park doesn't appear to be a sound financial decision

In this analysis, building an industrial park is at least profitable.

# Public Reaction



TSI ref. 23SI05

- You can see by the difference in cost versus benefits that the assumptions you use in your projections greatly affect your outcome.
- You can safely assume those who support an industrial park will want to use the first projections while those who think the money would be better spent on a new library will want to use the latter projections.
- No matter what numbers you use, you ultimately will have to answer to citizens who both support and oppose your decision.



# Conclusion

- While business can make decisions based solely on whether or not a proposed action will make a profit or minimize a loss, local government officials must take into account other factors.
- Local government officials must consider public opinion and a variety of other intangibles in addition to cost comparative data but the Cost-Benefit-Analysis can make those decisions much easier and defensible.

# Example - Parking house P + R Ssun - Koper



TSI ref. 23SI05

- **Investment value:** € 6.581.609,59 100%
- Municipality of Koper: € 3.507.160,59 53,3%
- CTN - mechanism: € 3.074.449,00 46,7%
  - of which ERDF: € 2.459.559,20
  - of which RS budget: € 614,889.80
- **Results/Benefits** (among others):
  - Reducing the volume of road traffic;
  - Increasing the use of public passenger transport;
  - Providing a safe route to work, school;
  - Increasing the quality of life in the municipality;



# Example - Parking house P + R Ssun - Koper



TSI ref. 23SI05

- **1<sup>st</sup> step of CBA:**
- Comparing all costs of the project with the benefits, to get a realistic overview of the desired project (e. g. For presentation to funders and donors).
- Estimate possible co-financing (EU-funding, funds from state budget ...).
- The result should be between the maximum value for co-financing and the minimum value (i.e. the realistic value).



# Example - Parking house P + R Ssun - Koper



TSI ref. 23SI05

- **2<sup>nd</sup> step of CBA:**
- Municipality will compare just 53,3% of total costs with the benefits, as only this burdens the municipality's budget.
- The CBA result will look completely different (from municipality's point of view).
- Assume donor financing of 85% - 90%.



# Example - Parking house P + R Ssun - Koper



TSI ref. 23SI05

- **Assumption:**
- Investment value (Municipality of Koper): € 3.507.160,59  
Only an amount of € 1,500.000 (42,8%) is available from the budget = **Funding Gap** of € 2.007.160,59 (57,2%).
- A funding gap is the amount of money needed to fund the ongoing operations or future development of a project that is not currently funded with cash, equity, or debt.
- Funding gaps can be covered by investment from venture capital or investors (donors), equity sales, or through debt offerings and bank loans.



# Example - Parking house P + R Ssun - Koper



TSI ref. 23SI05

- **Assumption:**
- The project is considered very important, so a bank loan is taken out.
- Based on the loan conditions (term, loan interest (fixed, variable), repayment terms (at the end of the term, annually), the additional costs must be calculated and taken into account in the CBA.





# Benefit – Cost Ratio

- Benefit-Cost Ratio (BCR) = Present Value of Expected Benefits / Present Value of Expected Costs.
- This formula helps to determine whether the benefits outweigh the costs.
- It also allows to compare different projects and their rentability based on BCR

# Public Infrastructure Decisions

- A city council is deciding between building a new public park or a community center. A cost-benefit analysis is carried out for each option:
- Total costs of the public park: € 500.000  
Estimated societal benefits of the park (increased property value, improved health, etc.): € 700.000
- Total costs of the community center: € 750.000  
Estimated societal benefits of the community center (education, community cohesion, etc.): € 900.000

# Public Infrastructure Decisions



TSI ref. 23SI05

- Benefit-Cost Ratio of the public park:  $700,000/500,000 = 7/5$   
Benefit-Cost Ratio of the community center:  $900,000/750,000 = 6/5$
- The public park has a higher Benefit-Cost Ratio and could therefore be a more favorable option, despite the community center having higher absolute benefits.



# Costs and benefits that cannot be valued in Euro terms



TSI ref. 23SI05

- Some costs and benefits resist the assignment of Euro values
- Cost and benefit estimates should be reported within three categories:
  - monetized
  - quantified, but not monetized
  - qualitative, but not quantified or monetized.
- The challenge is to consider non-monetized impacts adequately.



# Cost-effectiveness analysis

- Widely used alternative to CBA in circumstances where the most important impact cannot be monetized. It compares alternatives on the basis of the ratio of their costs and a single quantified, but not monetized, effectiveness measure, such as lives saved.
- Compares the relative costs and outcomes (instead of benefits) of different decisions. It aims to be more holistic.
- Considers outcomes (such as human impact) rather than just costs or profits.

# Cost-effectiveness analysis

## ■ Examples:

Safe and pleasant environment	Increasing traffic safety
Improving the image of public transport	Reduction of greenhouse gas emissions
Improving air quality in cities	Improving the quality of living space
Maintaining and promoting health	Ensuring a higher standard of living
Improving the public transport offer	Development of sustainable mobility
Increasing the attractiveness and quality of the urban environment	Contribute to the sustainable urban development
Improve the efficiency of space use	Improve the quality of public areas

# Thank you for your attention

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