

# A Overview of Cost-Benefit Analysis

# **1 COST-BENEFIT ANALYSIS – AN OVERVIEW**

- **1.1 Explanation of cost-benefit analysis**
- Cost-benefit analysis (CBA) is a tool used to determine the worth of a project, programme or policy. It is used to assist in making judgments and appraising available options
- CBA is a quantitative analytical tool to aid decision-makers in the efficient allocation of resources. It identifies and attempts to quantify the costs and benefits of a programme or activity and converts available data into manageable information

CBA -helps  
managers answer questions such as

- Does the proposal provide a net benefit to the community as a whole?
- Should the proposed project, programme or policy be undertaken?
- Should the project or programme be continued?
- Which of various alternative projects or programmes should be undertaken

## 1.2 What is a CBA attempting to achieve?

- A CBA is normally undertaken as one aspect of a more comprehensive assessment of a programme's appropriateness, efficiency and effectiveness.
- A CBA is primarily designed to answer the question 'does the expenditure of public money on this particular programme provide a net benefit to the economy and the public, bearing in mind that these resources could be applied in an alternative use?'

## 1.3 Types of evaluations

- There are many ways to evaluate programmes and activities. However, there are three methods that have frequent relevance to public agencies. These methods are:
- CBA;
- financial evaluation; and
- cost-effectiveness analysis

# *Cost-Benefit Analysis*

- CBA is a methodology for assessing the net benefits accruing to society as a whole as a result of a project, programme or policy
- The CBA method considers the flow of real resource costs and benefits.
- CBA attempts to measure the value of all costs and benefits that are expected to result from the activity.
- It includes estimating costs and benefits which are ‘unpriced’ and not the subject of normal market transactions but which nevertheless entail the use of real resources.

## ***Financial Evaluation***

- A financial evaluation (or ‘investment evaluation’) is generally conducted from the perspective of an individual firm or agency rather than from the vantage point of the community as a whole.
- It is essentially concerned with assessing the impact of a programme or project on the organization's own financial performance
- In a financial evaluation, only cash flows in and out of the organization are considered; cashflows involving other parties are excluded, as are ‘unpriced’ costs and benefits.

# ***Cost-Effectiveness Analysis***

- Cost-effectiveness analysis (CEA) is aimed at determining the cost of achieving a specific physical target.
- CEA is useful in areas such as health, accident safety and education where it is often easier to quantify benefits in physical terms than to value them in dollars

## 1.4 Programme evaluation and CBA

- Programme evaluation is essentially an assessment of a programme, or part of it, in order to aid judgments about its appropriateness, efficiency and effectiveness.
- CBA is a useful tool in programme evaluation. It examines whether a particular use of resources generates net returns.
- It is important to note the distinction between outputs and outcomes in a government programme context.  
*Outputs are physical deliverables over which managers have a high degree of control whereas outcomes reflect the real programme impacts or benefits.*

## **2 WHY UNDERTAKE A COST-BENEFIT ANALYSIS?**

- **2.1 CBA facilitates meaningful comparisons**
- **2.2 CBA is conducive to good programme management**
- **2.3 CBA and distributional impact-** implicitly estimates the size of gains and losses for affected individuals and groups
- **2.4 CBA encourages clear thinking about the true ‘value added-** A CBA provides an estimate of the worth of a proposal relative to an accompanying estimate  
of what would happen in the absence of the proposal.

# **3 WHEN IS A COST-BENEFIT ANALYSIS USED?**

- **3.1 Analysing capital expenditure**
- **3.2 Analysing a policy option**
- **3.3 Using or disposing of an existing asset**
- **3.4 Post evaluation of a project or programme**
- **3.5 Quantification issues-** In each of these cases, quantification of the effects in money terms is an important part of the evaluation. However, projects or proposals frequently offer benefits that have no market value and are difficult to quantify. For example, the benefits of a health programme that is designed to improve the quality of human life lend themselves more readily to a qualitative rather than quantitative assessment.

## B Conducting a Cost-Benefit Analysis

- **4 COST-BENEFIT ANALYSIS – EXPLANATION OF THE PROCESS**
- The assessment involves identifying, quantifying and, where possible, valuing in money terms the costs, benefits and uncertainties of each option.  
It also involves quantifying costs and benefits that occur at different points in time on a comparable basis.

# *Key steps in the Cost-Benefit Analysis Process*

- Determine scope and objectives
- Identify the constraints
- List feasible alternatives
- Specify costs and benefits
- Quantify costs and benefits
- Discount future stream of benefits
- and costs to calculate NPV
- Sensitivity test for uncertainty
- Outline equity issues
- Report

## 4.1 Determine scope and objectives

- **Questions to Consider in Setting Objectives**
- What is the programme, project or activity trying to achieve?
- How do these achievements relate to the agency's objectives?
- Do the objectives take into account the interests of the economy and the public?
- What factors are critical in achieving the objectives?
- Are the objectives measurable?
- Do the objectives reflect outputs or outcomes?
- Are the objectives consistent with relevant Government policies?

## 4.2 Assess the constraints

- Constraints may be financial, distributional,
- institutional, managerial, environmental and political in nature.

## 4.3 Consider the alternatives

- A CBA involves the identification and specification of a set of alternatives. In most cases, a ‘do nothing’ option should be included as a base case. This option is generally required because
- costs and benefits are nearly always measured as incremental to what would have happened had the project not gone ahead.

## **4.4 Identify, quantify and value the costs and benefits of each alternative**

- A critical step in the CBA process involves identifying, quantifying and valuing the costs and benefits of each alternative.
- Typical costs of a proposal would include:
  - initial capital costs;
  - capital costs of any buildings, equipment, or facilities that need to be replaced during the life of the project;
  - operating and maintenance costs over the period of a programme or project; and
  - costs which cannot be valued in money terms (often described as 'intangibles').
- Typical benefits of a proposal would include:
  - benefits which can be valued in money terms, in the form of revenues, cost savings or non-market outputs; and
  - benefits which cannot be valued in money terms (also described as 'intangibles').

## 4.5 Calculate the Net Present Value

- In CBA, the net social benefit (NSB), or the excess of total benefit over total cost, is represented by the net present value (NPV) of the proposal.
- Before determining the value (or NPV) of a proposal, the costs (*C*) and benefits (*B*) need to be quantified for the expected duration of the project. The NSB is calculated by subtracting the cost stream from the benefit stream and is represented as follows:
- $NSB = B - C$

## 4.6 Sensitivity analysis and dealing with uncertainty

- The values of future costs and benefits on which the NPV is based are forecasts that cannot be known with certainty.
- While they should be forecast expected values, it is important to test the NPV for ‘optimistic’ and ‘pessimistic’ scenarios.
- This is achieved by changing the values of key variables in the analysis, such as the discount rate, costs and benefits, and measuring the impact of the changes on the NPV.
- This is known as sensitivity analysis and is a critical component of any CBA.

- For example, assume a proposal that has two possible outcomes. The probability of producing an NPV of \$5 million is 60% and the probability of producing an NPV of \$3 million is 40%.
- We can now work out the expected NPV (ENPV) as follows:
- $\text{ENPV} = (0.6 \times \$5\text{m}) + (0.4 \times \$3\text{m}) = \$4.2\text{m}$

## 4.7 Consider equity and distributional implications

- There may also be broader social justice considerations where a project involves a significant redistribution of income, regardless of the net economic gains to the community.
- To illustrate,
- a CBA of a new highway that bypasses a country town will compare, primarily, the costs of constructing the new road with the benefits in terms of travel time savings and reduced accidents (involving both travelers and local residents). However, building the road is likely to have distributional consequences: for example, retailers in the town may be adversely affected while new retailing opportunities — such as service stations, restaurants and motels — may open up along the new highway. These distributional consequences are not captured by the CBA

## **4.8 Report the results and prepare a recommendation**

- The final stage in the CBA process is to write up the analysis and prepare recommendations.
- The reasons for a particular recommendation should be clearly set out.
- It is important to highlight the assumptions used in forecasting the costs and benefits of the proposal or programme.

# B Conducting a Cost-Benefit Analysis

- **5 TECHNICAL TOPICS :**This section will discuss some common technical issues faced when performing a CBA
- **5.1 Opportunity cost in practice**
- **5.2 Project length of life – time horizon and terminal/residual value**
- **5.3 Setting a discount rate:** It is necessary to discount costs and benefits occurring later relative to those occurring sooner since money has an opportunity cost  
money received now can be invested and converted into a larger future amount

# Decision rules

- The IRR is the discount rate at which the NPV of the project is zero. The decision-maker is implicitly asked to make a judgment as to whether this rate of return is ‘acceptable’ or not.
- If the recommended discount rate were 8 per cent (in real terms), then projects having an IRR greater than 8 per cent would be regarded as ‘acceptable’. The IRR criterion is commonly used
- by international financial institutions.

- *Calculating the Benefit-Cost Ratio*
- Using the simpler benefit-cost ratio (BCR), it can be represented as follows:
- $\text{BCR} = \text{net present value of benefits} / \text{net present value of costs}$  The BCR can be estimated in two ways.
- One method is to calculate the present value of benefits to the present value of costs. Another method is to calculate the ratio of the present value of net recurrent benefits to the present value of capital costs.
- However the former is possibly used more often. In either case, a ratio of greater than 1 (one) shows there is net benefit to a particular project having considered the present values of the costs and benefits.
- The BCR should always be greater than 1 in order for the benefits of a proposal to exceed the associated costs.

# Details of the presenter

- Thanks
- End of the session
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