

# COST BENEFIT ANALYSIS

DR.RADHIKA MEENAKSHI SHANKAR

# GENESIS

- Jules Dupuit, a French engineer, first introduced the concept of in the 1930s. It became popular in the 1950s as a simple way of weighing up project costs and benefits, to determine whether to go ahead with a project.
- As its name suggests, Cost-Benefit Analysis involves adding up the benefits of a course of action, and then comparing these with the costs associated with it.

# DECISION MAKING

## Individual

**Should I buy a I phone 6 ?**

# Decision Making

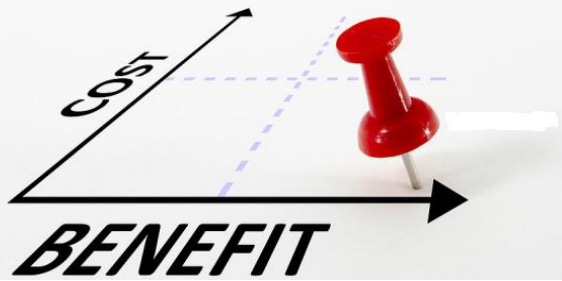
## Societal Decision Making

CATCH ME IF YOU CAN....

- A wanted criminal is stuck inside a cave below a historical monument .

The following are the options available for you

- Blast the cave off
- Put sleeping gas into the cave
- Send two commandos in
- Ask him to surrender and come out with a deal.

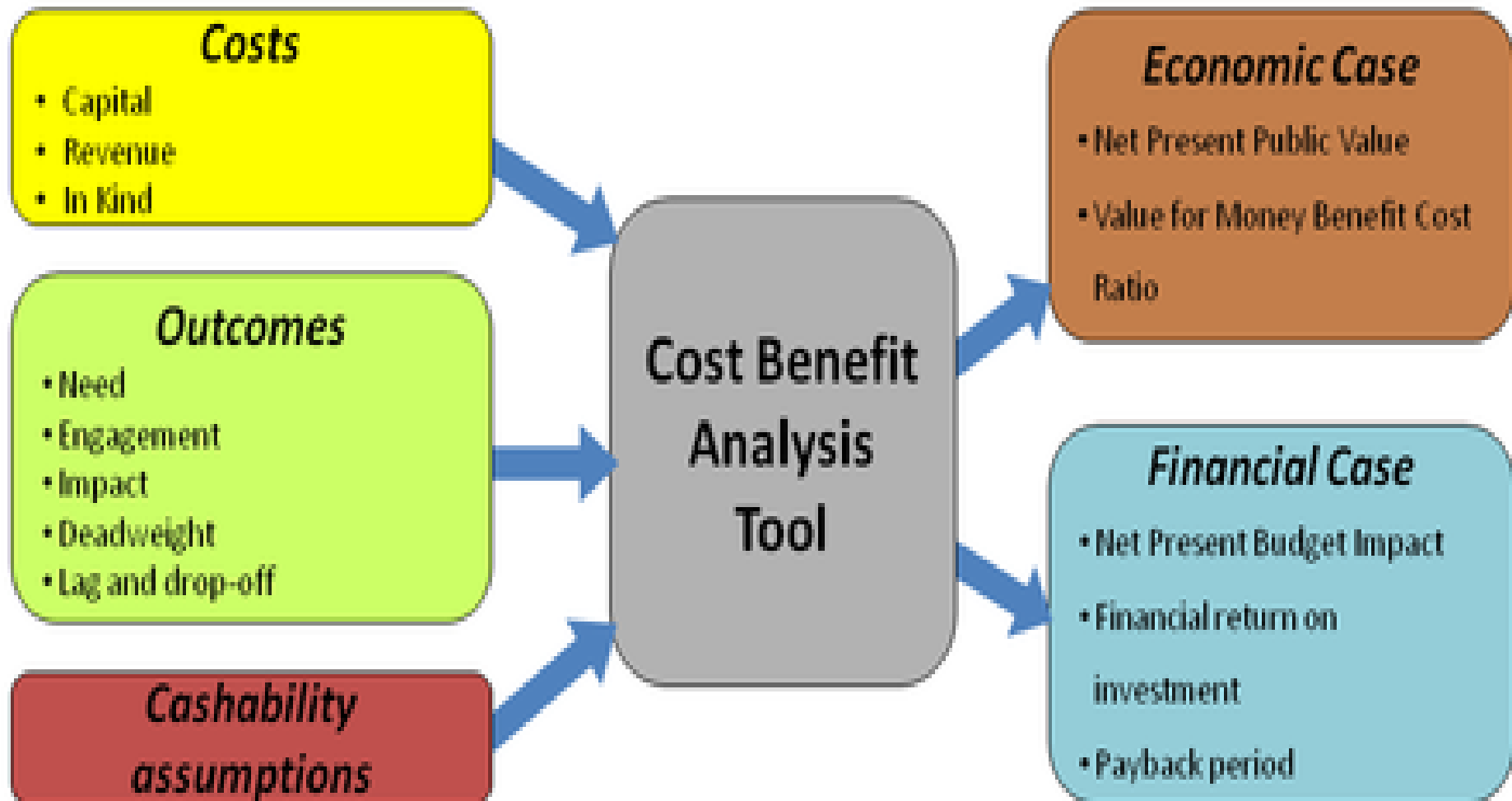


# WHAT IS CBA

- Technique for rational decision making.
- It lists the costs and benefits of a decision over a time frame and justifies the decision taken.
- It converts implicit costs and benefits **BASED ON JUSTIFIABLE ASSUMPTIONS** also in money terms and factors it into the decision.

# <http://www.britannica.com/topic/cost-benefit-analysis>

- A cost–benefit ratio is determined by dividing the projected benefits of a program by the projected costs. In general, a program having a high benefit–cost ratio will take priority over others with lower ratios.
- Determining this ratio is a difficult task, however, because of the wide range of variables involved. Both quantitative and qualitative factors must be taken into account, especially when dealing with social programs.
- For instance, the monetary value of the presumed benefits of a given program may be indirect, intangible, or projected far into the future.
- The time factor must be considered in estimating costs, especially in long-range planning. Variable interest rates, tying-up of funds, and the disruption of normal cash flow must be factors in the analysis if an accurate cost–benefit ratio is to be determined.



# Process of CBA

- Define the problem and decision question
- List the explicit costs
- List the implicit cost
- List the explicit benefits
- List of Implicit benefits
- Compare the total costs and benefits
- Take a decision.



# Kinds of cba

- Financial
- Economical (fin + social considerations)

# costs

- Capital- Machinery, building, computers, office equipments
- Working costs- rent electricity, travelling expenses, water, gas.....
- Implicit costs- time, feelings, opportunities lost

# Benefits

- Explicit- Revenue, cash
- Implicit- good feeling, euphoria, reputation, public relations

# Why cba

- **Minimize risks**
- **Better credibility**
- **Best informed, rational quality decision making.**
- Good evidence
- Good alignment with vision
- Helps better customer relations
- **Be a good society citizen.**

# Economic tools

- Impact outcomes-

Number of jobs created

Time saved

Carbon emissions reduced

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- Time period
- Implicit returns
- Explicit returns

# Financial Techniques

- Time value for money
- Capital budgeting techniques-NPV,IRR,B/C & pay back.

# Financial Decision tools

- Net Present Value NPV
- Internal Rate of Return
- Payback Period
- Benefits Costs Ratio

# Time value

What would you take?

1000rs today or 1000 rs two years from now.

today – as you have opportunity to use it during the time - time value for money.....

**TIME** allows you the *opportunity* to postpone consumption and earn **INTEREST**.



# Compound interest

- $A = P(1 + r/100)^n$

- $P = A$

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 $(1 + r/100)^n$

$$PV_0 = FV_n / (1+i)^n$$

$$PVO = FV_n \times \text{pvif}_{r,n} \text{ (tables)}$$

# NPV

- Cash flows across a time zone- inflows and outflows
- Interest rate-called DISCOUNT rate usually the cost of capital/roi of the industry
- Discount value table.

# NPV

- The present value of inflows across the time zone in years MINUS the present value of outflows reveals the NET PRESENT VALUE.
- If NPV is positive then the proposal is accepted else rejected.
- If  $NPV = 0$  then (the discount rate is called IRR) and the decision is based on other criterions as the resultant NPV is indifferent.

# Present value tables

| <b>Period</b> | <b>6%</b> | <b>7%</b> | <b>8%</b> |
|---------------|-----------|-----------|-----------|
| 1             | .943      | .935      | .926      |
| 2             | .890      | .873      | .857      |
| 3             | .840      | .816      | .794      |
| 4             | .792      | .763      | .735      |
| 5             | .747      | .713      | .681      |

# example

50000 cost of machinery

Yields 20000 every year for 3 years. if cost of capital is 8%

Pv of inflows =  $20000 \times .926 + 20000 \times .857 + 20000 \times .794$

$18520 + 17140 + 15880 = 51540$

Pv of outflows =  $50,000 \times 1.000 = 50000$

$NPV = 51540 - 50000 = 1540$

positive hence acceptable.

$BCR = 51540 / 50000 = 1.03$

>1 acceptable financially.

# Benefits Costs Ratio

$$BCR = \frac{\textit{Present Value of Cash Inflows}}{\textit{Present Value of Cash Outflows}}$$

Ratio of discounted inflows to outflows.

Rule: Accept project if BCR greater than 1.

Use caution if using to compare mutually exclusive projects.

Similar BCRs can have radically different NPV's.