

# **CSE4708: Software Project Management**

**Unit II : Project Evaluation & Estimation**

**Topic: Cost Benefit Analysis**

Name: Manka Sharma

Date : 11<sup>th</sup> August 2020

# Project Evaluation and Estimation

Meaning: ( What, How, Who, Why)

- What: It is a specialized planning process which involves systematic, objective and comprehensive appraisal of development programmes for individual commodities and/or projects.
- How: it is conducted by assessing or appraising its operational efficiency; technically, economically, financially and managerially.
- Who: It is usually conducted by a group of outside experts

# Project Evaluation and Estimation

Meaning: ( What, How, Who, Why)

- Why? It is done in order to find out projects achievement and weaknesses and to suggest ways and mean to overcoming the weakness and to improve its operation.
- In summary: It is a process of evaluating the rate of return on a project, its social profitability and its side effects on the growth rate of population, on employment , on labor and management training and on rate of reinvestment.

# Project Evaluation and Estimation

Project evaluation involves 4 stages:

- Review: Review of the situation before the project is actually started
- Appraisal: This is done in order to find out how much has been accomplished and what remains to be accomplished
- Recommendation: Suggestions on ways and means to improve its operation further and to plug loopholes
- Evaluation: Evaluation of the end achieved by the project when it is complete and is in full operation

# Cost – Benefit Analysis

- One of the main ways people make decisions is by using a cost benefit analysis.
- Cost benefit analysis is a process used primarily by businesses that weighs the sum of the benefits, such as financial gain, of an action against the negatives, or costs, of that action.
- The technique is often used when trying to decide a course of action, and often incorporates dollar amounts for intangible benefits as well as opportunity cost into its calculations.

# Cost – Benefit Analysis

- It is the most popular and appropriate method of appraising projects .
- It helps the planning authority in making correct investment decisions to achieve optimum resource allocation by maximizing the difference between the present value of benefits and cost of a project
- It is used to describe and quantify the social advantages and disadvantages of a policy in terms of the common monetary unit.

# Cost – Benefit Analysis

- Its objective function, Net Social Benefit , NSB, is expressed as:

$$\text{NSB} = \text{Benefits} - \text{Costs}$$

# Cost – Benefit Analysis

There are 4 types of benefit-cost criteria commonly used:

- B-C
- B-C/I
- $\Delta B/\Delta C$
- B/C

- Note: I relates to direct investment and  $\Delta$  is increment or marginal change



# Cost – Benefit Analysis

## B-C Criterion

- ▶ This favors large projects and makes small and medium size projects less beneficial.
- ▶ Therefore, can only be used in the determination of the scale of the project on the basis of the maximization of the difference between B & C

## B-C/I Criterion

- ▶ Used in determining the total annual returns on a particular investment to the economy as a whole irrespective of the those accrue
- ▶ Note: I does not include the private investment that my have to be incurred by the beneficiaries of the project

## B/C Criterion

- ▶ This is the best criterion.
- ▶ This benefit-cost ratio is the measure for evaluation of a project.
- ▶ If  $B/C = 1$ , the project is marginal
- ▶ If  $B/C > 1$ , the benefits are more that the cost
- ▶ If  $B/C < 1$ , the benefits are less that the cost

## B/C Criterion

- ▶ This is meant to determine the size of a project that has already been selected and is not for selecting a project

# Cost – Benefit Analysis

- The benefit cost ratio formula does not take into account the **time horizon** of the project.
- Future benefits and costs cannot be treated at par with present benefit and costs
- Therefore , the need for **discounting the future benefits and costs** because society prefers the present to future.
- For this reason economist have come up with a number of 'decision rules' or criteria.

# Cost – Benefit Analysis

- Cost-Benefit Analysis (CBA) is a technique used by companies to arrive at the key decision after working out costs and benefits of a particular action with the help of different models including Net Present Value, Benefit-Cost Ratio etc.

# Cost – Benefit Analysis Models

## #1 – Net Present Value Model

The NPV of a project refers to the difference between the present value of the benefits and the present value of the costs. If  $NPV > 0$ , then it follows that the project has economic justification to go ahead.

It is represented by the following equation:

$$NPV = \sum \text{present value of total future benefits} - \sum \text{present value of total future costs}$$

# Cost – Benefit Analysis Models

## #2 – Benefit-Cost Ratio

On the other hand, the Benefit-Cost provides value by calculating the ratio of the sum of the present value of the benefits associated with a project against the sum of the present value of the costs associated with a project.

$$BCR = \frac{\sum \text{present value of total future benefits}}{\sum \text{present value of total future costs}}$$

The greater the value above 1, the greater are the benefits associated with the alternative considered. If using the Benefit-Cost Ratio, the analyst has to choose the project with the greatest Benefit-Cost Ratio.

# Cost – Benefit Analysis - Example

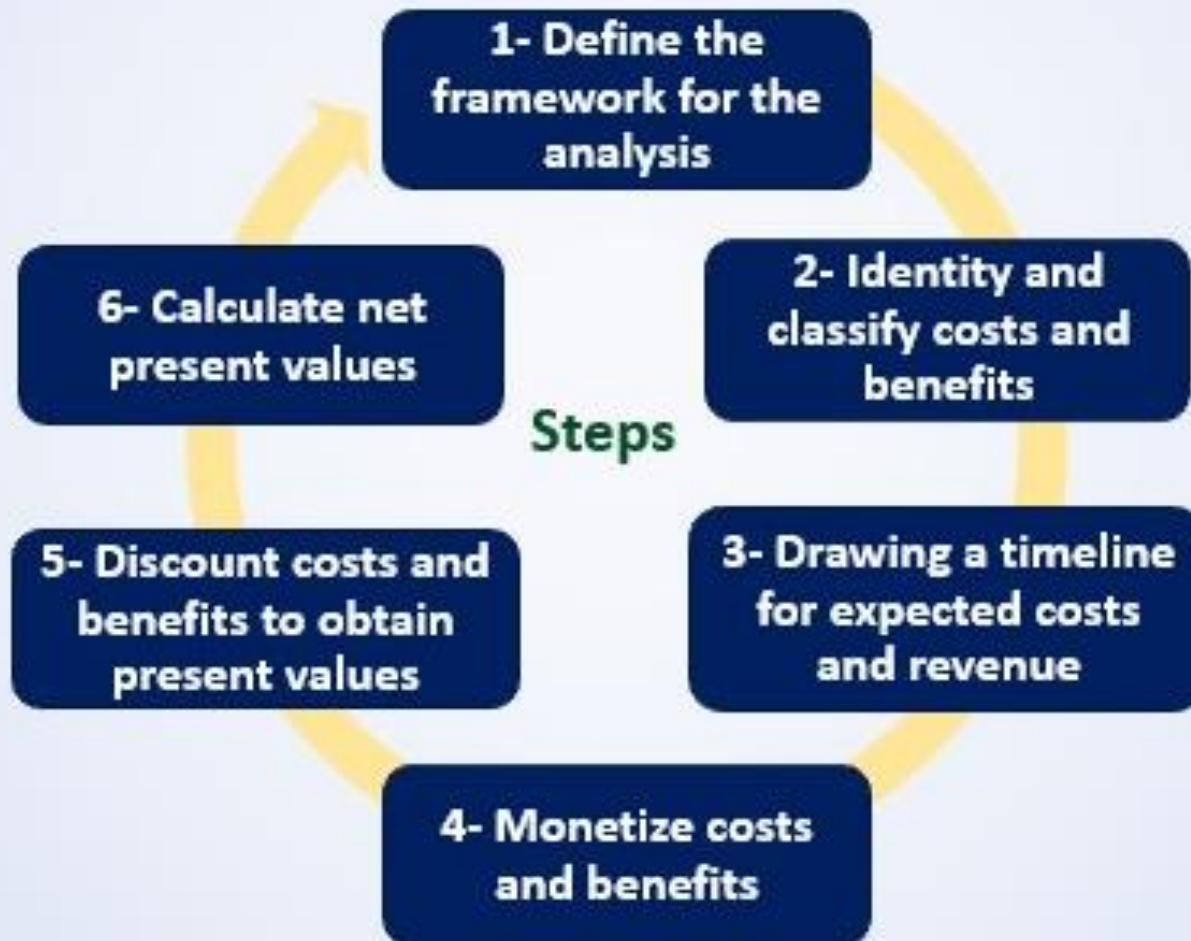
Let's take a quick look at the cost-benefit analysis example suggesting a comparison between the two:

Project Alternative 1	Project Alternative 2
<ul style="list-style-type: none"><li>• Present value of Costs = \$80 million</li><li>• Benefits = \$150 million</li><li>• NPV = \$150 million – \$80m = \$70m</li><li>• BCR = 100 mn /70 mn = 1.88</li></ul>	<ul style="list-style-type: none"><li>• Present value of Costs = \$9 million</li><li>• Present value of Benefits = \$20 million</li><li>• NPV =\$20 million – \$9 million = \$11 million</li><li>• BCR = 20 mn /9 mn = 2.22</li></ul>

- Both investment proposal provides a net positive outcome.
- However, the NPV and BCR methods of obtaining results provide slightly varied outcomes.
- Using NPV suggests investment option 1 provides a better outcome as the NPV of \$70 million is greater than the NPV of option 2 (\$ 11 million).
- On the other hand, applying the BCR method, option 2 would be preferred as a BCR of 2.22 is greater than the BCR of 1.88.

# Steps of Cost – Benefit Analysis

## Cost-Benefit Analysis



# Steps of Cost – Benefit Analysis

## **Define the framework for the analysis.**

- Identify the state of affairs before and after the policy change or investment on a particular project.
- Measure the profit of taking up this investment option as opposed to doing nothing or being on ground zero.



# Steps of Cost – Benefit Analysis

## **Identify and classify costs and benefits.**

- It is important to costs and benefits are classified in the following manner so as to ensure that you understand the effects of each cost and benefit.
- Direct Costs (Intended Costs/Benefits)
- Indirect Costs (Unintended Costs/Benefits),
- Tangible (Easy To Measure And Quantify)/
- Intangible (Hard To Identify And Measure), And
- Real (Anything That Contributes To The Bottom Line Net-Benefits)/Transfer (Money Changing Hands)

# Steps of Cost – Benefit Analysis

## **Drawing a timeline for expected costs and revenue.**

- When it comes to decision making, timing is the most important element.
- Mapping needs to be done when the costs and benefits will occur and how much they will pan out over a phase.
- This solves two major issues. Firstly, a defined timeline enables businesses to align themselves with the expectations of all interested parties. Secondly, understanding the timeline allows them to plan for the impact that the cost and revenue will have on the operations. This empowers businesses to better manage things and take steps ahead of any contingencies.

# Steps of Cost – Benefit Analysis

## **Monetize costs and benefits.**

- Ensure to place all costs and all benefits in the same monetary unit.

## **Discount costs and benefits to obtain present values.**

- This implies converting future costs and benefits into present value. This is also known as discounting the cash flows or benefits by a suitable discount rate. Every business tends to have a different discount rate.

## **Calculate net present values.**

- This is done by subtracting costs from benefits. The investment proposition is considered efficient if a positive result is obtained. However, there are other factors to be considered as well.