The Lesson 9

AN INTRODUCTION TO COST BENEFIT ANALYSIS (CBA)

CBA is an assessment method used for quantifying policies, programs, projects and demonstrations or any interventions in monetary terms with a view to see its all consequences (Boardman, E. et al, 2008). According to Benjamin Franklin, it is a systematic cataloguing of impacts as benefits (pros) and costs (cons). It values in dollars and then determines the net benefits of the proposal relative to the **status quo** (net benefits equal to Benefits-costs). Thus it is a systematic approach to estimate the strengths and weaknesses of alternatives that satisfy transactions, acjtivities or functional requirements for a business (Wikipedia, 2016).

When calculating financial or economic rate of returns of projects it needs to estimate flows of income and expenditure, which known as "cash flow" analysis.

Thus in CBA, it values all the costs and benefits of projects. When it assess the public projects, it assess all the costs and benefits to the society as whole. It refers as "social cost benefit analysis" and symbolizes as follows.

NSB= B-C

9.1 Purpose of Using CBA

CBA is mainly used by governments and private sector businesses in view of assessing the desirability of a given policy or expected balance of benefits and costs in accordance with foregone alternatives and the status quo. Thus as a technique that used to determine options of development interventions, it has two purposes:

1. To determine if it is a sound investment/decision (justification/feasibility),
2. To provide a basis for comparing projects. It involves comparing the total expected cost of each option against the total expected benefits, to see whether the benefits outweigh the costs, and by how much

Theoretical Base of CBA

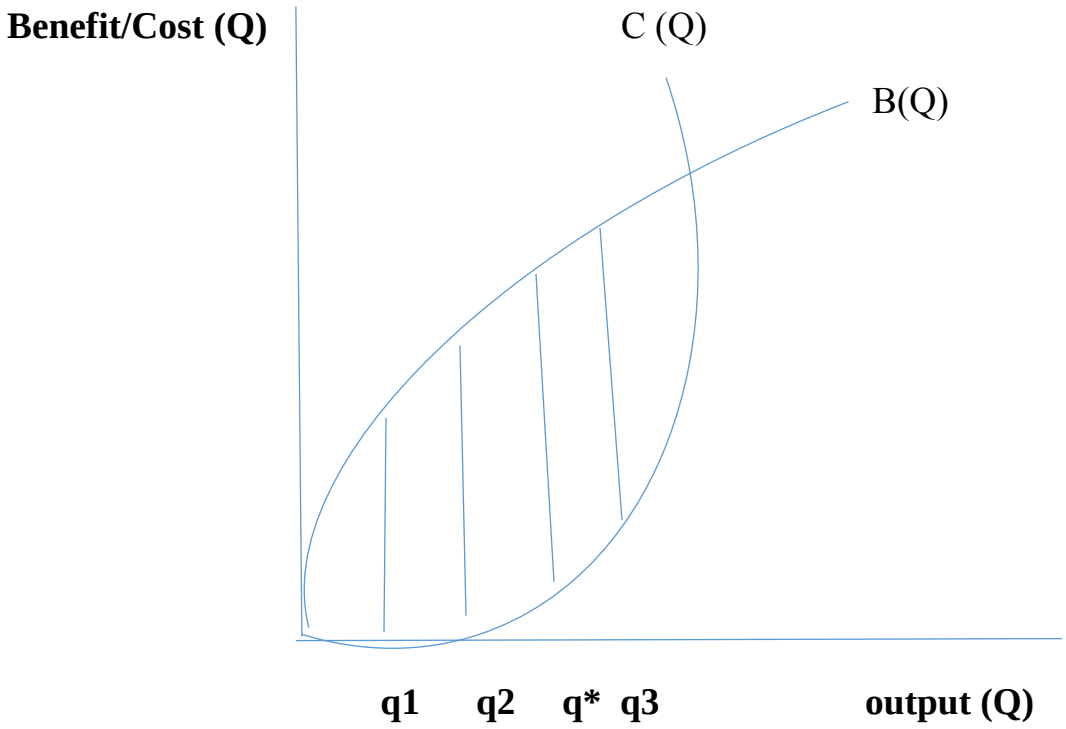
Theoretical base of cost and benefit analysis is based on following concepts.

Willingness to Pay - Consumer Surplus and Producer Surplus

Difference between Financial Profitability and Social Returns

CBA is used mainly for social decision making in view of more efficient allocation of society's resources and assess the effects and impacts (Boardman, E. et al, 2008). Thus, fig 9.1 indicated the most efficient level of resource allocation at q*, where highest difference between cost and benefit curves. Though, the benefit exceeds at q1 and q2, q* is the most efficient level of resource allocation. It is required to follow the most efficient level of resource allocation for the public project because it use scared resources of the society.

Fig. 9**.1:** THE Efficient Resource Allocation



At the same time, it is important to apply pareto efficiency in determining resource allocation. **"An allocation of goods is Pareto efficient if no alternative allocation can make at least one person better off without making anyone else worse off"**

9.2 Types of CBAS

Though CBA is related to cost effective analysis, it has some distinct features apart from CBA analysis. Thus four types of CBAs are used.

1. Ex-Ante: is commenced while the project or the policy is under consideration. It assist in the decision about whether scarce resources should be allocated by government to specific policy or project immediately
2. Ex-post: Ex post analysis is conducted at the end of a project or a policy.
3. In Medias Res: Studies are performed during the life of the project or the policy.
4. Comparison of Ex-Ante and ex post: This sort of comparative CBA is useful to policymakers for learning efficacy of CBA.

9.3 Evaluation Process

Following steps are to be applied in the process of CBA (Boardman, E. etal, 2008).

1. List alternative projects/programs.
2. Decide whose benefits and costs count (List stakeholders)
3. Catalogue impacts and Select measurement indicators and measure all cost/benefit elements.
4. Predict outcome of cost and benefits over relevant time period.
5. Convert all costs and benefits into a common currency.
6. Discount benefits and costs to obtain present value (Apply discount rate)
7. Calculate net present value of project options.
8. Perform sensitivity analysis
9. Make recommendations

1. List alternative projects/programs

Specify set of alternative projects by considering opportunities foregone due to the project. For instance, there would be many alternatives for a highway construction project i.e. rail way or a water canal. If we assume that a high way project designed by the government, it may determine on certain dimensions i.e. size (how many lanes), road surface, routing, fees and timing etc.

The high way project mentioned in table 9.1 have main options i.e. no tolls with tolls. If the government decides to charge from users it includes tolls and otherwise select no toll option. It also viewed from two perspectives i. e. global perspectives and provincial perspectives. If the project design on local conditions such as physical, social and economic requirements, it includes provincial perspective. If it consider global factors without specifying provincial boundaries, it viewed on global perspectives. Thus four project options has identified as A, B, C and D in table 9.1. Each project options have described with variables of project benefits and costs. Benefits were measured by Time and operating cost savings, Horizon value, Safety Benefits (lives) and Alternative Route Benefits. Project costs were measured by Constructions, maintenance, toll collection and toll booth construction.

Since the CBA compare net social benefits with foregone or the displaced project, it refer as counter factual. According to Boardman, E. et al, 2008, counter factual **status quo** reflects net social benefits of forgone alternative projects as shown in table 9.1. Note that sometimes, **status quo** is not the valid criterion to decide valid alternative. If the project would displace specific alternative, then the project should be evaluated by comparing displaced option instead of hypothetical option. For instance, if the government decided to allocate limited resources for transport project either high way or new railway, then the project should compare with railway project cost and benefits, not on the **status quo.** But comparison with different projects is not easy because comparison is difficult for qualitative projects such as health, poverty, social development (Boardman, E. et al, 2008).

The table 9.1: CBA Analysis for the Proposed High Way

Item	No Tolls		With Tolls	
	Global Perspective	Provincial Perspective	Global Perspective	Provincial Perspective
Project benefits	A	B	C	D
Time and operating cost savings	389.8	292.3	200.4	217.8
Horizon value	53.3	53.3	53.3	53.3
Safety Benefits (lives)	36.0	27.0	25.2	18.9
Alternative Route Benefits	14.6	10.9	9.4	7.1
Toll Revenue	-	-	-	37.4
New Users	0.8	0.6	0.3	0.2
Total Benefits	494.5	384.1	378.	334.7
Project costs				
Constructions	338.1	338.1	338.1	338.1
Maintenance	7.6	7.6	7.6	7.6
Toll Collection			8.4	8.4
Toll Booth Construction			0.3	0.3
Total Costs	345.7	345.7	354.4	354.4
Net Social Benefits	148.8	38.4	24.2	-19.7

Source: Quoted from Boardman, E. et al, (2008) Cost-Benefit Analysis: Concepts and Practice, Pearson Education

2. Decide whose benefits and costs count (List stakeholders)

Selecting stakeholders who gain benefits and bear the cost is very important. It decides by the government or the implementing agency in view of provincial perspectives. However, selections based on the provincial requirements are not always identical with global perspective that concern every one and eco system. e. g. global climate change and tourists.

3. Catalogue impacts and Select measurement indicators and measure all cost/benefit elements\

The impact is measured in terms of benefits and costs. Benefits means good outcome generated from the project and cost represent bad outcomes or the commitments to reach expected returns. Good outcomes or benefits are measured by using indicators. Indicators may quantitative or qualitative variables. For instance, benefits of the high way project is measured by time, cost and human lives saved by construction of new high way. How many hours saved per trip? How much save fuel cost per trip in Rupees? and number of accidents and deaths avoided were considered as measurable indicators for time, cost and lives saved. Variables of cost were based on construction and maintenance expenses of the project.

The other steps to be followed in the process of project evaluation will present in details in the following chapters. Thus chapters 10 and 11 present financial analysis which describe discount rates, net present value and internal rate of returns. Chapters 12 and 13 describe sensitivity analysis and social cost benefit analysis respectively.

According to **status quo** analysis**,** the best option be selected from table 9.1 is the project A which has the highest net social benefit of $148.8 m. However, project A comes under no toll option and global perspectives. If the government decide to implement no toll option, then it should be based on the provincial perspectives as in project B. So, selection would be project B. Nevertheless, if government decide to implement with toll option it has to consider project D despite the fact that net social benefit is negative. The project C will not select since it comes under global perspectives. So, it is clear that Status quo is not the correct determinant and need

to consider other project criterion such as net present value (NPV) and internal Rate of return (IRR).