**Chapter Six**

**Economic (Social cost – Benefit) Analysis**

**Overview of SCBA**

Social Cost-Benefit Analysis (SCBA) is a methodology developed for evaluating investment projects from the viewpoint of the society (or the economy) as a whole. The fundamental objective of SCBA is to ensure the industrial project is viable from the overall national & societal perspective. SCBA is used primarily for evaluating public investments, (though it can be applied both to private and public investments). Projects are evaluated with in macroeconomic planning framework, which magnifies national economic objectives and enhances broad allocation of resources to various sectors. Thus, when we evaluate a project from the view point of the society (or economy) as a whole, it is called Social Cost Benefit Analysis (SCBA)/Economic Analysis.

**Difference between projects by private investors & government (society)**

* Private investors focuses on commercial profitability of a project.
* It is merely based on monetary (and as well explicit) costs & benefits.
* Could be misleading in measuring the “true’’ economic benefits & costs of industrial projects in the society. the society.
* Doesn’t measure the project’s true economic impact(s) in the society.
* Government evaluates projects through making economic analysis (social cost -benefit analysis).
* SCBA uses shadow prices (world prices) in measuring costs & benefits.
* SCBA focuses on the social costs & benefits of projects Social costs & benefits often tend to differ from monetary costs & benefits.

**WHAT ARE THE PRINCIPAL SOURCES OF DISCREPANCY BETWEEN PRIVATE INVESTORS AND GOVERNMENT/SOCIAL/ PROJECTS?**

1. **Market Imperfections**

Market prices form the basis for computing the monetary costs and benefits of projects from the point of view of the private investor. Market prices, in this regard, could reflect social values only under conditions of perfect competition. However, when imperfections exist, market prices do not reflect social values.

The common market imperfections found in most economies, and especially in developing countries, are:

**Rationing on Prices and Distribution of Commodities:** Rationing of a commodity refers to existing control over its price & distribution.In this regard, the price paid by consumers under rationing is often significantly less than the price that would have prevailed in a competitive market.

**Existence of Minimum Wage Rate Legislations:** In such cases, the wages paid to labor are usually more than what wages would have been in a competitive market, which is free from such wage legislations.

**Foreign Exchange Regulation:** Developing countries exercise close control and impose regulations over foreign exchange transactions.The official rate of foreign exchange in such cases is typically less than the rate that would have prevailed in the absence of foreign exchange control or regulations.The existence of such controls or regulations often results in an overvalued local currency due to the undervaluing of the prices of foreign currency.Official exchange rate (OER) is controlled in most nations and often made to be less than the real value of foreign currency, which has implications to reducing the volume of foreign exchange transactions.

1. **Externalities**

A project may have beneficial external effects, for instance, it may contribute to the development of certain infrastructural facilities like roads that benefit residents in the neighboring areas. Such benefits are considered in SCBA, though they are ignored in assessing the monetary benefits to the project sponsors, as they do not receive any monetary compensation from those who enjoy this external benefit created by the project. Likewise, a project may have harmful external effects like environmental pollution. In SCBA, the cost of such environmental pollution is relevant, though the project sponsors may not incur any monetary costs on this.

Externalities are relevant in SCBA because, in such analysis, all costs and benefits, irrespective to whom they accrue and whether they are paid for or not, are relevant from the broader society perspective.

1. **Taxes, Subsidies, and Domestic Interests**

Taxes, subsidies, and domestic interests are transfer payments. From the private point of view, taxes are definite monetary costs and subsidies are definite monetary gains and hence, appear in the financial analysis (in the costs & benefits stream). From the society (or national economy) point of view, however, taxes & subsidies are generally regarded as transfer payments and hence, considered irrelevant. Taxes and subsidies do not represent direct claims on the country’s resources; but merely reflect a transfer of control over resources from one member or sector of society to another.

In addition, interests on domestic loans merely transfer purchasing power from the project to the lender. It does not use up real resources. Domestic loans and their repayments are also financial transfers (and hence, not relevant from the SCBA perspective). The opportunity cost of such loan funds is relevant in the analysis. However, interest payments to foreign lenders are always relevant in SCBA, as payment of interests to lenders abroad needs the use of funds from the national (domestic) pool of savings.

1. **Concern for Redistribution of Income**

A private firm does not bother as to how its benefits are distributed across various groups in the society. The society, however, is concerned about the distribution of benefits across different groups. In this regard, a birr of benefit going to an economically poor section is considered more valuable than a birr of benefit going to affluent (rich) section.

In developing countries, relatively high social value is attached to income going to the poor. Hence, projects benefiting the poor are more socially valuable. For instance, irrigation projects, projects for opening hospitals in rural areas, and the like are more socially valuable relative to networking projects, projects for opening hospitals in urban areas, and so on.

1. **Concern for Savings and Investment**

Project’s benefits might be described in terms of enhancing savings or increasing consumption in the society. In this regard, a differential value should be attached to these benefits. From a social point of view, the division of benefits between “consumption” and “savings” (the latter leading to investment) is relevant, particularly in the capital scarce developing countries.

In general, the benefits of a project may be seen from two angles, that is, Those enhancing savings (for instance, opening hospitals to offer medical services at lower fees, projects improving the nearby roads, which is, in turn, enhancing transport services & lowering charges, etc). Those enhancing (or contributing to the increase in consumption) in the society, for instance, opening luxuries hotels, cinemas, etc As a birr of benefit saved deemed more valuable than a birr of benefit consumed, more social-value is attached to projects that enhance savings than consumption in the society. The impact of the project on savings and investment should be reflected in SCBA, whereby a higher valuation is placed on a benefit saved and lower valuation is put on a benefit consumed. Increase in savings enhances investments in the society.

1. **Merit Wants**

Goals and preferences not expressed in the market place, but believed by policy makers to be in the larger interest, Wants not sought in the market But are needed by larger society.

**Examples of merit want:**

* The government may prefer to promote an adult education program
* Balanced nutrition programs for school going children and feeding center for rural students
* Rural roads
* School for pastoralists
* Programs for empowering women in the society

Often, individuals do not seek these goals in the market place. While merit wants are disregarded and irrelevant from the private point of view, they are important from the social point of view.

1. **Project Linkages**

A project may have wide-ranging repressions on demands of inputs and outputs in general. It may cause gains and/or losses for producers and consumers other than those involving in the project itself. In this regard, the project may have forward or backward linkages in the industry. For instance, other industries may use or process the project’s output, which is called forward linkage; or the project may use inputs or outputs of others, which is called backward linkage.

As such, linkages have impacts on demands of inputs/outputs and often results in gain or loss on producers & consumers in the economy. Although measurement of linkages is difficult, ignoring them is not desirable. Hence, attempt should be made to identify and measure the project’s externalities and linkages from the viewpoint of the society.

1. **Exchange Rate**

The Official Exchange Rate (OER) shows true The Official Exchange Rate (OER) shows true economic value only if the following 3 conditions fulfilled

* Move freely without intervention by the government.
* No rationing on foreign exchange.
* No subsidy on foreign currency transactions.

**Approaches to SCBA**

There are two principal approaches for Social Cost Benefit Analysis.

**UNIDO Approach**: This approach is mainly based on the publication of UNIDO (United Nation Industrial Development Organization)‏ named *Guide to Practical Project Appraisal* in 1978.

**L-M Approach:** I.M.D Little & J.A.Mirlees have developed this approach for analysis of Social Cost-Benefit in Manual of Industrial Project Analysis in Developing Countries and Project Appraisal & Planning for Developing Countries.

1. **UNIDO Approach**

The UNIDO approach of Social Cost Benefit Analysis involves five stages:

* Calculation of *financial profitability* of the project measured at market prices.
* Obtaining the net benefit of the project at *shadow (efficiency) prices*.
* Adjustment for the impact of the projecton *Savings & Investment*.
* Adjustment for the impact of the project on *Income Distribution*.
* Adjustment for the impact of the project on *Merit and Demerit Goods* whose social values differ from their economic values.

**Stage-1: Calculation of financial profitability of the project**

* A good technical and financial analysis must be done before a meaningful economic (social) evaluation can be made so as to determine financial profitability.
* Financial profitability is indicated by the Net Present Value (NPV) of the project, which is measured by taking into account inputs (costs) and outputs (benefits) at market price.

Net Present value of a Project is calculated as:



 Where,

 *Vt* = Value of outputs at market price at time *t*

 *Ct* = Value of inputs at market price at time *t*

 *K =* Discount Rate

 *T =* Lifetime of the project

 *I0 =* Initial cost at the start of the project.

* The project is viewed as financially feasible if NPV > 0.

**Stage-2: Obtaining the net benefit of the project at economic (shadow) prices**

* The Commercial Profitability analysis (calculated in stage - 1) would be sufficient only if the Project is operated in perfect market. Because, only in a perfect market, market prices can reflect the social value.
* If the market is imperfect (most of the cases in reality), net benefit of the Project is determined by assigning shadow prices to inputs and outputs.
* Therefore, developing shadow prices is very much vital.
* Shadow Prices reflect the real value of a resource (input or output) to society.
* Shadow Prices are also referred as economic prices, accounting prices, economic/accounting efficiency prices etc.
* Shadow Prices can be defined as the value of the contribution to the country’s basic socio-economic objectives made by any marginal change in the availability of commodities (0utput) or factor of production (input).
* Example: *A project of power station may increase the production of electricity which contributes to one of the socio-economic objectives of the country*.

**General Principles of Shadow Pricing**

1. **Numeraire :**

This term refers to the unit of value – the standard of value – in terms of which costs and benefits are to be counted. It is a unit of account in which the values of inputs and outputs are to be expressed.

Numeraire is determined at-

* Domestic currency rather than border price.
* Present value rather than future value.
* Constant price rather than current price.
1. **Tradability:**

**Tradability refers to** whether a good or service is tradable or non-tradable; if tradable whether is fully traded or non-traded. A good/service is tradable in the absence of or within limited trade barriers.

**A tradable good/service is actually traded when-**

* The import (export) supply is perfectly elastic over the relevant range of volume.
* All additional demand (production) must be made (consumed) by import (export) due to the full capacity in the domestic industry (fulfillment of demand by domestic consumer).
* The import (CIF) price is less or the export (FOB) price is more than the domestic cost of production.

 **A good/service is non-tradable; if**

* its import (CIF) price is greater than its domestic cost of production, and/or
* Its export (FOB) price is less than its domestic cost of production.

**Sources of Shadow Pricing:**

Depending on the impact of the project on national economy, there are three sources of shadow pricing:

Consumer Willingness to Pay (CWP) is what a consumer wants to spend for a product or service. The difference between CWP and actual payment is called consumer surplus*.*

**Shadow Pricing of Resources**

**Tradable inputs & outputs:** For a fully traded good, the shadow price is border price translated into the domestic currency at shadow foreign exchange.

To illustrate, assume that a project uses two indigenous equipments costing Bir. 250,000. These equipments can be exported at $10,000. The shadow foreign rate of $ 1.00 is equivalent to Bir. 30. Therefore, shadow price of these equipments (inputs) are ($10,000 × 30) = Birr 300,000.

**Non-Tradable Inputs & Outputs:**

To illustrate, assume that for a project, one-half of the required input is collected from additional domestic production which has a domestic cost of Birr 200,000 and the rest one-half is collected from diversion from other consumers who are willing to pay Birr 300,000. Therefore, the shadow price of the inputs will be:

 (Cost of production + consumer’s willingness to pay)‏

 = Birr (200,000 + 300,000)‏

 = Birr 500,000

Assume again that a newly establishes power station having a total capacity of 5,000 mega watt electricity, charges Birr 10 per one kilo watt electricity consumption. The consumers of that particular area are willing to pay Birr 20 per kilo watt. Therefore, the shadow price is (Birr 20 × 5,000,000kw) = Birr 100million, instead of Birr 50 million (10 x 5,000,000kw).

**Shadow Pricing of Externalities:**

Although valuation of external effects is difficult as they are often intangible in nature and there is no market price, shadow pricing of externalities may be made indirect means such as : The harmful effect of the bridge may be measured by the consumer willingness to pay for the output of the people which has been reduced due to the bridge. The cost of pollution may be estimated in terms of the loss of earnings as a result of damage to health caused by it.

**Labor: ‏**

 **Capital:**

Investment of capital in a project causes to happen two things:

i. Financial resources are converted into physical assets

ii. Financial resources are withdrawn from national pool of savings. Thus alternative projects are foregone and there is an opportunity cost of it.

The shadow price of physical assets is calculated in the same manner in which inputs and outputs are calculated. The opportunity cost of capital (shadow price of capital) depends on the source from which the capital has generated.

**Obtaining Net Benefit of the Project at Shadow Prices**

* Determining the shadow price of
* One-Shot Costs
* Annual costs
* Annual benefits
* Calculating Net-benefit of the project from social point of view by :



**Where,**

 ***Vt* = Shadow price of Benefit at time *t***

 ***Ct* = Shadow price of Operating Expenses at time *t***

 ***K =* Social Discount Rate**

 ***T =* Lifetime of the project**

 ***I0 =* Initial cost at the start of the project.**

**Illustration**

The Government is considering a project which would supply water for irrigation, generate electricity and provide a measure of protection against floods. The project is expected to have a 25 year life time. The costs and benefits of the project are as:

**COSTS:**

* Power equipment costing Birr 300,000,000 (Additional Information: This equipment can be exported at $ 17,500,000. The shadow price of Birr per one dollar is 20)
* 30000 tons of cement produced indigenously is used in the project at a cost of Birr 180,000,000. (Additional Information: However, one-half of the cement will come from additional domestic production which costs Birr 5,000 per tone and one-half come from diversion from other consumers who are willing to pay Birr 6,500 per ton.)‏
* Other construction materials (sand, bricks, steel etc.)‏ Cost Birr 150 million (Additional Information: these materials comes from additional production, at production cost of 100 million Birr)
* 6,000,000 man days of unskilled labor for which the project committee decided to pay a daily wage of Birr40. (Additional Information: The shadow price of unskilled labor is 30 Birr Per day)‏
* Skilled labor costing Birr60,000,000 ( However, this cost reflects what others are willing to pay for the skilled labor)‏
* Operating & Maintenance cost of the project will be Birr 75,000,000 annually. (However, the operating cost should be Birr 65,000,000 from social view point)‏

**Benefits:**

1. 0.5 million acres of land will be irrigated. The Government will charge the water levy at Birr 150 for per acre. (Additional Information: The value of additional output per acre due to the irrigation will be Birr 500 per acre).
2. 1000 mega watt of electricity will be generated for domestic use in a year. The electricity tariff will be charged at Birr 100 per Kilo watt. (Additional Information: The consumers are willing to pay Birr 150 per kilo watt consumption of electricity).
3. Flood damages can be saved by Birr 20,000,000 annually. However, the Government will not able to collect anything for this.

**Required: by assuming the discount rate to be 10%**

* Prepare a summary table for costs of the project
* Prepare a summary table for benefits of the project
* Determine profitability of the project from the private (financial) angle
* Determine profitability of the project from the social (economic) angle

**Solution**

* Summary table for costs of the project

|  |  |  |  |
| --- | --- | --- | --- |
| Cost type | Nature of the cost | Private Angle(Market price) | Social angle (shadow price) |
| Power equipment | One –shot | 300,000,000 | 350,000,000 |
| Cement (indigenous) | One –shot | 180,000,000 | 172,500,000 |
| Other construction materials. | One –shot | 150,000,000 | 100,000,000 |
| Labor cost (unskilled) | One-shot | 240,000,000 | 180,000,000 |
| Labor cost (skilled) | One –shot | 60,000,000 | 60,000,000 |
| Operating and maintenance cost  | Annual  | 75,000,000 | 65,000,000 |

* Summary table for Benefits of the project

|  |  |  |  |
| --- | --- | --- | --- |
| Benefit Type | Nature of the benefit | Private Angle(market price) | Social angle(shadow price) |
| Irrigation  | Annual  | 75,000,000 | 250,000,000 |
| Electricity  | Annual  | 100,000,000 | 150,000,000 |
| Flood relief  | Annual  |  \_ | 20,000,000 |

**Profitability of the project from the private (financial) angle**

**Determination of costs**

**One- shot costs (initial cost)**

Cost of power equipment------------------ Birr 300,000,000

Cement--------------------------------------------- 180,000,000

Other Construction materials----------------- 150,000,000

Labor (unskilled) -----------------------------------240,000,000

Labor (skilled) ---------------------------------------60,000,000

 Total initial cost--------------------------------------**Birr 930,000,000**

**Annual cost**

Operating and maintenance cost------------------Birr 75,000,000

**Determination of annual benefit**

Irrigation------------------------------------------------------Birr 75,000,000

Electricity-------------------------------------------------------- 100,000,000

Total annual benefit------------------------------------- Birr 175,000,000

The to determine the profitability of the project, the net present value of the project can be calculated as follows:



Where,

 *Vt*= Annual Benefit at time *t which is 175 million Birr in this case*

 *Ct* = Annual cost at time *t which is Birr 75 million for this case*

 *K =* Discount Rate = 10% (assumed)‏

 *T =* Lifetime of the project = 25 years

 *I0 =* Initial cost at the start of the project which is Birr 930 million for this project

Therefore,

Therefore, the project is generating a negative NPV of Birr 22.3 Million from the private angle. And this project would have to be rejected from the private investor perspective had it been belongs to private owners or business people.

**4. Determination of profitability from the social (economic) angle Costs**

 **One –shot costs**

Cost of power equipment------------------ Birr 350,000,000

Cement--------------------------------------------- 172,500,000

Other Construction materials----------------- 100,000,000

Labor (unskilled) -----------------------------------180,000,000

Labor (skilled) ---------------------------------------60,000,000

 Total initial cast------------------------------------------Birr 862.5M

**Annual costs**

Operating and maintenance costs------------------------65,000,000

**Annual benefit**

 Irrigation------------------------------------------------------Birr 250,000,000

Electricity-------------------------------------------------------- 150,000,000

Flood relief--------------------------------------------------------20,000,000

Total annual benefit-------------------------------------------- Birr 420M

Net Present value of a Project from Social angle is calculated as:



 Where,

 *Vt* = Shadow price of Benefit at time *t which is Birr 420M for this project*

 *Ct* = Shadow price of Operating Expenses at time *t which is 65M for the project*

 *K =* Social Discount Rate = 10% (assumed) ‏

 *T =* Lifetime of the project = 25 years

 *I0 =* Initial cost at the start of the project which is Birr 862.5M for this project.

Therefore:

 = {355 (PVAF.10%, 25) – 862.5M}

 = {35.5 X 9.0770 – 862.5M}

 = {3.22235B – 862.5M}

 = 2.35985B

From the view point of society, the project is generating a positive NPV of Birr. 2.35985 Billion.

Next to this,

* Stage 3: Adjustment for the impact of the project on Savings & Investment
* Stage 4: Adjustment for the impact of the project on Income Distribution and
* Stage 5: Adjustment for Merit and Demerit Goods are the subsequent activities to be taken in SCBA

**L-M Approach**

I.M.D. **L**ittle and James A. **M**irrlees have developed an approach to SCBA which is famously known as L-M approach. The core of this approach is that the social cost of using a resource in developing countries differs widely from the price paid for it. Hence, it requires ***Shadow Prices*** to denote the real value of a resource to society.

**Features of L-M Approach**

L-M Numeraire presents *uncommitted social income.*

* L-M method opts for savings as the yardstick of their entire approach. Present savings is more valuable to them than present consumption since the savings can be converted into investment for future.
* L-M approach rejects the ‘consumption’ numeraire of UNIDO approach since the authors (L & M) feel that the consumption of all level is valuable.

This approach measures the cost and benefits in terms of *international or border price.* Due to the fact that the border prices represent the correct social opportunity costs or benefits of using or producing traded goods

 For SCBA purpose, the resources – inputs & outputs – of a project are

Classified into: Labor, Traded Goods and Non-traded Goods

Therefore, to find out the real value of these resources, we should calculate –

* Shadow wage rate (SWR)‏
* Shadow price of Traded Goods
* Shadow price of Non-traded Goods

**a) Shadow Wage Rate (SWR)‏**

The purpose of computing the SWR is to determine the opportunity cost of employing an additional worker in the project. For this we have to determine –

* The value of the output foregone due to the use of a unit of labor
* The cost of additional consumption due to the transfer of labor

**b) Shadow price of Traded Goods**

Shadow price of traded goods is simply its border or international price.

* If a good is exported, its shadow price is its FOB price;
* If a good is imported, its shadow price is its CIF price.

**c) Shadow price of Non-traded Goods**

* Non-traded goods are those which do not enter into international trade by their very nature. (e.g. land, building, transportation)‏
* Hence, no border price is observable for them.
* Ideally, Shadow price of Non-traded Good is defined in terms of marginal social cost (MSC) and marginal social benefit (MSB).
* L-M suggest that the monetary cost of non-traded goods be broken down into –
* Labor → SWR (Social Wage Rate)‏
* Tradable → Social Conversion Factor (SCF)‏
* Residual components → SCF

**Dissimilarities between Two Approaches**

**Similarities between Two Approaches**

* Calculation of Shadow Prices to reflect social value
* Usage of Discounted Cash Flow Techniques
* Taking into account about the effect of a project on savings, investment and income of a society.