PUBLIC INVESTMENT : SOME MEASURING INSTRUMENTS

Sharad Sharma

INTRODUCTION

In the exercise of synchronizing projects formulation to achieve certain national objectives, investment decisions should be guided by some cost and benefit measurement instruments. This is particularly important in view of scarcity of some resources for balanced development of an economy. The basic purpose of application of measurement tools in public investment decisions is to rationalise the guidelines for investment in which specific use of inputs with alternatives uses should be determined in the optimum possible scale. A planner has to take into consideration the economic and social effects of the investment decisions as pre-determined values. Therefore it is an ex ante process. Investment projects appraisal is an area of experimentation while evaluation is an area which acquires experiences or is the ex post consideration. The basic purpose of this paper is to familiarise the readers with some of project appraisal, widely applied in public investment decisions. The aim here is to make preliminary but reasonable acquaintance of the basic elements of social cost- benefit analysis as well as initiate a meaningful step towards advanced learning/discussion in the subject.

BASIC INSTRUMENTS

The basic instruments concerning measurement of public investment include costs and benefits.

COSTS

(a) **Private cost and social cost**: Cost of transporting goods for a farmer is a private cost while the depreciation of road may be the social cost. In the construction of a hydro-electric project, the number of households to be displaced/resettled and the hardship associated with it may be the social cost.

(b) **Marginal/incremental cost**: When a project activity expands, some additional costs are incurred. For example, if output is increased from 100 units to 101 units and the cost may increase from Rs. 310 to Rs. 314, then the marginal cost of producing one additional unit of output would be Rs. 4.00.

(c) **Opportunity cost**: Resources have to be utilised where gains would be maximum. For example, land can be used to produce crop A or crop B. The return for crop A is Rs. 200 and for crop B is Rs. 150, which means the land is used for crop A. If the yield of crop A declines to Rs. 125 then it is wise to use land for growing crop B. Thus the concept of opportunity cost is important in making rational decisions about public investments e.g. in irrigation projects with alternatives like dam construction. digging
tubewell, multipurpose project including irrigation, Education project (free
education to poor household children); opportunity cost of school education
or working in the farm/looking after the cattle) etc.

BENEFITS

Private and social benefits: Main distinction here is between the gains
achieved by private individuals and the benefits accruing to the society. For
example, a good housing scheme would improve the health of the people and
increase labour efficiency in the society. There are direct and indirect benefits which
should be valued in same \textit{numeriare}.

INTANGIBLES

Tangible benefits can be measured in monetary units. For example, benefits
in crop production through irrigation project, electricity units sold by hydro-
electricity project etc., can be measured. But due to construction of reservoir, Local
population may be affected by malaria disease for which monetary measurement is
very difficult to make. This is an indirect cost. For benefits, external economies
generate some benefits for which an estimate may be made. Inclusion of benefits and
costs arising from indirect sources are always debatable.

INTEREST RATE AND DISCOUNT RATE

Projects have their time-dimension. For example, consumption of Rs. 100
today is not the same as consuming the same amount few years later. It involves
sacrifice to present consumption for which a premium should be added, called
interest rate. Interest rate is thus the quantification of time preference of present
over future, In case of discount rate. We \textit{look present from the future}. For example,
with 5\% interest rate, the future value of Rs. 100 is Rs. 105. If we look from the
future to the present, the present value of Rs. 105 of the future is Rs. 100, or, the
present value of Rs. future at 5\% interest is Rs. 95.23.

\begin{equation}
\text{Calculation: Rs.} \frac{100 \times 100}{105} = \frac{10000}{105} = 95.24 \quad \text{or} \quad \frac{100}{105} = 0.9524
\end{equation}

If the present value of Rs. 105 (of the future) is Rs. 100., the present value
of Rs. 100 (of the future) is Rs. 95.24. The discount rate is also called the "present
worth factor". Or, at 5\% interest rate if Rs. 95.23 is deposited at the bank today, one
year after the amount would Rs. 100. This is the present value of Rs. 100 next year,
discounted at 5\% interest rate.

This distinction between present and future consumption arises because
future consumption is generated at the cost of sacrificing some of the present
consumption in the form of investment for future income.

SHADOW PRICES/ACCOUNTING PRICES

As the market imperfections may not reflect true scarcity of some resources,
e.g. foreign exchange, shadow prices are used. The market price of foreign exchange
based on supply and demand is called the shadow price of foreign exchange. The
effect of using shadow price would be to encourage production of important substitutes or exportable and to discourage expenses involving foreign exchange. In labour surplus economy, economists may argue that the shadow price of labour should be almost zero, therefore, labour intensive projects should be favoured.

**Net Present Value (NPV)**

When discount rate is used, which quantifies the preference for present consumption over future, it reduces costs and benefits for different years. The surplus of income over cost reduced to present period provides an indicator to make investment decisions.

<table>
<thead>
<tr>
<th>Years</th>
<th>Total Cost</th>
<th>Total benefits</th>
<th>Net benefits</th>
<th>Discounting factor (10%)</th>
<th>Net Present Value (NPV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
<td>(6)</td>
</tr>
<tr>
<td>1</td>
<td>50</td>
<td>-</td>
<td>-50</td>
<td>0.909</td>
<td>-45.5</td>
</tr>
<tr>
<td>2</td>
<td>50</td>
<td>-</td>
<td>-50</td>
<td>0.826</td>
<td>-41.3</td>
</tr>
<tr>
<td>3</td>
<td>-</td>
<td>40</td>
<td>40</td>
<td>0.751</td>
<td>30.0</td>
</tr>
<tr>
<td>4</td>
<td>-</td>
<td>60</td>
<td>60</td>
<td>0.683</td>
<td>41.0</td>
</tr>
<tr>
<td>5</td>
<td>-</td>
<td>75</td>
<td>75</td>
<td>0.620</td>
<td>46.6</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>175</td>
<td>75</td>
<td></td>
<td>117.6</td>
</tr>
</tbody>
</table>

Discount factor: Divide 1 by 1.10 as 10% interest. Then

$$\frac{1}{1.10} = 0.909, \text{then} \frac{0.909}{1.10} = 0.826 \text{ and so on}$$

Formula for NPV calculation

$$V_0 = V_t \left[ \frac{1}{(1 + r)^t} \right]$$

Where

- $V_0 = \text{NPV}$
- $V_t = \text{Net benefits flow}$
- $\frac{1}{(1 + r)^t} = \text{Discounting factor}$

Net benefits x discounting factor = NPV

UNIDO standard formula for calculating NPV = $\sum_{t=0}^{T} \left( \frac{V_t - C_t}{(1 + r)^t} \right) - K$
Where,

\[ t = \text{Annual flow of social benefits; } C_t = \text{Social cost of variable inputs:} \]

\( r = \text{discount rate at which future benefits and costs are discounted} \)

\( K = \text{Fixed cost of investment} \)

But this is absolute figure, if NPV is higher than zero, then investment in the project is worthwhile. The selection process of project should be arranged in terms of descending NPV. But NPV does not provide us with information on rate of return on investment. For this we used another indicator called Benefit Cost Ratio (BCR).

**Benefit Cost Ratio (BCR)**

To obtain the benefit cost ratio, the present value of benefit (NPV) is divided by present value of cost, The ratio between the two gives us Benefit cost ratio, i.e. benefit per rupee of cost. Figures in the are calculated for this

\[
\text{Benefit Cost Ratio} = \frac{\text{Present Value of Benefits}}{\text{Present Value of Cost}} = \frac{117.6}{86.8} = 1.35
\]

If BCR is more than 1, an investment in project is worthwhile. Projects with highest BCR are selected from descending order. In a single project, the rule is to select the project if its BCR is higher.

The major problem with NPV is which discount rate to chose? This problem is solved through iteration process, described in the computation of Internal Rate of Return.

**Internal Rate of Return (IRR)**

IRR is another measure of using discounted cash for arriving at the worth of project. If finds out that rate of return at which NPV = 0 or BCR = 1. The IRR itself is a discount rate which represents the average earning power of money in a project life.

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Cost</th>
<th>Total Benefit</th>
<th>Net Benefit</th>
<th>DF 10%</th>
<th>NPV (Colm 4x5)</th>
<th>DF 15%</th>
<th>NPV (colm 4x7)</th>
<th>DF 25%</th>
<th>NPV (Colm 4x9)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
<td>(6)</td>
<td>(7)</td>
<td>(8)</td>
<td>(9)</td>
</tr>
<tr>
<td>1</td>
<td>150</td>
<td>-</td>
<td>-150</td>
<td>0.909</td>
<td>136.4</td>
<td>0.869</td>
<td>-130</td>
<td>0.800</td>
<td>-120.0</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td>25</td>
<td>20</td>
<td>0.826</td>
<td>16.5</td>
<td>0.756</td>
<td>15.1</td>
<td>0.640</td>
<td>12.8</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>50</td>
<td>45</td>
<td>0.751</td>
<td>33.8</td>
<td>0.658</td>
<td>29.5</td>
<td>0.512</td>
<td>23.0</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>75</td>
<td>70</td>
<td>0.683</td>
<td>47.8</td>
<td>0.572</td>
<td>40.0</td>
<td>0.409</td>
<td>28.6</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>125</td>
<td>120</td>
<td>0.621</td>
<td>74.5</td>
<td>0.497</td>
<td>59.6</td>
<td>0.328</td>
<td>39.4</td>
</tr>
<tr>
<td>Total</td>
<td>170</td>
<td>275</td>
<td>105</td>
<td>-</td>
<td>36.2</td>
<td>-</td>
<td>13.9</td>
<td>-</td>
<td>-16.2</td>
</tr>
</tbody>
</table>

IRR = Lower Discount Rate + Difference between higher & Lower discount rates
\[ x = \frac{\text{NPV at lower Discount Rate}}{\text{Absolute Difference between NPV at two discount Rates}} \]

\[ IRR = 10 + 15(25 - 10) \frac{36.2}{36.2 + 16.2} = 10 + 15(0.690) = 20.34; IRR = 20\% \]

IRR is derived through iteration process, discount rate is raised or lowered to arrive at a state where NPV becomes zero. There may be a number of combinations of discount rates other than 10, 15 and 25.

However, IRR itself does not, on its own provide a criterion for selection of projects. It also has to be compared with market rate of interest or social rate of interest. In this case, following investment decisions can be applicable:

(a) Select a single project if (IRR) \((r^*)\) is greater than market rate of interest or social discount rate, social opportunity cost \((r)\)

(b) In case of more than one projects, rank the projects in descending order of values of IRR \((r^*)\) and select that set of projects for which \(r^*\) is greater, subject to available fund.

The Selection of IRR for the Projects can be represented through diagram also.

\[ r^* = IRR \]

\[ r = \text{Social rate of discount/Market rate of interest} \]

At \(Or^*\) discount rate, NPV becomes zero which is our IRR. All projects are within the range of OZ, that is ABC are selected and the projects beyond OZ are rejected as NPV become negative, which means, the investment is not recovered which amounts to a loss to the individual or society.

**SHADOW/ACCOUNTING WAGE RATE (AWR)**

The argument is that no output is foregone when is used in the project in a situation of mass unemployment. Because the opportunity cost of labour would be zero and market wage paid to the workers would bear no relationship to the opportunity cost. Even with seasonal employment, the output foregone in employing a worker from rural area is less than market wage. While estimating the shadow...
price of labour, in order to reflect its true value, the life-span of a project is also

Because, the situation of labour supply may not be same for 25 or 30 years. In general, the output foregone in rural areas would be between zero and MP of labour.

The output foregone is the cost of labour in economic sense. Economic Wage Rate (EWR) includes cost of consumption of labour while receiving wage and, therefore, claims on limited resources. This means future consumption is foregone. So the workers' present and future consumption foregone should be estimated to arrive at social wage rate. The shadow wage rate calculation for development projects (applied in most fisheries projects in India, irrigation projects in the Philippines etc.) consider mainly certain factors.

Crucial factors such as output foregone, other costs (Cost of transferring Labour from one to another location, disutility of work/loss of leisure, increase in consumption of labour in new employment etc.) The increase in consumption of labour in new employment has greater significance in calculating AWR because it shows premium on consumption vis-a-vis on saving.

Accounting Wage Rate (AWR) = m+s (1-i)w

where m = Marginal product in present employment

s = Saving rate from profit

I = Accounting Price for Investment

W = Market/ Project Wage Rate

S (I=i) = Measure of society's loss due to premium on saving as compared to consumption, or value of W would be if it was return to capital instead of labour.

AWR reflects social loss by employing an additional worker on a new project. Marginal product foregone, disutilities of moving, premium placed on saving etc, are included in this loss. Based on the loss, AWR can be calculated for a project. When market wage rate (W) is very low in a labour surplus economy, the AWR could be quite high/approaching the W. Based on calculation of average Agricultural product in Ratnagiri district of India at Rs. 2/day and Marginal Product of Rs. 1. Value of S = 0.3 and accounting price for I = 1.5, the AWR arrived for the project, as ratio of W was 0.65 for male and 0.43 for female workers. (Cost-Benefit Analysis of Ratnagiri fisheries Project made by SN Mishra and John. Beyer, from Pitale: project Appraisal Technique, 1982, See Selected Reference).

Sensitivity Analysis

In order to arrive to the degree of uncertainty about the project, e.g. the cost of raw materials may increase, or the supply may be delayed etc., the decision-maker has to make alternative calculations of costs/benefits of a project. The sensitivity
analysis, however, does not provide correct answer, but with information helps to
arrive at the decision. Because various elements are interdependent. Also if a certain
variation from estimated cost may affect IRR calculation and the analysis may not
like to go beyond the point which affects the IRR. The cost/benefit flow data need to
be modified in the stream for project life e.g. 10% increase in cost of imports or a
15% decline in income from the project with the necessary modification in the data,
new NPV and IRR are calculated for the same method, but incorporating sensitivity
analysis.

**Bruno Ratio**

This implies the domestic cost of saving a unit of foreign exchange. The
ratio of the cost of domestic resources (e.g. labour, materials, capital) used by a
project to foreign exchange rate is recommended. If both domestic resources and
foreign exchange are expressed in the same currency, a ratio of 1 is the nominal cut-
off point. Ratios higher than 1 or greater than the exchange rate imply protection to
the project for its survival.

**Switching Value**

The value that reverses the ranking of two alternative projects is called
switching value or the "Weight value". For example, project A produces shoes with
modern equipment highly capital intensive with small number of workers, while
project B consists a net-work of small shoe production units which employ large
number of small craftsmen in total, with small amount of capital. If the income
going to the poor is given an weigage of 1.5., project A may be having higher rate
of return. But if income going to the poor is given a weigage greater than 1.5.,
project B may show higher return. Thus, 1.5 becomes the switching value.

**Financial and Economic Analysis**

Public investment appraisals are done for efficient use of resources. Here,
the two factors lead to the distinction between financial analysis and economic
analysis. They are: Exclusion/Inclusion of some costs and benefits in the appraisal
of projects: Valuation of Cost and benefits at market prices or shadow prices.

A project incurs expenses on capital investment, in machinery, equipment,
operation and maintenance cost, purchase of raw materials, payment of wages and
important of goods and services. This category is called use of resources/generation
of goods and services. Another category includes: Direct taxes on profit, sales tax,
Octroi, and all other taxes, fees, subsidies, loan repayment interest, depreciation
duties, export/import duties etc. This category is called payments which do not
involve use of resources (costs) or do not generate resources (benefits). Hence, there
are two types of costs and benefits, one which involves the use/production of goods
and services and another which does not involve use of resources but is the transfer
of resources from to the government. Presentation of specific distinctions of these
are made in the following points.
An illustration of the difference between financial analysis and economic analysis shows that:

<table>
<thead>
<tr>
<th>Analysis</th>
<th>IRR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project A</td>
<td></td>
</tr>
<tr>
<td>Financial Analysis</td>
<td>13%</td>
</tr>
<tr>
<td>Economic Analysis with adjustment for transfer payments</td>
<td>17%</td>
</tr>
<tr>
<td>Economic Analysis with Adjustment for transfer payments and shadow prices</td>
<td>24%</td>
</tr>
<tr>
<td>Bank's lending rate</td>
<td>15%</td>
</tr>
<tr>
<td>Project B</td>
<td></td>
</tr>
<tr>
<td>IRR</td>
<td>19%</td>
</tr>
<tr>
<td>IRR</td>
<td>6%</td>
</tr>
<tr>
<td>IRR</td>
<td>10%</td>
</tr>
<tr>
<td>IRR</td>
<td>15%</td>
</tr>
</tbody>
</table>

In the above illustration, if financial IRR is taken into account, project B is acceptable as IRR is 90% which is higher than bank's lending rate. In case of project A its financial IRR is 13%. less than bank's lending rate. The economic analysis of the project after making adjustment for transfer payment reveal that in the case of project B, government subsidy of a substantial amount was making it more attractive. If subsidy is taken out of calculation of benefits, the use of resources indicate that its capacity to generate benefit is very weak. Also, Project B is already
enjoying a tax holiday and import duty exemption. If the project is granted tax exemption and relief of 50% on import duty, it will be financially viable. A further analysis of projects using shadow wage/exchange rate may indicate, economic rate of return of project A increases further. Hence, in the above illustration, through project B is financially viable, it is not economically viable. In the case of project A, it is economically viable but financially not viable, but can be made financially viable by giving certain concessions on tax and import duties. Thus project A may be recommended for acceptance with certain taxes and duties considerations.

**BRIEF ON UNIDO & LITTLE-MIRRLESS (L+M) METHODS OF PROJECT APPRAISAL**

The two methods most frequently used in project appraisal are UNIDO and Little-Mirrless Methods developed in the early 1970s and published in 1972 and 1974 respectively (See selected references). The basic features of these two methods and a numerical presentation of NPV calculation using the methods are presented in this section.

**UNIDO METHOD**

Price or Numeriare is expressed in *domestic prices* with adjustment for divergence between private cost and benefit in UNIDO method. Here consumption is measured in domestic currency.

**L+M METHOD**

Price or numeriare is expressed in world prices, or the 'numeriare' is the dollar, foreign exchange. Domestic and foreign resources are made comparable by giving value at world price to everything (Border prices in general). The import is expressed in Freight on Board while import is expressed in cost, Insurance and Freight.

Calculation of NPV by using the UNIDO and L+M method:

- **Assumptions:**
  1. World Prices measured in $, Domestic Price in Rs.
  2. Shadow exchange rate is Rs. 1.25 or $ 0.8 over Office Exchange Rate.
  3. Standard conversion factor for converting non traded goods into word prices, (FOB) Prices at 0.8 or 1.25.
  4. All output is exported with annual value of $ 3000.0
  5. Foreign exchange component in investment $ 1000.0
  6. Local components in investment (for non-traded goods) Rs. 1000.0
  7. Traded inputs of $ 100 and non traded inputs (land, unskilled labour, water etc.) Rs. 1000.0
<table>
<thead>
<tr>
<th>Year</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNIDO Method</td>
<td></td>
</tr>
<tr>
<td>(Price=Rs.)</td>
<td></td>
</tr>
<tr>
<td>1. Cost of Investment (K)</td>
<td></td>
</tr>
<tr>
<td>a. Foreign Component</td>
<td>1250</td>
</tr>
<tr>
<td>b. Local Component</td>
<td>1000</td>
</tr>
<tr>
<td>Rs. 1000 x conversion</td>
<td></td>
</tr>
<tr>
<td>factor of 1.25</td>
<td></td>
</tr>
<tr>
<td>2. Input cost (C)</td>
<td></td>
</tr>
<tr>
<td>a. Traded Inputs</td>
<td>1250</td>
</tr>
<tr>
<td>b. Non-traded inputs</td>
<td>1000</td>
</tr>
<tr>
<td>(Rs. 1000 x conversion</td>
<td></td>
</tr>
<tr>
<td>factor of 1.25)</td>
<td></td>
</tr>
<tr>
<td>3. Benefit Flow (V)</td>
<td>3750</td>
</tr>
<tr>
<td>4. Net Benefit</td>
<td>-2250</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Price = $)</td>
<td></td>
</tr>
<tr>
<td>b. Local component</td>
<td>1000</td>
</tr>
<tr>
<td>Rs. 1000 x conversion</td>
<td></td>
</tr>
<tr>
<td>factor of 0.8</td>
<td></td>
</tr>
<tr>
<td>b. Non-traded inputs (Rs. 1000</td>
<td>1000</td>
</tr>
<tr>
<td>x conversion factors of 0.8)</td>
<td></td>
</tr>
<tr>
<td>3000</td>
<td></td>
</tr>
<tr>
<td>-1800</td>
<td></td>
</tr>
<tr>
<td>1200</td>
<td></td>
</tr>
</tbody>
</table>


From the above table, using the formula (See A.6. Section)

\[
NPV = \sum_{t=0}^{\infty} \left( \frac{B_t - C_t}{(1 + r)^t} \right) - K
\]

the NPV derived from UNIDO and L+M Methods can be expressed as:

From UNIDO Method: \[ \frac{1500}{(1.1)} + \frac{1500}{(1.1)^2} - 2250 = Rs. 353.2 \]

From L+M Method: \[ \frac{1200}{(1.1)} + \frac{1200}{(1.1)^2} - 1800 = $282.6 \]

**COMPARATIVE CONCLUSIONS**

(a) Both approaches single out values of foreign exchange, saving and unskilled labour as source of distorted price mechanism. So both use accounting prices to correct these distortions.

(b) Both methods use discounted cash flow and calculate NPV.

(c) Both methods advocate explicit allowance for inequality and distribution considerations in project choice through shadow wage. However, in UNIDO, this is done through greater weight to increased consumption for poor than rich which reduces present value of lost consumption. In L+M approach, distribution considerations are dealt with by working out value of standard of living of particular extra workers employed. Extra consumption of the rich may be given no future value and treated as cost to favour labour intensive projects.
USE OF COMPUTER IN COMPUTATION OF VALUES FOR PROJECT APPRAISAL

(a) The microcomputer Software for financial and economic analysis of development projects is known as costhen or costtab developed by the Information and Technology Facilities Department of the World Bank and Investment Centre of the Food and Agriculture Organization. The IBM or compatible micro-computer with a hard-disc and 640 of internal memory under DOS 2.1 or higher version can utilize the package. The package also gives modules for computation e.g. Highway project for Gambia. Technical Training for Bangladesh etc.

(b) Also to compute values separately for different components of Project Appraisal, e.g. NPV, IRR etc. Lotus Worksheet or Windows Excel also have formula facilities. For example, in Lotus (123), the computation of IRR is carried out through/IRR with a guess value for IRR given to the computer. The result for IRR is obtained for the cash flow data entered to the computer.

(c) Gittinger (See selected reference) also gives methods for calculating discount rates, capital cost recovery etc. using simple calculators with memory functions.

(d) The discount rate tables for development projects cash flow analysis are available in most of the publications on cost-benefit analysis.

PROJECT APPRAISAL: THEORY AND PRACTICE

During late 1960s, considerable development of methods of social cost benefit analysis was observed. In 1970s, these methods were applied. There were massive public sector investment booms in many developing countries. But much of the investment yielded little. Thus, the methods proposed raised wide debate and discussion among economists, though the methods were considered practical.

(a) Reasons for decline of interest in Shadow prices and CBA in World Bank

- Actual prices should coincide with shadow values. For public sector projects, a good guideline is to make prices coincide with their shadows.

- Structural adjustment loans and non project loans e.g. development finance corporations account for increasing proportion of World Bank lending.

(b) Nature of Projects

In case of health and education, no economic rate of return is estimated. For example, in Brazil in most cases, the World Bank loan included very few projects with cost benefit analysis. Similar trend was observed also in other countries.

Cost benefit and rate of return calculation seem to be the most useful instruments in case of large Capital-Intensive Public Investment Projects. A minimum rate of return criteria, say 10 percent will help to screen out a number of projects with low IRR.

National parameters, such as discount rates and shadow wage rates should be updated. Use of single accounting rate of interest unvarying by time and country is misleading for parameter estimation. In most cases, as the rate is always 10%, the parameter can substantially vary. Little and Mirrlees argued that some of the methodological components recommended by them for project appraisal were either neglected or inadequately used.

Many environment sensitive projects have controversial cost and benefit valuation. Environmental audit components differ in magnitude with more subjective arguments. This biasness in terms of social cost and benefit valuation is in itself a subjective judgement.

CONCLUSION

Good project appraisal is an essential part of public investment and should be done by planners with their own incentives. Environment for sound project appraisal, and both the favourable intellectual and the political organisational conditions etc. are vital for a sound public investment projects appraisal.

WORKS CITED


