UNIT 4 PROJECT APPRAISAL-II (ECONOMIC FEASIBILITY)

Contents

4.0 OBJECTIVES

The present unit is aimed at orienting you to the practical aspects of the economic feasibility technique. In the process, some steps, necessary to identify costs and benefits have been explained. A detailed discussion on the choice of economic efficiency indicators has also been provided.

By the end of this unit, you should be able to achieve the following objectives:

- a good understanding of the different economic measures and the differences between them;
- a proper identification of the costs and benefits stream; and
- the right use of decision criteria for appraisal.

4.1 INTRODUCTION

During the course of our discussion in the last unit on technical feasibility analysis, the concept of economic efficiency was introduced to you. The emergence of the financial institutions (national and international) as the major suppliers of credit for financing capital expenditures in rural areas has made it imperative for appraising the project proposal for better results. The primary consideration, no matter who initiates the proposal, is to choose the most advantageous alternative or proposal for implementation. The present unit attempts to provide an understanding of the theoretical foundations of the method of economic feasibility analysis. However, a special emphasis is laid on developing insights into their use at the Block level. There is, therefore, a clear bias in this unit towards providing an answer to the question, "How to carry out an economic feasibility analysis"?

4.2 ECONOMIC FEASIBILITY: WHAT, WHY AND HOW

Economic feasibility analysis is a quantitative measurement of economic efficiency of feasible project variants. This analysis is carried out so that one

of the variants could be chosen on the strength of its superiority over the others. Economic analysis serves to quantify differences between alternatives and reduce them to a basis, which enables project comparison. The importance of the use of these methods, however, varies with the alternatives under consideration.

Thus, project economic analysis involves techniques for comparing and deciding between alternatives on the basis of monetary or economic desirability. The use of these techniques is vitally important, for there is much to be gained or lost by virtue of the particular alternative chosen. Let us, therefore, examine these concepts to develop an answer to the question: How the economic analysis should be carried out?

Economic Efficiency

You must have realized by now that the central and eventual purpose of economic analysis of project proposals is to work out efficiency measures. Obviously, the question which arises here is: what are economic efficiency measures?

Economic efficiency is derived from the primary categories of inputs and outputs of the project. A derivation becomes possible only when input and output quantities have been converted into their respective values by multiplying them with respective prices or unit values.

A necessary and indispensable condition for derivation of economic efficiency, therefore, is that the price or unit value of inputs, and outputs must be given. Being a derived value concept, an economic efficiency measure represents or stands for a relation. At this point you must ask the question: What is this relation? Or alternatively, how is this relation expressed?

Fundamentally, this relation can be expressed in two possible ways:

a) as a difference of value sums of inputs and outputs, and

b) as a ratio of output to input value sums.

It clearly follows from this that for any project, there could be two fundamental measures of its economic efficiency, one given by the **difference** and the other by **ratio** of the relevant value sums. While the first gives the **absolute** measure, the second gives the **relative** measure of a project's efficiency.

When there are more than one project variants to choose from, and indeed this is the general case, it is the relative measure of efficiency that ranks the project variants according to higher and lower efficiency and enables the project team to choose that variant, which ranks first in the list.

Check Your Progress I

Notes: a) Use the space provided for your answer.

b) Compare your answer with the text.

Can you think of differences in efficiency measures? If yes, explain why?

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i) **Differences in Efficiency Measures (Private and Social):** Different economic agents value the same things differently because their goals, objectives or motivations are usually different.

Take for instance a dairy project where one of the project is straw for feed. A peasant who participates in the project may have to buy a part of his straw requirement from other peasants at the prevailing market price of straw in or around his village. The value of this input for this individual peasant is the quantity of straw purchased multiplied by the price paid.

Consider now the value of the straw input to the project from the angle of all the peasants, that is, from the angle of the society as a whole. Straw is a by product of agriculture and it has hardly any other use. Therefore, for society, the value of the straw input to the project is virtually nil.

The difference in the value of straw input alone will be different in the two cases. While in the first case, the estimate will give a measure of the project's private economic efficiency, in the second case, it will give its social economic efficiency.

This type of difference occur irrespective of whether the proposed investment in the project is wholly private, public or any shade between the two. All these types of project investments occur in our country because of the mixed economy with various forms of property ownership.

ii) **Public and Social Economic Efficiency Measure:** There is also a difference between public and social economic efficiency. The public is identical with the state and with that of the agencies of the state. But the state is not identical with society; therefore, the public and social are not identical. To further clarify the difference, let us think of the proposed investment in the dairy project as wholly public and let the project be run and managed by a public agency. The goal of the public agency is to produce and supply milk at competitive prices to a city population, otherwise served by private suppliers. Straw is once again an input to the project.

The management, like the individual peasant, has to buy its straw input requirement from the nearby peasants at the prevailing market price in the area or buy it elsewhere and transport it to the animal shed in the project area. The value of this straw for the public management agency of the project, similar to that of the individual peasant, is the quantity purchased multiplied by the price paid.

But, for society, for the reason given earlier, the value of the straw input to this wholly public project remains nil. Therefore, for this difference in the value of the straw input alone, other things being the same, the public economic efficiency

measure of the project would be quite different from its social economic efficiency measure.

In conclusion, we can say that for any project, there are different measures of its economic efficiency. These relate to the economic agents or institutions involved in the project, be they private, public or any other.

The same conclusion applies if output values are considered, since different economic agents and institutions may value the same project output differently.

There are some pure public investment projects belonging generally to social infrastructural sectors and to the field of science and technology, whose output and services are provided to consumers free and whose output are very difficult, if not impossible, to measure in value terms. The relevant measure in such cases is the social efficiency for choosing among the available variants. This is indicated by the comparative social costs of the variants under the supposition that the value for services from the variants is the same and equal to one, whatever meaning may be assigned to one. On this basis, the variant with minimum social cost is the most efficient.

Costs and Benefits

The focus of the foregoing discussion is clearly on the costs and benefits of a project. Costs and benefits of a project are derived from its input and output values. Differences in input and output values, according to the agents and institutions involved, naturally lead to differences in the private, public and social costs and benefits of a project. Therefore, a proper identification of the costs and benefits stream becomes the primary task for any project formulator.

At first it might appear to you that no matter who incurs them, input values together constitute project costs. Similarly, no matter to whom these accrue, all output values together constitute project benefits. There are, however, two factors, which make a difference. First, from the social angle, a negative output value, the value of socially undesirable or harmful product constitutes a social cost of the project. A negative input value, therefore, constitutes a social benefit. Second, from the private and public angle, besides input costs, the project may involve incurring of non-input costs on the one hand and receiving of non-output benefits on the other. Input costs are traditionally described as real resource costs to the material transformation process within the scope of the project.

Let us examine the concept of non-input costs and non-output benefits for easy identification.

i) **Non-input Private or Public Costs:** The non-input private or public costs are of two types:

a) ***Taxes and Duties*****:** Payments for rights of the state, such as excise and customs duty, royalty, sales tax, development duty, tax on profit, land revenue and payment for private rights like rents, patent charges and brand names.

b) ***Sales Promotion Charges*****:** Payments for promoting sales of project outputs like advertising and commissioning of marketing agents.

There is, however, much debate about the treatment of depreciation and interest

charges on the installments of loans, all of which give the appearance of being non-input costs from the private or public angles. Therefore, a proper approach in dealing with these items must be clearly described.

Depreciation is a financial accounting mechanism employed by private and public industrial firms to show how much physical capital assets have been used during an accounting period. While management may record depreciation of an asset as a cost in its annual balance-sheet, it should never be forgotten that the cost of the asset (an input cost) was incurred at the time of acquiring it.

The inclusion of depreciation charges in the private or public cost would, therefore, mean double counting of the input cost of the asset in point. Hence, depreciation is irrelevant for assessing a project's economic cost, public or social. But depreciation is very relevant for assessing the financial viability of a project, as depreciation charges are available to management as a source of funds.

Similar is the case of repayment of loan installments. Since the cost of an asset has been incurred when acquiring it, showing repayment as costs would again mean double counting. Once again, however, repayment of installments is relevant for analyzing the financial viability of the project.

It should also be noted in this context that in the financial balance-sheet or in the cash flow statement of the project, while repayments of installments are shown as expenditure, the loan amount outstanding is shown as receipts, thus avoiding double counting. In economic accounting, the asset cost simply takes the place of the equivalent loan.

Interest is truly a non-input cost, a payment for ownership rights of investible funds. Those who save and advance loans for investment in private or public projects must be compensated for the sacrifice of consumption, while they advance funds. But one of the central concerns for making a project economic analysis from the private or public angle is primarily to check whether the project would generate sufficient returns to be able to pay interest on the capital borrowed. Precisely for this reason, interest has to be kept out of the private or public economic cost of the projects. Adopting this practice, the project evaluator should be able to show that the project's private or public rate of return is greater than the relevant rate of interest. This would simply mean that the project is worthy of being undertaken.

ii) **Non-output Private or Public Benefits:** You may, on the other hand, also find that some of the projects have non-output benefits from the private or public angles. These may be in the form of rebates and exemption from states taxes and duties of various kinds, subsidy on sales and procurement or purchase of output at a support price. Perhaps you can now visualize the group of non-output benefits accruing to a private or public agency. You must also be able to understand the effect of such concession on the project output.

Well, the effect is an increase in the net value of project output compared with the net value. This takes place only if the net output value had been assessed at the open market price inclusive of taxes and without the subsidy and support through State purchases.

In brief, the private or public total cost of the project, thus, comprises direct

input and non-input costs incurred by the private or public agency concerned. The total benefits, on the other hand, comprise direct output and non-output benefits received.

The net of total benefit over total cost from the private or public angles gives us the net revenue, income, earnings, profit, surplus, etc.

The general rule, therefore, for getting at respective costs and benefits of the project is: Whatever is to be paid by way of input and non-input expenditures would go as costs and whatever is to be received by way of output and non-output revenues would be identified as benefits. These would be applicable to the private or public agency goals.

iii) **Social Costs and Benefits:** In regard to social costs and benefits of the project, you may face a situation that is simultaneously simpler and more complicated.

Check Your Progress II

Notes: a) Use the space provided below for your answer.

b) Compare your answer with the text.

c) It is expected that you will answer without consulting the text.

Perhaps you can spend some time to reflect on the question and enlist at least one reason why the identification of social costs and benefits should be simultaneously simpler and more complicated.

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The process of identification is simpler because our attention is now confined to input and output related costs and benefits alone. There are no non-inputs costs and non-output benefits of the project from the society's angle.

The complication arises because input costs and output benefits have to be traced both directly and indirectly. It not only has to be directly incurred or generated by the project, but also indirectly, elsewhere in the economy, by other projects, as a consequences of this project's presence. These are generally described as external effects, which may be external economies or diseconomies.

The accompanying Table 1 has been designed in a format especially for the

Block level planner. The Table facilitates easy identification and accounting of social costs and benefits of project.

Table 4.1: Identification and Accounting Table for a Project's Social Costs and Benefits

Item Number	Items of Costs and Benefits	Illustrative Example	Remarks
1.0	**Input Costs** (inputs used)		
1.1	**Direct** Input use		For the production of the project outputs
1.2	**Indirect** Input use	Pollutants and Costs of their neutralization	For prevention or neutralization of harmful outputs
1.2.1	By the project internally		
1.2.2	By other project externally		
2.0	**Input Benefits** (inputs saved)		
2.1	**Direct** Saving of input out of displaced project	Feeds used for indigenous cow, when the latter is displaced by crossbred cow	This benefit accrues to the project.
2.2	**Indirect** Saving of inputs by other project externally	A canal project's effect in reducing operating inputs of existing tube-wells in the command area due to rise in water tables	This benefit accrues to other projects
3.0	**Output Benefits** (desirable output generated)		
3.1	**Direct** Output of primary goods or services from the project		
3.1.1	Output of **Secondary** goods or services from the project	Education, health, housing facilities for workers at the project site, on job skill formation, i.e. learning by doing, use of the project road by local inhabitants, otherwise meant for carrying materials to the project site	These benefits may partly accrue internally to the project and partly externally outside the project
3.2	**Indirect** Increase in output or output value of other project for	Increase in precipitation or soil conservation	This benefit accrues externally to other projects

Item Number	Items of Costs and Benefits	Illustrative Example	Remarks
	the same levels of input use	resulting from an afforestation project and, in turn increasing agricultural yield in the vicinity, extension of railway line through an agricultural region	
4.0	**Output Costs** (undesirable outputs generated or desirable output costs)		
4.1	**Direct**		
4.1.1	Output of undesirable products from the project	Pollutants and effluents from industrial projects, milk and manure from indigenous cow displaced by crossbred cow, fish catch by traditional sail boats displaced by mechanized trawlers, earthen pottery by China clay pottery, etc.	The cost to prevent harmful effects may or may not be incurred either internally or by other projects. If it is actually incurred then it is accounted under item Nos. 1.2.1 and 1.2.2
4.1.2	Loss of output of displaced project		
4.2	**Indirect** Loss of output by other projects	Loss of agricultural output from waterlogged agricultural land as a result of canal irrigation project	
5.0	**Total Social Cost:**	[(1.0+4.0) – (1.2.1+1.2.2)]	Provided cost items 1.2.1 and 2.1.2 have been accounted under 1.0
6.0	**Total Social Benefits:** (2.0+3.0)		
7.0	**Net Social Benefits:** (6.0 – 5.0)		
8.0	**Displaced Net Benefits:** (4.1.2 – 2.1)		These are directly displaced by the project
9.0	**External Social Costs:** (1.2.2+4.2)		
10.0	**External Social Benefits:** (2.2+3.2)		

Item Number	Items of Costs and Benefits	Illustrative Example	Remarks
11.0	**External Net Benefit:** (10.0 – 9.0)		
12.0	**Net Social Benefit of the project** (7.0) – (3.1 – 1.1)+ (10.0 – 9.0) – (8.0)		The net social benefit is the direct net benefit of the project plus the direct net external benefit minus the net benefit displaced by the project

The Table is self-explanatory and illustrative. Some basic facts, however, need to be pointed out, these should be kept in mind, while identification is carried out for social costs and benefits.

First, the pattern of social benefits differs with the nature and type of projects.

Second, the actual amount of cost or benefit shown against specific item heads for any project, especially under the indirect external costs and benefits category, may turn out to be negligible or nil. Some of these may not even be measurable or may be difficult to measure. It should not be deleted beforehand, as it is likely to cause incomplete identification and one may indeed miss the significant social costs or benefits of the project.

Third, it is in general difficult to keep within narrow limits the external social effects of a project, because, any new project is like a pebble thrown into a pond, which causes waves all around. The maximum impact is naturally felt around the point of impact. As one moves away, the waves become weaker and the impact declines, until it becomes imperceptible. Similar are the social external spread effects of project. For social cost benefit calculations, even if the circle effects are captured, this would not be a mean achievement.

Finally, the statement in the last row of the Table provides a check on the statement in row (7.0), which gives the net social benefit of the project.

4.3 ROLE OF TIME IN ECONOMIC APPRAISAL

Time is an essential feature of almost every aspect of a project. As we have seen in a preceding unit, every project has an economic life starting with the first year of construction and extending up to the year in which it is scrapped. At the time of preparing its blue-print and its appraisal, its life lies wholly in the future. This means that project inputs, outputs and also direct or indirect costs and benefits are all future dated.

The project profile is accordingly a future time sequence of inputs and outputs, of costs and benefits running over its life. There are two immediate consequences of this feature of the project profile. These consequences, therefore, must be properly assessed.

Present and Future Economic Values

This consequence pertains to costs, benefits or their components, even of same amounts, but occurring at different dates because they do not have the same present value. Let us explain this concept of present and future values with some illustrations.

i) ***Present value*:** The present value series are independent of time and, therefore, ordinary arithmetical operations can be performed with ease.

This being the case, the sum of the present value series of costs and benefits gives us the total present value of the project's costs and benefits. The difference between the benefit and cost sum gives us the present value of net benefits or net present value of benefits. Therefore, when we are assessing the social costs and benefits of a project in the format of Table 4.1, this table will have a time dimension column at its right, giving how many years the project's life is expected to be. When the entries in each row have been discounted at the social rate of discount, we shall have the corresponding present value series.

The sum of this series will give us the total present value under respective heads. It is easy to see that the sum of the present value series corresponding to row (7) or row (12) of Table 1 will give us the net present value of benefits of the project. Exactly similar is the case when project costs and benefits are viewed and estimated from the private or public angles. But the question remaining to be answered is, how does one obtain a present value series of costs and benefits when the project life lies in the future?

ii) ***Future value*:** Just as the saying goes that a bird in hand is better than two in the bush, a rupee's worth of benefit received five years hence (from now into future) has far less value than if received now. The farther away in the future a rupee of benefit lies, the lower is its present value. The position is the same with respect to cost, which is actually negative benefit. And it happens because all of us – individuals, institutions and even society as a whole – discount the future *vis a vis* the present.

In other words, we attach less and less weight (importance) to a unit of benefit or cost the farther and farther it occurs in the future, and the rate at which these weights decline is called the rate of discount. Private individuals with a limited span of life discount the future at a rate higher than that at which society or government would do. Such a difference in discounting of future gives rise to different private and social rate of discount.

The future time sequence of project costs, benefits and their components, whether private, public or social can, therefore, be converted into a corresponding present value series, provided we are given the relevant rate of discount.

Now, the most important question in the process of project appraisal revolves around the discount rate. One has, therefore, to decide as to what rate of discount should the utilized.

So far as private and public discount rates are concerned, the rates of interest at which the public project agency, private individuals, households or firms would borrow or lend investible funds, in part or whole, provide the appropriate substitutes for these rates of discount. For illustration, suppose a State government or a public sector agency borrows investment funds for a project from the National Bank for Agriculture and Rural Development (NABARD) and, in turn, relends a part of the borrowing to rural households, which show their keenness to participate in the project by agreeing to make the

complementary private investment, partly financed by their own savings and partly by loans.

Let us further suppose that the borrowing rate of interest is 5 per cent and the relending rate is 7 per cent. Therefore, it can be said that relevant rate of discount for public costs and benefits of the project is 5 per cent, whereas it is 7 per cent for the private costs and benefits.

Why is it so?

This is because the relevant discount rate is the corresponding interest rate working in reverse. For a 5 per cent rate of interest Rs. 100 (present value) will become Rs. 105 a year from now (future value). On the reverse, Rs. 105 at cost (benefit) a year from now, at 5 per cent rate of discount will be worth Rs. 100 now.

Another point worth noting is that the value of the discount factors is indeed the weight attached to a unit of future cost or benefit by the parties concerned. The larger the value of the farther in the future is the year, the smaller is the value of the discount factor or the weight attached to a unit of cost to the incurred or benefit to be valued in the future year.

When it comes to finding the present value of future social costs and benefits of the project, we require a social rate of discount. This also is national parameter, the value of which is supposed to be given by the national planning agency. In the event that the national agency fails to give a single value of this parameter, the project team should use a range of values.

Uncertainty about Estimates

The second consequence is that an area of uncertainty would exist around the estimate of almost everything of relevance to the project, be it the construction period, the economic life of the project, estimates of inputs, outputs, prices, costs, benefits or their components. Given the knowledge, experience and information available, the project team, it is assumed, would try to prepare the best estimates of the quantities and values involved.

It has been observed that the best estimates go wrong more often in respect of cost and benefit values, which, among other things, depend upon prices of inputs and outputs. The price of an input may shoot up in future due to unforeseen causes, pushing up the investment or the operating costs as the case may be. Similarly, the demand for the project output may fall and push down its price, reducing the output benefit in the process. It must be admitted that by the very nature of uncertainty problem, there is no readymade formula or completely satisfactory method to handle it. All that one can possibly do is to ask (i) how badly the present value of net benefit of the project will be affected because of the uncertainty surrounding the estimate of any one of the variable or a whole set of variables and (2) whether the project would still remain within the acceptable range.

In operational terms, this means performing a sensitivity test on present value of net benefit with respect to possible change – anticipated on the basis of objective information and one's subjective judgment – that are likely to occur

in the estimate of one or other variable as a result of uncertainty surrounding the variable. This is known as sensitivity analysis. This analysis, however, is not suited when uncertain effects of many variables have to be considered simultaneously because uncertain effects get compounded. These can be compensatory or self-cancelling. Nevertheless, uncertainty remains.

According to this test, for a relative change in the estimate of an uncertain variable, say 5, 10 or 20 per cent change upwards or downwards, as the case may be, you have to recompute, other things remaining unchanged, the present value of net benefit. Supposing a 5 per cent change in the variable's estimate makes a 20 per cent change in the present value of net benefit, the conclusion is that the project is highly sensitive to future changes in this particular variable. On the contrary, if the change in the present value of net benefit is of a minor magnitude so that it does not affect either way the viability of the project, the obvious conclusion is that it is insensitive. Where sensitivity is high, the project may require recasting or may even be abandoned if the changed present value of net benefit becomes negative.

Activity I

The importance of a sensitivity analysis can be easily understood from field experiences. You are required to list at least five estimates of different types where differences have been observed between the original and mid-point estimates. Give reasons for these observed differences.

Notes: a) Use the space provided to list and explain in two lines each your reasons for listing.

b) Check your answer with the tutor-counsellors during the contact programme.

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4.4 CHOICE OF ECONOMIC EFFICIENCY INDICATORS (DECISION CRITERIA)

You may recall that there are two types of economic efficiency measures, viz., absolute and relative. Therefore, it becomes pertinent to examine the merits and demerits of different indicators. This examination will equip you with skills to choose the right indicator of economic efficiency, which would result in the

ultimate selection of your project proposal. Thus you must be fully equipped to know 'when' and 'where' to use 'which' indicator.

Present Value of Net Benefit (PVNB)

The present value of net benefit is an index of economic efficiency of investment project. As already noted earlier in the present unit, the present value series of project costs and benefits give us an absolute measure of worthiness or efficiency of the project in point. So long as our attention is confined to a single project, or two or more projects whose present value of costs (PVC) are the same, this index or criterion of choice among projects remains adequate.

But in the more general case, when there are many projects with different PVCs, this absolute measure fails to produce a correct choice among project variants.

Benefit-Cost Ratio (B/C Ratio)

In the case of more than one competing projects with different costs, a relative measure of efficiency or index of worthiness becomes necessary for making the right choice. The ratio of Present Value Benefit (PVB) to PVC, in short, the benefit-cost ratio (B/C Ratio), provides such a measure. It essentially gives the benefit per unit of cost.

The benefit cost ratio criterion states the following decision making rule:

i) In the case of single project, choose it if its B/C ratio is one or greater than one.

ii) In the case of many projects, rank the projects in descending order of their B/C ratio.

Internal Rate of Return (IRR)

It should be noted that the present value of net benefit, and so also the benefit-cost ratio of a project, can be estimated only if appropriate rates of discount are known or given. In a situation where the social rate of discount is not given, the only alternative left for the project team is to discount the time sequence of social costs and benefits at rates of discount upward of zero and find, at each rate, the difference between the sum of PVB and sum of PVC, or in other words, NPVB. If, at a particular rate of discount, one finds NPVB to be positive, one chooses the next higher rate of discount and finds the corresponding value of NPVB again. The process is repeated until that rate of discount is reached at which NPVB equals zero. This rate of discount is called the Internal Rate of Return (IRR) of the project.

Why is it known as Internal?

Internal, because it emerges peculiarly just from the cost benefit data of project, external aid not being necessary, as in the case of the first two criteria.

Why Rate of Return?

Rate of return, because it is indeed per unit yield on the investment cost of a

project. IRR, as a criterion of choice among competing projects, suffers from two shortcomings.

i) It is biased in favour of quick yielding projects.

ii) The choice is not always consistent with the choice made on NPVB or B/C ratio criteria.

Let us illustrate these shortcomings. Suppose there is a provision of Re. 1 of investment and there are two alternative projects A and B. A is quick-yielding and offers Rs. 3 of benefit in the third year, while B is a long-gestation project with a promise of Rs. 10 of benefit in the tenth year. The IRRs, of A and B, alongside their NPVB and B/C ratio at 15 per cent social rate of discount, is given in Table 4.2.

Table 4.2: IRR, NPVB and B/C Ratio of Alternative Projects A and B

Year	(0)	(1)	(2)	(3) ... (10)	IRR (per cent)	At 15% Social Rate of Discount	
						NPVB (Rs.)	B/C
Project A							
1) Investment cost (Rs.)	1	0	0	0 0	44.0	0.97	1.97
2) Benefit (Rs.)	0	0	0	3 0			
Project B							
1) Investment cost (Rs.)	1	0	0	0 0	25.5	1.47	2.47
2) Benefit (Rs.)	0	0	0	0 10			

According to the IRR criterion, the quick-yielding project A should be chosen, as it offers a higher IRR. This choice is, however, contradicted if the choice was made on NPVB or B/C ratio criteria as, according to these, the project B should be chosen.

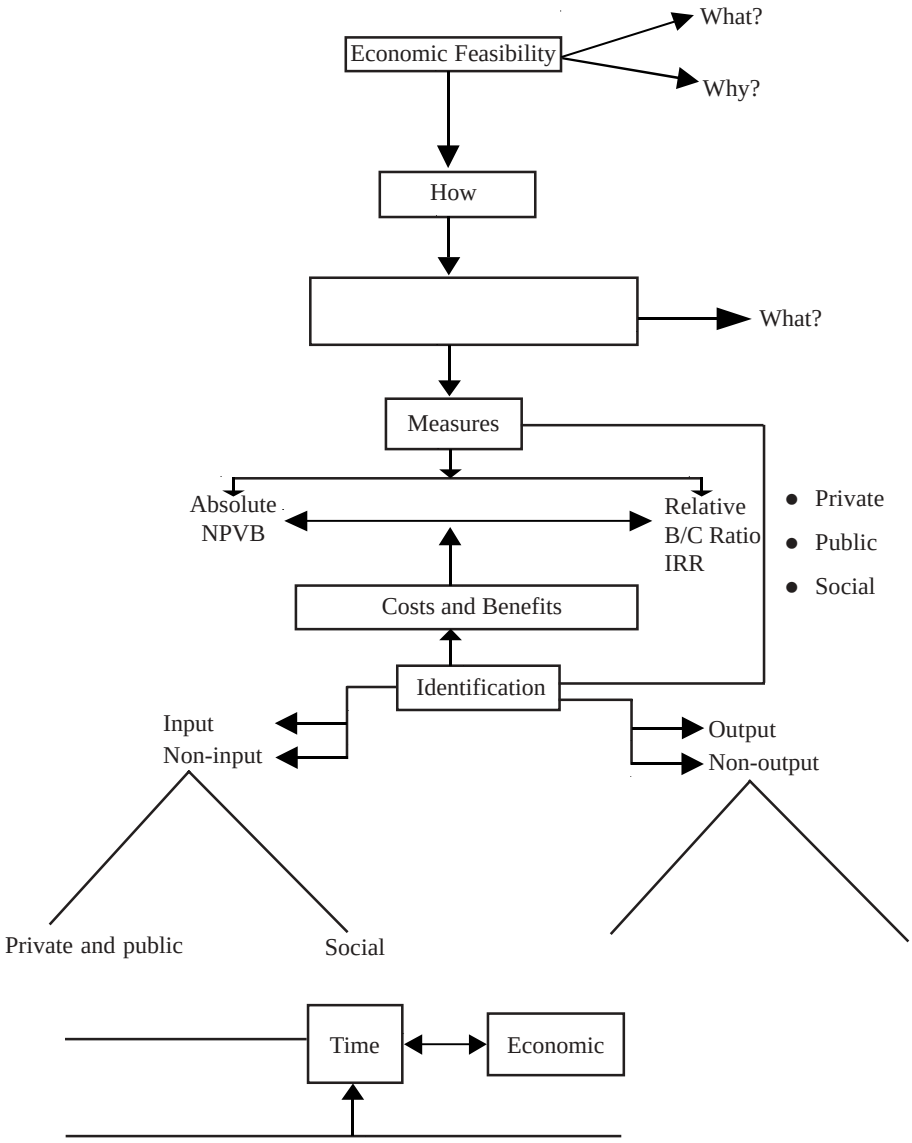
Even apart from these shortcomings, IRR by itself does not provide a complete decision rule for affecting a choice. For it requires a standard of comparison, a predetermined private or social rate of interest at which the investment funds are borrowed or made available. Thus, overlooking its already discussed shortcomings, IRR is a suitable criterion of choice only among those projects, which depend upon borrowed funds at stipulated rate of interest.

Check Your Progress III

Notes: a) Use the space provided below.

b) Compare your answer with the text.

Complete the following schematic representation of the main features of the unit.



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4.5 LET US SUM UP

The rationale of different economic measures have been discussed in the preceding paragraphs. It is very pertinent now to sum up and demonstrate how in a sequence of steps, a project team can assess the economic efficiency of projects in practical cases. The steps are as follows:

Step 1: For any technically feasible project belonging to a non-social service infrastructural sector, identify and list the private persons and institutions required to make complementary or supplementary investment in the project besides the public sector institution that would be in charge of public sector.

Step 2: For a technically feasible project belonging to the social service infrastructural sector, go straightaway to step (7).

Step 3: Following step (1) prepare year-wise sequences of costs and benefits over the expected life of the project separately for each institution in the list. If the number of private persons and institutions to be involved is large, select a typical case or representative person and institution from each group and prepare the cost and benefit statements only for them. When both poor and non-poor private persons and institutions are involved, select one typical or representative case from each of these groups for this purpose.

Step 4: For any year of project life, assess the input cost and output benefits at the base year constant prices of inputs paid and outputs received. Then, add to these the expected non-input costs to be incurred and the expected non-output benefits to be received by the typical person or institution concerned.

Step 5: For a typical person or institution concerned, discount cost and benefit sequences at the rate of interest at which loan is to be given or funds borrowed to meet the whole or part of the investment requirement.

Step 6: For every typical representative person and institution involved, calculate NPVB and B/C ratio using the discounted series of corresponding benefits and costs.

Step 7: Prepare a year-wise sequence of social costs and benefits over the expected life of the project with the help of the format given in Table 1. Note that all inputs used or saved and all outputs generated or displaced, irrespective of the persons and institutions concerned, private or public, have to be included in assessing the social costs and benefits.

Step 8: For any year of project life, assess the values of social costs and benefits at the base year with constant market prices of the inputs and outputs, but these prices should be net of all commodity taxes, excise, customs duty, sales tax, etc.

Step 9: Discount social costs and benefits at rates of discount greater than zero. At each rate of discount, work out the social NPVB and B/C ratio. Continue the process until NPVB equals zero and B/C ratio equals one.

Step 10: Replace market prices of inputs and output by their respective social (accounting or shadow) prices and repeat step (7 to 9). If the ratios of social to market prices are available, the social values of the corresponding inputs and outputs are obtained by multiplying the amounts assessed at market prices by the respective ratios. Frequently, not all market prices may have to be replaced. In fact, the focus should be on material inputs, unskilled labour and foreign exchange components of inputs and outputs.

Step 11: If it is possible to estimate the share of savings in NPVB as computed at social prices, work out present value of aggregate consumption, provided, of course, that the shadow prices of investment have been given by the national planning agency. If these are not given, skip this step.

Step 12: If project investment is already earmarked for the poor, step 11 can be omitted. This is because projects for the poor will compete only

among themselves for the funds earmarked for such projects. The relative positions of the competing projects remains unchanged.

Step 13: Perform sensitivity tests on NPVB as computed through step (10) with respect to uncertain variables to make sure that, in spite of uncertainty, it will remain positive, this step should be carried out immediately after step (10).

In these 12 steps, the appraisal of economic efficiency of the project should be completed. It must, however, be noted that the estimates of socio-economic efficiency measures of the project, be it NPVB, B/C ratio or IRR, made steps 7 to 10, would have incorporated the project's contribution to the three major plan objectives: increased income, increase in employment and national self-reliance.

NPVB is an index of increased income, so also are the related indices, B/C ratio and IRR. Social prices of unskilled labour and foreign exchange take care of the contribution to employment and national self-reliance objectives respectively.

4.6 KEY WORDS

Economic Feasibility	**:**	A quantitative measurement of economic efficiency of feasible project variant.
Benefit-Cost Ratio	**:**	The ratio of present value of costs to present value of benefits.
Depreciation	**:**	Loss of value in an asset due to use, wear and tear, ageing, etc.
Discount Rate	**:**	The rate at which a reduction is made in the future value.
Internal Rate of Return	**:**	The rate of discount at which the NPV (Net Present Value) equals zero.
Marginal	**:**	Pertaining to the last additional unit, positive or negative.
Sensitivity	**:**	Degree of showing the effect of positive or negative change.
Shadow Prices	**:**	It is the price, which indicates the real resource value of inputs and/or outputs.

4.7 SUGGESTED READINGS

Mishra, S.N. (1984), *Rural Development Planning – Design & Method*, Satvahan Publications, New Delhi (essential reading, especially Chapter 4).