PROJECT MANAGEMENT IN AGRIBUSINESS AND ALLIED SCIENCES

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Projects are the investment activities in which capital resources are spent to create a productive asset for realizing benefits over time. Projects are the cutting edges of development. These are also considered as building blocks of investment plan. Project also refers to specific activity with specific starting point and specific end point to achieve a specific objective. It should be measurable in costs and returns. Agricultural Projects, on the other hand, are defined as the investment activities related to agricultural development in which resources and costs are incurred to create geographical capital assets (Gittinger, 1976). Project is an activity, on which we spend money in expectation of returns with specific priorities for area development and reach specific clientele group. In Agricultural Projects, there is a gestation period, i.e., the time period lapsing between the investment time and returns of the projects. Projects in general are the smallest operational entities or elements planned, formulated, implemented and evaluated as per the project cycle with specified goals of country's economic plans and programmes.

PROJECT APPRAISAL AND EVALUATION TECHNIQUES

When costs and benefits have been identified, priced, and valued, the analyst is ready to determine which among various projects is to accept and which to reject. There is no one best technique for estimating project worth (although some are better than others; and some are especially deficient). The techniques of project appraisal can be discussed under two heads viz., (i) Undiscounted and (ii) Discounted.

Undiscounted techniques: (a) Simple Rate of Return (b) Payback period, (c) Value-added, (d) Capital- Output Ratio, (e) Proceeds per unit of outlay, and (f) Average annual proceeds per unit of outlay

Discounted measures: Under this, Net Present worth (NPW), Benefit-Cost Ratio (BCR), Internal Rate of Return (IRR), N/K Ratio and Sensitivity Analysis, are prominent.

Undiscounted Techniques:

1. Simple Rate of Return: The SRR is a commonly used criterion of project evaluation. It basically expresses the average net profits (Net Cash Flows) generated each year by an investment as a percentage of investment over the investments' expected life. It is as: SRR = Y/I; Where; Y = the average annual net profit (after allowing depreciation) from the investment, I = the initial investment.

2. Pay Back Period: The payback period refers to the length of time required to recover the capital cost of the project. In other words, it is the length of time from the beginning of the project until the net value of the incremental production stream reaches the total amount of capital investment (Net value of incremental production = value of incremental production less O&M, production cost). The formula used to work out the payback period is**:** P = I ÷ E, where, P = Payback period of the project in years

I = Investment of the project in rupees, E = Annual net cash revenue in rupees

Or,

$$\textbf{Pay Back Period (PBP)} = \sum_{t=0}^{n} \textbf{Rt} > \sum_{t=0}^{n} \textbf{Ct}$$

Where; Rt= Return in period t, and Ct is Cost in period t.

According to this criterion, the shorter the period for recovery the more profitable is the project. This criterion has two important weaknesses, viz.,

a) It fails to consider earnings after the payback period and

b) It does not adequately take into consideration the timing of proceeds.

3. Value-Added: It is the amount of economic value generated by the activity carried out within each production unit in the economy. In any production unit, value-added is measured by the difference between the value of the output of the firm and the value of all inputs purchased from outside the firm. The capital and labour attached to each firm are considered internal inputs. Thus, value-added is the value that has been added by the labour and capital of the enterprise to the economy. Gross value-added includes payment for taxes, interest, rent, profits, and reserves for depreciation. Deducting depreciation gives the net value-added. The sum of all the net value-added is referred to as net domestic product. So the more the value added by the project, the more it will be justified economically.

4. Capital-Output Ratio: The capital-output ratio is defined as the average value-added produced per unit of capital expenditure. Projects with low capital-output ratio are favoured.

5. Proceeds per Unit of Outlay: It is calculated by dividing total net value of incremental production by the total amount of investment. So, the higher the proceeds per unit of the outlay, the higher is the economic viability of the project. This criterion does not take into consideration the time value of money.

6. Average Annual Proceeds per Unit Outlay: To calculate this measure, the total of the net value of incremental production is first divided by the number of years during which it will be realized and then this average of annual proceeds is divided by the total capital cost. So if average annual proceeds per unit of outlay are high, the project will be economically justified for implementation.

Discounting Techniques:

Discounting techniques take into account the time-value of money. Discounting is essentially a technique by which one can 'reduce' the future benefit and cost streams to their present worth. The technique of discounting permits us to determine whether to accept or reject the projects for implementation that have obviously shaped time-stream, that is, patterns of when costs and benefits fall during the life of the project, when they differ from one another and are of different durations. The most common means of doing this is to subtract year by year the costs from the benefits to arrive at the incremental net benefit-stream, the so-called cash flow and then to discount that. Then we may consider the differences between these present worth and determine what discount rate would be necessary to make the net present worth equal to zero (IRR), derive a ratio of present worth of benefit & cost streams and internal rate of return.

1. Net Present Value / Worth (NPW): It is simply the present worth of the incremental net benefit or incremental cash flow. It is the difference between discounted benefits and discounted costs of a project.

$$\mathbf{NPV} = \sum_{\mathbf{t=0}}^{\mathbf{n}} \frac{\boldsymbol{R_t - C_t}}{\boldsymbol{(1+r)^t}}$$

Where; NPV = net present value from project

Rt = returns received from project in year t

Ct = costs of project in year t

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---------- = discount factor at interest rate '*r*' *p.a.*

$1 + r^{(t)}$

NPW criterion suggests to us to accept all independent projects with a zero or greater net present worth when discounted at opportunity cost. No ranking of acceptable, alternative independent project is possible with the present worth criterion because it is an absolute and not relative measure. A small, highly attractive project may have a smaller net present worth than a larger marginally acceptable project. If both have positive NPW then both projects should be undertaken. It is because of lack of funds we cannot undertake both; the complication is that the opportunity cost of capital has been estimated to be too low. Then the correct response is to raise the estimate of opportunity cost until we have only the selection of projects with NPW that are zero or positive and for which, in fact, there will be just sufficient investment funds.

2. Benefit-Cost Ratio (BCR): This ratio is obtained when the present worth of the benefit-stream is divided by the present worth of the cost-stream. Note that the absolute value of BCR will vary depending on the interest rate chosen. The higher the interest rate, the smaller the resultant benefit-cost ratio, and if a higher enough rate is chosen, the benefit-cost ratio will be driven down to less than 1.

The BCR criterion suggests to us to accept all independent projects with a benefit-cost ratio of 1 or greater, when the cost and benefit streams are discounted at the opportunity cost of capital. The benefit-cost ratio discriminates against projects with relatively high gross returns and operating costs, even though these may be shown to have a greater wealth-generating capacity than that of alternatives with a higher benefit-cost ratio.

$$\textbf{Benefit} - \textbf{Cost ratio} = \frac{\textbf{\textit{Present worth of grass returns}}}{\textbf{\textit{Present worth of costs}}}$$

$$BCR = \frac{\sum_{t=1}^{n} \frac{b(t)}{(1+r)t}}{\sum_{t=1}^{N} \frac{c(t)}{(1+r)t}}$$

3. Internal Rate of Return (IRR): It is the discount rate that makes the NPW of the incremental net benefit-stream or incremental cash flow equal to zero. It is the maximum interest that a project could pay for the resources used if the project is to recover its investment and operating costs and still break even. It is the rate of return on capital outstanding per period while it is invested in the project. IRR criterion suggests to us to accept all independent projects having an internal rate of return equal to or greater than the opportunity cost of capital. One cannot simply choose that discount rate which will make the incremental net benefit-stream equal to zero. There is no formula for finding the internal rate of return straightaway. We are forced to resort to a systematic procedure of trial and error to find that discount rate which will make the net present worth of incremental net benefit-stream equal to zero. The most difficult aspect of the trial and error procedure is making the initial estimates. If the estimate is too far from the final result, then several trials will have to be made to find two rates close enough together to permit accurate interpolation (interpolation is the process of finding a desired value between two other values).

The formula of interpolation is given below:

$$\mathbf{IRR} = \sum_{t=0}^{n} \frac{R_t - C_t}{(1+r)^t} = \mathbf{0}$$

IRR = Lower discount rate + Difference between the two discount rates x Present worth of

net cash flow at lower discount rate / Absolute difference between the present worth of net cash flow at the two discount rates.

In practice, it is better not to interpolate between intervals greater than about five percent because the wider intervals can easily introduce an interpolation error.

4. Net Benefit-Investment Ratio (NBIR) (N/K Ratio): NBIR is simply the present worth of net benefits divided by the present worth of investment. To calculate this measure, simply divide the sum of the present worth after the incremental net benefits-stream has turned positive by the sum of the present worth of the negative incremental net benefits in the early years of the project. The reason for calculating the net benefit-investment ratio in this manner is that we are interested in an investment measure that selects projects on the basis of return to investment during the initial phases of a project. If the net benefit - investment ratio is 1 or greater, when we are discounting at the opportunity cost of capital, choose the project beginning with the largest ratio value and proceed until available investment funds are exhausted. It may be used to rank projects in those instances in which, for one reason or another, sufficient funds are not available to implement all the projects. It, thus, satisfies a frequent request of the decision makers that projects be ranked in the order in which they should be undertaken. It is suitable for use when there is incomplete knowledge of all the projects. At any given discount rate we cannot, with confidence, use the net present worth, or the internal rate of return, or the benefit-cost ratio as ranking measures; our criterion tells us only to accept all projects, which need the selection criterion for those three measures. The net benefit-investment ratio is the only measure of the ones we have discussed that can be used with confidence to rank directly.

Sensitivity Analysis (Treatment of Uncertainty)

Several times when the project is under execution, certain things go wrong with the project with the result that the desired benefits cannot be achieved within the stipulated time frame.

At times the actual execution of the project is delayed or the cost exceeds the original estimated cost (cost over-run). In such cases, the results get fairly changed. Many times, the IRR and NPW thus get reduced or the BCR becomes negative from positive. In order to take care of this problem, while the projects are under preparation or under examination, certain assumptions are applied for testing the viability of the project. For example, it is at times assumed that there will be a cost over-run by, say, 25% or a reduction in revenues, say, by 10% or a delay in getting the benefits, say, by three years and so on. Keeping one or two or all such assumptions in view, the streams of costs and benefits are re-drawn and the figures of costs and benefits are discounted and the NPW, BCR and IRR are re-worked out. This gives a fairly good picture as to what will be the fate of the projects if such problems occur. For the sensitivity analysis, it is very essential to carry out such an exercise in projects where high financial stakes are involved.

The criteria adopted to declare a project as worthwhile is that:

- ✓ Payback period (PBP) should not be greater than the investor's desired PBP
- ✓ Net present value (NPV) should be positive and greater than zero
- ✓ Benefit cost ratio (BCR) should be positively greater than unity.
- ✓ Internal Rate of Return (IRR) should be positive and greater than the cost of borrowing.

If all these criteria are fulfilled, then the investment will be justified as profitable and economically feasible (Gittinger, 1976).

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