$$C = A_1/(1+r) + A_2/(1+r)^2 + A_3/(1+r)^3 + \ldots\ldots\ldots\ldots A_n/(1+r)^n$$

Where, C = Initial Outlay at time Zero.

A1, A2,…….An = Future net cash flows at different periods.

r = rate of discount of internal rate of return.

The following steps are required to practice the internal rate of return method.

i. Determine the future net cash flows during the entire economic life of the project.

ii. Determine the rate of discount at which the value of cash inflows is equal to the present value of cash outflows.

iii. Accept the proposal if the internal rate of return is higher than or equal to the cost of capital or cut off rate and reject the proposal if tie internal rate of return is lower than the cost of cut-off rate.

iv. In case of alternative proposals select the proposal with the highest rate of return as long as the rates are higher than the cost of capital or cut-off-rate.

Advantages of Internal Rate of Return Method

(i) Like the net present value method, it takes into account the turn value of money.

(ii) It considers the profitability of the project for its entire economic life and hence enables evaluation of true profitability.

(iii) The determination of cost of capital is not a pre-requisite for the use of this method and hence it is better than net present value method where the cost of capital cannot be determined easily.

(iv) It provides for uniform ranking of various proposals due to the percentage rate of return.

(v) This method is also compatible with the objective of maximum profitability and is considered to be a more reliable technique of capital budgeting.

Disadvantages of Internal Rate of Return Method

In spite of many advantages, it suffers from the following drawbacks.

(i) It is difficult to understand and is the most difficult method of evaluation of investment proposals.

(ii) This method is based upon the assumption that the earnings are reinvested at the internal rate of return for the remaining life of the project, which is not a justified assumption particularly when the average rate of return earned by the firm is not close to the internal rate of return. In this sense, Net Present Value method seems to be better as it assumes that the earnings are reinvested at the rate of firm's cost of capital.

(iii) The results of NPV method and IRR method may differ when the projects under evaluation differ in their size, life and timings of cash flows.

Working Capital is a useful liquidity tool. It is determined by subtracting current liabilities from current assets (CA - CL). For example, the balance sheet shows a CA of $100,000 and CL of $50,000. There is, therefore, $50,000 of working capital. In other words, after paying all the bills, there is still $50,000of working capital left. This is good news.

Quick Working Capital looks at working capital more critically. Its concept is that some current assets are not as liquid as other assets. For instance, growing crops are not as easy to sell as crops in storage. Nor are crops or animals that need a few more weeks of production before they can be sold, compared with items that are ready for market. Nothing is as liquid as cash. Liquid current assets include items that can be sold quickly without a discount. CA - inventory - CL is a useful definition of quick working capital. If, for example, the entire inventory is growing crops, there is only $15,000 in quick working capital (100,000 - 35,000 - 50,000). Thus, the firm is not as liquid as the working capital of $50,000 implied.

Current Ratio also measures liquidity. It is calculated by dividing current assets by current liabilities (CA/CL.) Thus, if the current ratio of a firm at a specific point in time is 1.5, this means that there is $1.50 of current assets for every $1 of current liabilities. Or, there is $1.50 available now to cover every $1.00 of the firm's bills.

The Current Debt Ratio shows what proportion of the entire firm's debt is due in the next period. This ratio is found by dividing CL by total liabilities (CL/TL). Current liabilities are $50,000, and total debt is $550,000.The current debt ratio is, therefore, $50,000/$550,000, or .09. This means that nine cents of every dollar of debt is due in the next period. That is a good number. For an average firm with average debt, the ratio should be no higher than10 cents. Otherwise it will hurt the firm's cash flow in that too much of the firm's cash is earmarked for debt repayment.

Solvency

Solvency is a long-run term. It shows whether the firm can pay all its debts if it sells all its assets. If the firm's assets are greater than its liabilities, it is solvent. If they are not, it is bankrupt. Equity is the single best measure of solvency. If the firm has equity, it is solvent because there are more assets than liabilities. A positive equity trend is a useful indicator of a firm's financial health.

Leverage Ratio

The leverage ratio is calculated by Total Debt/Equity. If the total debt is $550,000,and equity is $450,000. Our leverage ratio here is 1.2.For every one dollar in equity, there is $1.20 in debt. Ideally, this number should be less than 1

Ideally, keep the leverage ratio at no more than 1, and try to reduce it to 0.5 whenever possible. A high leverage ratio is nothing to be ashamed of; it is something to get out of. The following examples show its importance: Suppose, for example, that a firm will get a guaranteed 20 percent return on its assets. It has $4million to invest so at the end of the year it will get$4.8 million (that is, $4 million x 1.2 = $4.8 million).

Putting these numbers onto two balance sheets shows what happened to the firm's financial structure. The firm had no debt. So, its return on its equity was the same as its return on assets, namely 20 percent. The real benefit of borrowing money is that the firm can do things with the money that it could not do

otherwise. Debt availability is essential for any business. Borrowing money creates leverage. There are advantages in borrowing money for investment opportunities. Suppose that the firm only has $1 million, that both assets and equity are $1million and that it has no debt but likes the guaranteed 20 percent return and decides to borrow some money to take advantage of this investment. The bank allows the firm a leverage ratio of 3, so it can borrow $3 for every $1 of equity. The firm now has $4 million in assets and will invest it at 20 percent. The two balance sheets show the starting and ending financial structures.

The $4 million increased to $4.8 million as before because o the 20 percent return on assets. But, with the 3-to-1 leverage, the firm's equity has increased from $1 million to $1.8 million, or by 80 percent. This is the joy of leverage. The ending balance sheet also shows that the leverage ratio fell to1.67. The investment was successful in that the return to equity was substantial, and the leverage ratio fell. Leverage is, of course, a two-edged sword. When things go wrong, the firm is worse off if it has borrowed money. So, the final example illustrates a negative 20 percent return, starting with a leverage ratio of 3. The firm has its original $1 million equity and borrows an additional $3 million as before. But this time it lost 20 percent of its asset value. The two balance sheets show what happened.

Assets fell to $3.2 million (that is, $4 million x0.8 = $3.2 million). The firm still has $3 million in debt. Because assets minus liabilities equal equity, the firm's equity has now fallen to $200,000, or to one-fifth of what it was. And the leverage ratio, which started at 3, has now increased to 15 (that is, 3,000/200). The firm now owes $15 for every $1 it owns. This is an almost impossible position from which to recover. The point of these examples is obvious. High leverage brings high returns if it works, but disaster if it does not work. Consequently, it is not generally good to maintain a leverage ratio in farming that is much above 1.

Conclusion

In conclusion, the balance sheet is the essential tool for illustrating a firm's financial structure. Quarterly balance sheets provide liquidity and solvency information that is vital for mapping a firm's financial future. A firm cannot operate without access to balance sheets. Spend time with them. A firm will gain profoundly.

Time Value of Money

Wealth is created when the market value of the outputs exceeds the market value of the inputs. Or the benefits should be greater than the costs. The value created by the investment is the difference between the Benefits and the costs. Therefore the decision rule obviously is; accept only those investments or financing proposals that enhance the wealth of shareholders ie., accept if [**B-C] > 0.**

However the problem here is how this benefits and costs are to be measured and evaluated. Because the benefits and costs usually occur at different times and over a number of years. This lead us to consider the concept of Time Value of Money. Time value of money implies that money received in the future is usually worth less than today because it could be invested to earn interest over this period.

A sum of money at present worth more than the same amount at some future time. There are a number of reasons for that:

i. **Risk**: One thousand rupee now is certain, whereas the same amount receivable next year is less certain

ii. **Inflation:** Under inflationary conditions, the value of money in terms of its purchasing power over goods and services, declines.

iii. **Personal consumption preference**: Most of us have a strong preference for immediate rather than delayed consumption.

There are mainly two methods to measure the time value of money namely; Future value and compounding and present value and discounting.

1. Future Value and compounding

Future value is the final accumulated value of a sum of money at some future time period. The future value of an investment will depend, not only on the rate of return on that investment but also how often that rate of return is calculated. **The frequency of calculation of the rate of return is called compounding**.

Example:

Suppose that in 2000 an investor deposits Rs. 500 that pays annually a compounded nominal interest rate of 5 %. How much will the deposit be worth on its maturity in 2005?

Let

PV_0 = the present value of money at the initial period of time.

$FV_{1..n}$ = the future value of the deposit amount in subsequent years.

I = the prevailing rate of interest.

Assuming that the principal and accumulated interest are reinvested in the deposit at the same rate of interest, then the future value of that particular deposit may be calculated as follows:

End Point	Method of Calculation		Future Value
	1	2	
FV1	$PV_0(1+i)$		
	500 (1+0.05)		**525**
FV2	$PV_0(1+i)^2$	$FV_1(1+i)$	
	$500(1+0.05)^2$	525 (1+0.05)	**551.25**
FV3	$PV_0(1+i)^3$	$FV_2(1+i)$	
	$500(1+0.05)^3$	551.25 (1+0.05)	**578.81**
FV4	$PV_0(1+i)^4$	$FV_3(1+i)$	
	$500(1+0.05)^4$	578.81 (1+0.05)	**607.75**

7. Virtual Management

It refers to the ability of a manager to simulate consumer behaviour using computer models based on the emerging science. Computer models will imitate human behaviour sufficiently to allow top management to simulate or test the impact of managerial decisions before implementing those decisions in the real world.

Production Function

Meaning of Production

Production is the conversion of input into output. The factors of production and all other things which the producer buys to carry out production are called input. The goods and services produced are known as output. Thus production is the activity that creates or adds utility and value. In the words of **Fraser**,

"If consuming means extracting utility from matter, producing means creating utility into matter".

According to **Edwood Buffa**,

"Production is a process by which goods and services are created"

Production Function

Production is the process by which inputs are transformed in to outputs. Thus there is relation between input and output. The functional relationship between input and output is known as production function. The production function states the maximum quantity of output which can be produced from any selected combination of inputs. In other words, it states the minimum quantities of input that are necessary to produce a given quantity of output. The production function is largely determined by the level of technology. The production function varies with the changes in technology. Whenever technology improves, a new production function comes into existence. Therefore, in the modern times the output depends not only on traditional factors of production but also on the level of technology. The production function can be expressed in an equation in which the output is the dependent variable and inputs are the independent variables. The equation is expressed as follows:

Q= f (L, K, T……n)

Where, Q = output

L = labour

K = capital

T = level of technology

n = other inputs employed in production.

There are two types of production function - short run production function and long run production function. In the short run production function the quantity of only one input varies while all other inputs remain constant. In the long run production function all inputs are variable.

Assumptions of Production Function

The production function is based on the following assumptions.

1. The level of technology remains constant.
2. The firm uses its inputs at maximum level of efficiency.
3. It relates to a particular unit of time.
4. A change in any of the variable factors produces a corresponding change in the output.

5. The inputs are divisible into most viable units.

Managerial Use of Production Function/Importance of Production function

The production function is of great help to a manager or business economist. The managerial uses of production function are outlined as below:

1. It helps to determine least cost factor combination: The production function is a guide to the entrepreneur to determine the least cost factor combination. Profits can be maximized only by minimizing the cost of production. In order to minimize the cost of production, inputs are to be substituted. The production function helps in substituting the inputs.

2. It helps to determine optimum level of output: The production function helps to determine the optimum level of output from a given quantity of input. In other words, it helps to arrive at the producer's equilibrium.

3. It enables to plan the production: The production function helps the entrepreneur (or management) to plan the production.

4. It helps in decision-making: Production function is very useful to the management to take decisions regarding cost and output. It also helps in cost control and cost reduction. In short, production function helps both in the short run and long run decision-making process.

COST FUNCTION

Introduction

The word 'cost' has different meanings in different situations. The accounting cost concept or the historical cost concept is not useful as such for business decision-making. The accounting records end up with the balance sheet and income statements which are meant for legal, financial and tax needs of the enterprise. The financial recordings reveal what has been happening. It is a historical recording which is not of very much help to the managerial economist in his business decision-making. The actual cost is not the relevant cost concept for business decision-making because it only reveals what has been happening. The decision-making concepts of cost aim at projecting what will happen in the alternative courses of action. Business decisions involve plans for the future and require choices among different plans. These decisions necessitate profitability calculations for which a comparison of future revenues and future expenses of each alternative plan is needed.

Cost-Output Relations or Cost Function

The cost-output relationship plays an important role in determining the optimum level of production. Knowledge of the cost-output relation helps the manager in cost control, profit prediction, pricing, promotion etc. The relation between cost and output is technically described as the cost function.

TC = F(Q)

Where

TC = Total cost

Q = Quantity produced

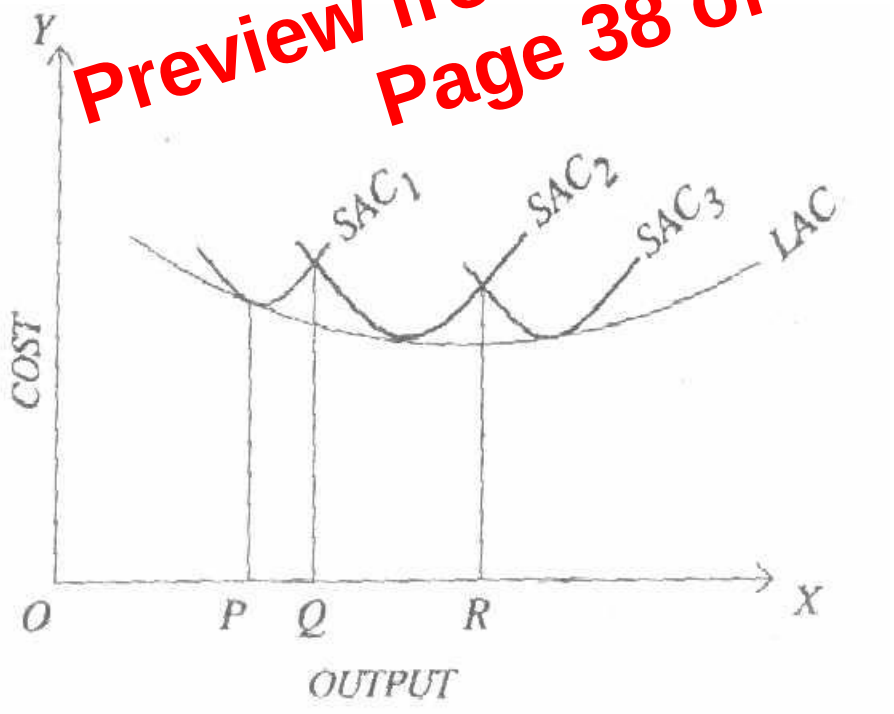
F = function

The short-run cost-output relationship can be shown graphically also. Fig.1 shows the relationship between output and total fixed cost, total variable cost and total cost. TFC curve is a horizontal straight line representing Rs.60, whatever be the output TVC curve slopes upward starting from zero, first gradually but later at a fast rate. TC = TFC+TVC.As TFC remains constant, increase in TC means increase in TVC only. As TFC remains constant the gap between TVC and TC will always be the same. Hence TC curve has the same pattern of behaviour as TVC curve.

Long-Run Cost-Output Relations

Long-run is a period long enough to make all inputs variable. In the long-run afirm can increase or decrease its output according to its demand, by having more or less of all the factors of production. The firms are able to expand the scale of their operation in the long-run by purchasing larger quantities of all the inputs. Thus in the long-run all factors become variable. The long-run cost-output relations therefore imply the relationship between total costs and total output. As the change in production in the long run is possible by changing the scale of production, the long-run cost-output relationship is influenced by the law of returns to scale. In the long-run a firm has a number of alternatives in regard to the scale of operations. For each scale of production or plant size, the firm has a separate short-run average cost curve. Hence the long-run average cost curve is composed of a series of short-run average cost curves.

A short-run average cost (SAC) curve applies to only one plant whereas the long run average cost (LAC) curve takes into consideration many plants. At any one time the firm has only one size of plant. That plant remains fixed during that period. Any increase in production in that period is possible only with that plant capacity. That plant has a corresponding average cost (SAC) curve. But in a long period the firm can move from one plant size to another. Each plant has its corresponding SAC curve.



The long-run cost-output relationship is shown graphically by the LAC curve. To draw an LAC curve we have to start with a number of SAC curves. In the fig. 5.3 we have assumed that there are only three sizes of

plants-small, medium and large, S ACj refers to the average cost curve for the small plant, S AC, for the medium size plant andSAC3 for the large size plant. If the firm wants to produce OP units or less, it will choose the small plant. For an output beyond OQ the firm will opt for medium size plant. Even if an increased production is possible with small plant production beyond OQ will increase cost of production per unit. For an output OR the firm will choose the large plant. Thus in the long-run the firm has a series of SAC curves. The LAC curve drawn will be tangential to the three SAC curves i.e. the LAC curve touches each SAC curve at one point. The LAC curve is also known as Envelope Curve as it envelopes all the SAC curves. No point on any of the LAC curve can ever be below the LAC curve. It is also known as Planning Curve as it serves as a guide to the entrepreneur In his planning the size of plant for future expansion. The plant which yields the lowest average cost of production will be selected. LAC can, therefore, be defined as the lowest possible average cost of producing any output, when the management has adequate I time to make all desirable changes and adjustments.

In the long-run the demand curve of the firm depends on the law of returns to scale.

> The law of returns to scale states that if a firm increases the quantity of all inputs simultaneously and proportionately, the total output initially increases more than proportionately but eventually increases less than proportionately.

It implies that when production increases, per unit cost first' decreases but ultimately increases. This means LAC curve falls initially and rises subsequently. Like SAC curve LAC curve also is U shaped, but it will be always flatter then SAC curves. The U-shape implies lower and lower average cost in the beginning until the optimum scale of the firm is reached and successively higher average cost thereafter. The increasing return is experienced on account of the economies of scale or advantages of large-scale production Increase in scale makes possible increased division and specialization of labour and more efficient use of machines. After a certain point increase in production makes management more difficult and less efficient resulting in less than proportionate increase in output.

ECONOMIES OF SCALE

INTRODUCTION

In the long run when scale of production is increased firm gets economies of scale up to a point. The term "economies" refers to cost advantage. Economies of scale refer to advantages of large scale production. Marshall has classified economies of scale into two-internal economies and external economies.

Diseconomies are the disadvantages which a faces when the scale of production is expanded beyond a certain level diseconomies may be of two types- internal and external diseconomies.

I. Internal Economies and Diseconomies

We saw that returns to scale increase in the initial stages and after remaining constant for a while, they decrease. The question arises as to why we get increasing returns to scale due to which cost falls and why after a certain point we get decreasing returns to scale due to which cost rises. The answer is that initially a firm enjoys internal economies of scale and beyond a certain limit it suffers from internal diseconomies of scale. Internal economies and diseconomies are of following main kinds: