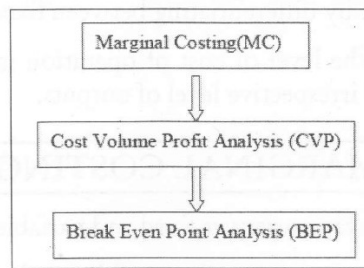


Break Even Analysis



Expansion Path

The case of a firm producing 1000 units of output using 10 units of capital and 10 units of labour (at point a) with input prices $w=2$ and $r=2$ is shown in Figure 15 using isoquants and isocosts.

Thus the cost of this input combination is 40 units. At point a, the 1000 unit isoquant is tangent to the 40 unit isocost line. If the firm wants to increase its output or expand its production, it will move to point b if 1500 units are to be produced and then to point c if 1750 units of output are to be produced. In general, the firm expands by moving from one tangency or efficient production point to another. These efficient points represent the expansion path.

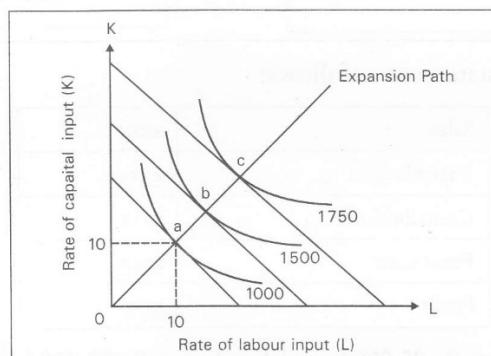


Figure 10.1: The Expansion Path for the Firm

An expansion path is formally defined as the set of combinations of capital and labour that meet the efficiency condition $\frac{MP_L}{MP_K} = \frac{P_L}{P_K}$.

An equation for the expansion path can be determined by first substituting the marginal product functions and input prices into the efficiency condition, and then by solving for capital as a function of labour. If the production function is $Q = 100 K^{1/2} L^{1/2}$, the corresponding marginal product functions are:

$$MP_L = \frac{dQ}{dL} = \frac{50K^{1/2}}{L^{1/2}}$$

and,

$$MP_K = \frac{dQ}{dK} = \frac{50L^{1/2}}{K^{1/2}}$$

Substituting the marginal product equations in the efficiency condition ($MP_L/MP_K = P_L/P_K = w/r$) gives

$$\frac{50 \frac{K^{1/2}}{L^{1/2}}}{50 \frac{L^{1/2}}{K^{1/2}}} = w/r$$

Solving for K gives

$$K = \frac{w}{r} L$$

This expression is the equation for the expansion path for the production function $Q = 100 K^{1/2} L^{1/2}$. If w and r are known, equation $K = w/r L$ defines the efficient combination of capital and labour for producing any rate of output e.g., the expansion path in the above figure. If $w=1$, and $r=1$, the expansion path would be:

$$K = L$$

If $w=2$ and $r=1$, the equation for expansion path would be

$$K=2L$$

If the expansion path is known, then knowing the isoquant- isocost system is not necessary to determine efficient production points. The firm will only produce at those points on the expansion path.

The expansion path indicates optimal input combinations, but it does not indicate the specific rate of output associated with that rate of input use. The output rate is determined by substituting the equation for the expansion path into the original production function.

Changes in Input Prices

If the price of one input, say labour, increases, the firm will adjust the input mix by substituting capital for labour. If the price of labour declines, thus making labour relatively less expensive, labour will be substituted for capital. In general, if the relative prices of inputs change, managers will respond by substituting the input that has become relatively less expensive for the input that has become relatively more expensive.

The isoquant-isocost framework can be used to demonstrate this principle (Figure 10.2). Let us suppose the firm is currently operating at point a where 100 units of output are produced using the resource combination $K=40$, $L=2$. This is an efficient resource mix because the 100 unit isoquant is tangent to the isocost line CC if the firm's goal is to maximise production subject to a cost constraint (i.e., the firm is limited to resource combinations on a given isocost function).

If the price of labour falls while the price of capital remains unchanged (i.e., labour has become relatively less expensive), the isocost pivots to the right from CC to the isocost CC'. The reduction in the price of labour means that the firm is able to increase the rate of production. Hence the firm moves from point a to point b, which is a new efficient resource combination. That is, the new isocost is tangent to the 120-unit isoquant at point b. Now 9 units of capital and 6 units of labour are employed. At point a, the efficient ratio of capital to labour was 5:1. Now the efficient ratio of two inputs is 3:2. The reduction in the price of labour has caused the firm to substitute that relatively less expensive input for capital.

Returns to Scale

If all inputs are changed simultaneously (possible only in the long run), and say increased proportionately, then the concept of returns to scale has to be used to understand the behaviour of output. The behaviour of output is studied when all factors of production are changed in the same direction and proportion.

In the long run, output can be increased by increasing the 'scale of operations'. When we speak of increasing the 'scale of operations' we mean increasing all the factors at the same time and by the same proportion. For example, in a factory, in the long run, the scale of operations may be increased by doubling the inputs of labour and capital. The laws that govern the scale of operation are called the laws of returns of scale.

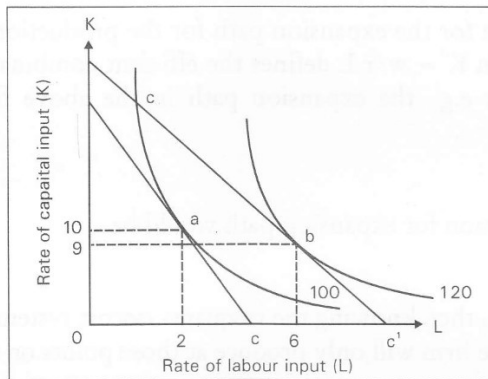


Figure 10.2: Response of the Firm to a Decrease in the Price of Labour

The laws of returns to scale always refer to the long run because only in the long run are all the factors of production variable. In other words, only in the long run is it possible to change all the factors of production. Thus the laws of returns to scale refer to that time in the future when changes in output are brought about by increasing all inputs at the same time and in same proportion.

Returns to scale are classified as follows:

1. **Increasing Returns to Scale (IRS):** If output increase more than proportionate to the increase in all inputs.
2. **Constant Returns to Scale (CRS):** If all inputs are increased by some proportion, output will also increase by the same proportion.
3. **Decreasing Returns to Scale (DRS):** If increase in output is less than proportionate to the increase in all inputs.

For example, if all factors of production are doubled and output increases by more than two times, then the situation is of increasing returns to scale. On the other hand, if output does not double even after a cent per cent increase in input factors, we have a diminishing returns to scale.

The general production function is

$$Q = f(L, K)$$

If land, K, and labour, L, is multiplied by h and Q increases by λ , we get,

$$\lambda Q = f(hL, hK)$$

We have constant, increasing or decreasing returns to scale, respectively depending upon, whether $\lambda = h$, $\lambda > h$ or $\lambda < h$.

For example, if all inputs are doubled, we have constant, increasing or decreasing returns to scale, respectively, if output doubles, more than doubles or less than doubles (Figure 10.3).

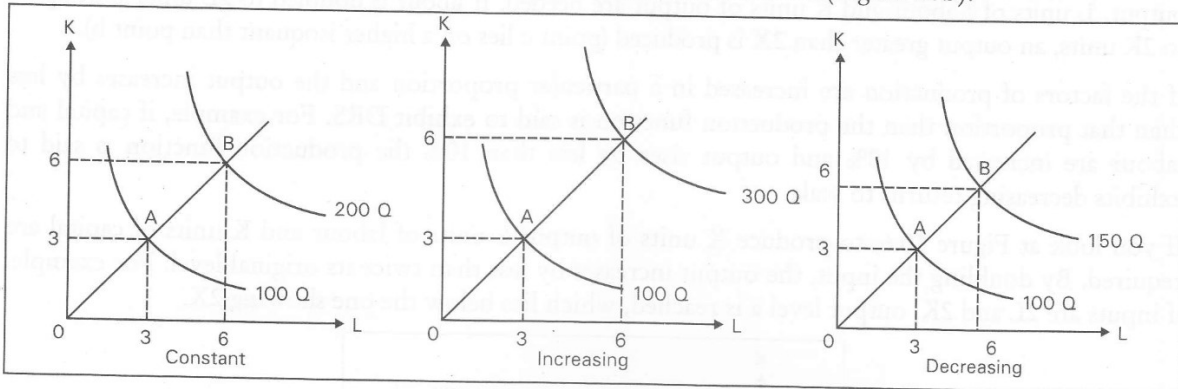


Figure 10.3: Returns to Scale

The firm increases its inputs from 3 to 6 units (K, L) producing either double (point B), more than double (point C) or less than double (point D) output (Q).

Increasing returns to scale arise because as the scale of operation increases, a greater division of labour and specialisation can take place and more specialised and productive machinery can be used. Decreasing returns to scale, arise primarily because as the scale of operation increases, it becomes more difficult to manage the firm. In the real world, the forces for increasing or decreasing returns to scale often operate side by side, with the former usually overwhelming the latter at small levels of output and the reverse occurring at very large levels of output.

If all the factors of production are increased in a particular proportion and the output increases in exactly that proportion then the production function is said to exhibit CRS. Thus if labour and capital are increased by 10% and the output also increases by 10% then the production function is CRS.

If you look at Figure 10.4, to produce X units of output, L units of labour and K units of capital are needed (point a). If labour and capital are now doubled (as is possible in the long run), so that there are 2L units of labour and 2K units of capital, the output is exactly doubled i.e., equals 2X (point b). Similarly, trebling input achieves treble the output and so on.

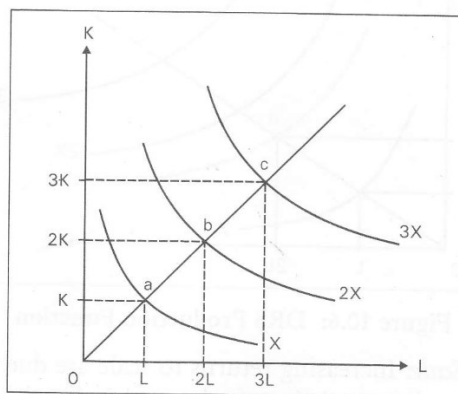


Figure 10.4: CRS Production Function

If all the factors of production are increased in a particular proportion and the output increases by more than that proportion then the production function is said to exhibit IRS. For example, in many industrial processes if all inputs are doubled, factories can be run in more efficient and effective ways, there by actually more than doubling output. This is demonstrated in Figure 10.5. To produce X units of output, L units of Labour and K units of capital are needed. If labour is doubled to $2L$ units and capital to $2K$ units, an output greater than $2X$ is produced (point c lies on a higher isoquant than point b).

If the factors of production are increased in a particular proportion and the output increases by less than that proportion than the production function is said to exhibit DRS. For example, if capital and labour are increased by 10% and output rises by less than 10% the production function is said to exhibit decreasing returns to scale.

If you look at Figure 10.6, to produce X units of output L units of labour and K units of capital are required. By doubling the input, the output increases by less than twice its original level. For example, if inputs are $2L$ and $2K$, output level a is reached, which lies below the one showing $2X$.

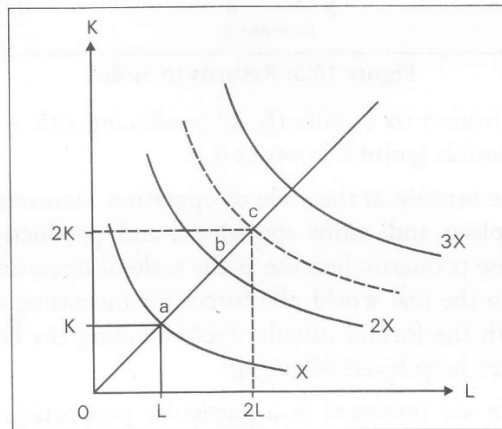


Figure 10.5: IRS Production Function

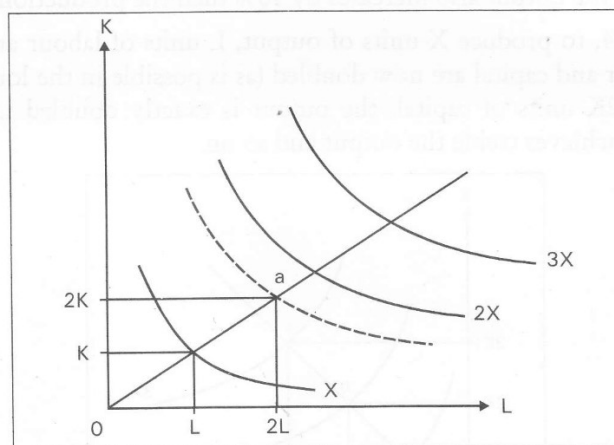


Figure 10.6: DRS Production Function

Causes of Increasing Returns to Scale: Increasing returns to scale are due to technical and/or managerial indivisibilities. One of the basic characteristics of advanced industrial technology is the existence of

mass production methods. Mass production methods (like the assembly line car industry) are processes available only when the level of output is large. They are more efficient than the best available processes for producing small levels of output. For example, increasing returns of scale may occur because each worker has specialised in performing a simple repetitive task rather than many different tasks. As a result labour productivity increases. In addition, a larger scale of operation may permit the use of more productive specialised machinery, which was not feasible on a lower scale of operation.

Cause of Decreasing Returns to Scale: The most common causes are "diminishing returns to management". The management is responsible for the coordination of the activities of the various sections of the firm. Even when authority is delegated to individual managers (production manager, sales manager, etc.) the final decisions have to be taken by the board of directors. As the output grows, top management becomes eventually overburdened and hence less efficient in its role as coordinator and ultimate decision-maker. Although advances in management science have developed numerous management techniques, it is still a commonly observed fact that as firms grow beyond the appropriate optimal, management diseconomies creep in. These may result because as the scale of operations increases, communication difficulties make it more and more difficult to run the business effectively.

Another cause for decreasing returns may be found in the exhaustible natural resources: doubling the fishing fleet may not lead to a doubling of the catch of fish; or doubling the plant in mining or an oil extraction field may not lead to a doubling of output.

Economic Region of Production (Ridge Lines)

The isoquant map corresponding to three levels of production Q_1 , Q_2 and Q_3 is shown in Figure 10.7. All the points on isoquant Q_3 indicate the same level of output. A rational producer will produce only between points E and F because it is only between points E and F that the isoquant is convex to the origin. A tangent drawn on isoquant Q_3 at E is vertical while that drawn at F is horizontal. The producer will not produce at point G on isoquant Q_3 because by moving from point E to G more of each of the two inputs has to be employed to produce the same level of output. The producer will also not produce at point H on isoquant Q_3 due to the same reason. Similarly, the economic range of production along isoquant Q_2 is CD and along isoquant Q_1 is AB. The points joining O, A, C and E form the upper ridge line R_1 and the point joining O, B, D and F form the lower ridge line R_2 . The area lying between the two ridgelines is the economic region or technically efficient region.

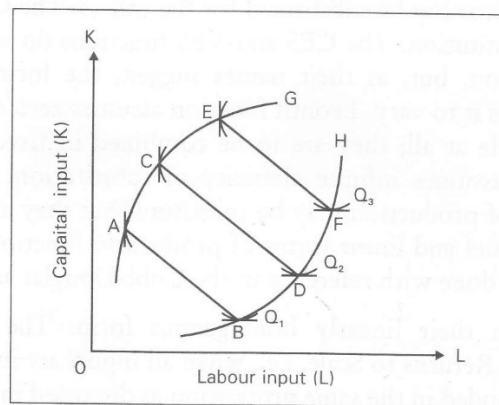


Figure 10.7: Rides Lines

Elasticity of Substitution

The shape of an isoquant is related to its elasticity of substitution. The elasticity of substitution measures the relative responsiveness of one variable (a good or a factor of production) to proportionate changes in the prices of other goods or factors of production. It can either be defined for goods or for factors of production.

The elasticity of substitution is a concept devised to measure (algebraically) the degree of substitution between two factors of production, resulting from a change in prices of the factors of production only, so that the output remains the same. Thus it measures the strength of the substitution effect. For example, if the price of a factor of production (say labour) falls, the producer will now substitute labour for capital and reach a new equilibrium position on the same isoquant. The numerical value of this substitution (independent of any unit) is measured by the elasticity of substitution.

$$e_{LK} = \frac{\% \text{ Change in K/L ratio}}{\% \text{ Change in MRTS}_{LK}}$$

$$= \frac{\Delta(K/L)/(K/L)}{\Delta(MP_L/MP_K)/MP_L/MP_K}$$

Elasticity of substitution may also be defined from the consumer's point of view as the degree to which one commodity can be substituted for another as a consequence of a given change in their price ratios. In other words, it is the proportionate change in the ratio of two commodities to the proportionate change in their price.

$$e_{x,y} = \frac{\% \text{ Change in commodity quantity ratio}}{\% \text{ Change in commodity price ratio}}$$

$$= \frac{\Delta(X/Y)/X/Y}{\Delta(P_X/P_Y)/P_X/P_Y}$$

Where (X/Y) is the quantity ratio of X and Y and (P_X/P_Y) is the ratio of prices of X and Y.

As you already know there are five different forms of production functions and the particular form of a production function is determined by the elasticity of factor substitution which is a measure of the ease with which the varying factor can be substituted for the others. The Cobb-Douglas function has a unitary elasticity of factor substitution. The CES and VES functions do not assume any specific value for the elasticity of substitution, but, as their names suggest, the former takes the elasticity as a constant, while the latter allows it to vary. Leontief function assumes zero elasticity of substitution, i.e., the factors are not substitutable at all; they are to be combined in fixed proportion. On the other extreme, the linear function assumes infinite elasticity of substitution, i.e., the factors are perfect substitutes. In reality, factors of production may be substitutes but they are not perfect substitutes. In the real world, thus, the Leontief and linear forms of production function can be safely ruled out. A lot of empirical work has been done with reference to the Cobb-Douglas and the CES form.

Both have been presented in their linearly homogenous form. The mathematical term Linear Homogeneity means Constant Returns to Scale, i.e., when all inputs are increased together in the same proportion, output is also expanded in the same proportion as discussed in the earlier section.

The other essential feature of linear homogeneity with regard to the production function is as follows: the average and marginal products depend upon the ratio in which the inputs are combined, but their

values are independent of the absolute magnitude of the inputs. Using the Cobb-Douglas function, $Q = AK^{1-\alpha}L^\alpha$. Where A and α are constant $1 > \alpha > 0$.

$$\begin{aligned} AP_L &= \frac{Q}{L} = \frac{AL^\alpha K^{1-\alpha}}{L} \\ &= AL^\alpha K^{1-\alpha} = A \left[\frac{K}{L} \right]^{1-\alpha} \end{aligned}$$

This shows that the average product of L depends only on the input ratio or factor proportion. If $A = 100$, $\alpha = 1/2$, $K=4$ and $L=1$ the average product of L is 200. If $K=800$ and $L=200$, the input ratio is the same and so is the magnitude of the average product.

The same relation holds true for the marginal product. Let us consider the marginal product of labour, keeping capital, K constant.

$$MP_L = \frac{\partial Q}{\partial L} = \alpha AL^{\alpha-1} K^{1-\alpha} = \alpha A \left[\frac{K}{L} \right]^{1-\alpha} = \left(\alpha \cdot \frac{Q}{L} \right)$$

This also shows that the marginal product depends on the input ratio or what is called "factor intensity". Demand elasticity coefficient always measures the proportional change in an independent variable induced by a given proportional change in the independent variable. This applies to production as well. Given the production function $Q=Q(L, K)$, the labour elasticity of output (e_L) is the proportional change in output, resulting from a given proportional change in labour input, L , the input capital, K , being held constant. Similarly, the capital elasticity of output (e_K) is the proportional change in output resulting from a given proportional change in capital K , the input labour, L , being held constant.

Like demand elasticities, input elasticities can be expressed as follows:

$$e_L = \frac{\% \partial Q}{\% \partial L} = \frac{\partial Q / Q}{\partial L / L}$$

$$e_L = \frac{\partial Q}{\partial L} \times \frac{L}{Q} = \frac{\partial Q / \partial L}{Q / L} = \frac{MP_L}{AP_L}$$

$$e_K = \frac{\% \partial Q}{\% \partial K} = \frac{\partial Q / Q}{\partial K / K}$$

$$e_K = \frac{\partial Q}{\partial K} \times \frac{K}{Q} = \frac{\partial Q / \partial K}{Q / K} = \frac{MP_K}{AP_K}$$

Thus the input elasticity of output turns out to be a ratio of the input's marginal product and average product. In general, marginal and average products vary as the input ratios change. Hence the input elasticities change as well. However, in the special case of Cobb-Douglas functions, the input elasticities are constant.

$$Q = AL^\alpha K^{1-\alpha}$$

$$\frac{\partial Q}{\partial L} = \alpha AL^{\alpha-1} K^{1-\alpha}$$

$$\frac{\partial Q}{\partial K} = (1-\alpha)AL^\alpha K^{-\alpha}$$

$$e_L = \frac{\partial Q}{\partial L} \times \frac{L}{Q} = \alpha AL^{\alpha-1} K^{1-\alpha} \cdot \frac{L}{AL^{\alpha} K^{1-\alpha}}$$

$$= \frac{\alpha AL^{\alpha} K^{1-\alpha}}{AL^{\alpha} K^{1-\alpha}} = \alpha$$

Similarly,

$$e_K = \frac{\partial Q}{\partial K} \times \frac{K}{Q} = (1-\alpha) AL^{\alpha} K^{-\alpha} \times \frac{K}{AL^{\alpha} K^{1-\alpha}}$$

$$= \frac{(1-\alpha) AL^{\alpha} K^{1-\alpha}}{AL^{\alpha} K^{1-\alpha}} = (1-\alpha)$$

The elasticity coefficients α and $(1-\alpha)$ are constants. These indicate how much output will change if an input used is changed by some proportion. Hence is a very important tool for production decisions. If average product of a factor is at the maximum, then average and marginal products are equal and, therefore, input elasticity becomes unity. Similarly, if marginal product is zero, then the input elasticity will be zero. Under no circumstances, the production manager should consider the employment of an additional factors if the input elasticity of that factor is zero. For example, in an underdeveloped economy, some labourers do not make any contribution to output (i.e., they are under employed) and, therefore, their withdrawal from the firm is strongly recommended.

The aggregate of all input elasticities of output is called the 'function coefficient (e)'. In other words, the function coefficient shows the proportional change in output, resulting from a given proportional change in all inputs. Referring to the Cobb-Douglas form, $Q = Q(L, K)$, we find,

$$e = e_L + e_K$$

$$= \frac{\partial Q}{\partial L} \cdot \frac{L}{Q} + \frac{\partial Q}{\partial K} \cdot \frac{K}{Q}$$

Since the Cobb-Douglas function is homogeneous of degree one, i.e., since it reveals constant returns to scale, a 1 per cent increase in all inputs (L, K) increases output, Q, by exactly 1 per cent then $e=1$. Thus the function coefficient provides a test for linear homogeneity of production function.

The Importance of Production Functions in Managerial Decision Making

For managers, an understanding of the basic concepts of production provides a solid conceptual framework for decisions involving the allocation of a firm's resources both in the short run and in the long run. Given below are two such key management principles.

- (i) *Careful Planning Can Help a Firm to Use its Resources in a Rational Manner:* In the short run analysis, we found that a firm has three stages of production and the stage II is the only stage for a rational firm to operate. However, the firm may find itself in stage I or III as the production levels do not depend on how much a company wants to produce but on how much its customers want to buy.

Figure 10.8 shows a short run production function where stage II applies to production levels between $Q_1=200$ and $Q_2 = 275$. If people want to buy less than 200 units or more than 275 units, for example, than in the short run the firm would be forced to operate in either stage I or stage III.

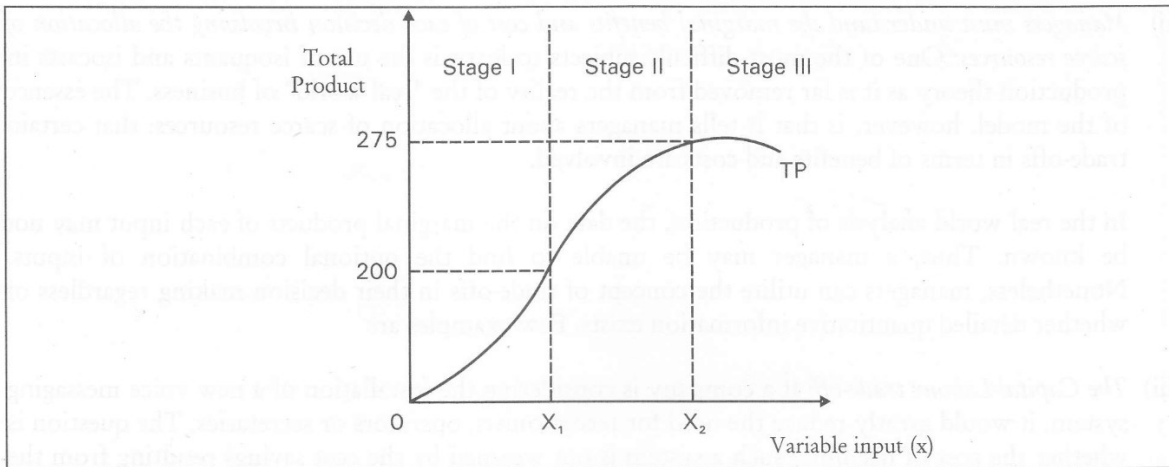


Figure 10.8: Production Stages and Capacity Planning

The information above implies that for a firm to avoid having to operate in either stage I or stage III, there must be careful planning regarding the amount of fixed inputs that will be used along with the variable ones. In business, this is called "capacity planning". For example, if the firm anticipated that the demand for its products would be in the range of 200 to 275, then the capacity implied in the above figure is perfect for its needs. However, if the firm anticipated the demand to be greater than 275, it would have to consider increasing its capacity so that stage II would include the higher level of output. Similarly, if the firm forecasts a demand less than 200, it would have to consider decreasing its capacity. These alternative capacity levels are shown in Figure 10.9.

Good capacity planning requires two basic elements (1) accurate forecasts of demand and (2) effective communication between the production and marketing functions. The first one is rather obvious but the second one is not very easy to achieve.

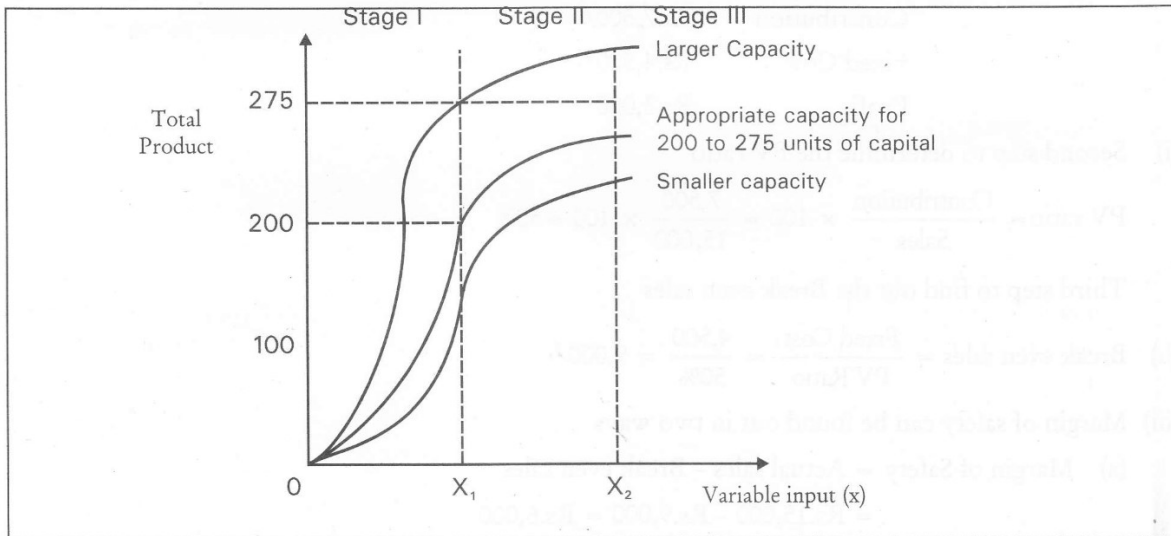


Figure 10.9: Adjustment Capacity based on Demand

- (ii) *Managers must understand the marginal benefits and cost of each decision involving the allocation of scarce resources:* One of the most difficult subjects to learn is the use of isoquants and isocasts in production theory as it is far removed from the reality of the "real world" of business. The essence of the model, however, is that it tells managers about allocation of scarce resources; that certain trade-offs in terms of benefits and costs are involved.

In the real world analysis of production, the data on the marginal products of each input may not be known. Thus, a manager may be unable to find the optional combination of inputs. Nonetheless, managers can utilize the concept of trade-offs in their decision making regardless of whether detailed quantitative information exists. Few examples are

- (iii) *The Capital-Labour trade-off:* If a company is considering the installation of a new voice messaging system, it would greatly reduce the need for receptionists, operators or secretaries. The question is whether the cost of installing such a system is out weighed by the cost savings resulting from the elimination of certain support personnel.

Illustration 1

From the following information relating to quick standards ltd., you are required to find out (i) PV ratio (ii) break even point (iii) margin of safety (iv) calculate the volume of sales to earn profit of Rs.6,000/-.

Total Fixed Costs	Rs.4,500/
Total Variable Cost	Rs..7,500/
Total Sales	Rs.15,000/-

First step to find out the Contribution volume

Sales	Rs 15,000/
Variable Cost	Rs. 7,500/
Contribution	Rs.7,500/
Fixed Cost	Rs.4,500/-
Profit	Rs.3,000

- (i) Second step to determine the PV ratio

$$\text{PV ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100 = \frac{7,500}{15,000} \times 100 = 50\%$$

Third step to find out the Break even sales

- (ii) Break even sales = $\frac{\text{Fixed Cost}}{\text{PV Ratio}} = \frac{4,500}{50\%} = 9,000/-$

- (iii) Margin of safety can be found out in two ways

(a) Margin of Safety = Actual sales - Break even sales
= Rs.15,000 - Rs.9,000 = Rs.6,000

(b) Margin of Safety = $\frac{\text{Profit}}{\text{PV Ratio}} = \frac{3,000}{50\%} = \text{Rs.6,000/-}$

(iv) Sales required to earn profit = Rs.6,000/

To determine the sales volume to earn desired level of profit

$$= \frac{\text{Fixed Cost} + \text{Desired Profit}}{\text{PV Ratio}}$$

$$= \frac{\text{Rs. 4,500} + \text{Rs. 6,000}}{50\%} = \text{Rs. 21,000/-}$$

10.4 APPLICATION OF MANAGERIAL COSTING IN MANAGERIAL DECISION MAKING (MAKE OR BUY DECISION)

The firms, which are routinely in need of spares, accessories are bought from the outsiders instead of any production or manufacturing, though the requirement is at regular intervals. Most of the automobile manufacturers are usually buying the components from outside instead of producing them on their own. The Maruthi Udyog ltd had given a contract to the Nettur Technical Training Foundation, Bangalore to design the tool for the panel and to manufacture regularly to the tune of the orders.

The leading four wheeler manufacture in India is buying the panel from the NTTF on contract basis in stead of manufacturing.

Why don't they manufacture in spite of buying them from the NTTF?

The main reason of buying is cheaper than the production of an article.

Illustration 2

The management of a company finds that while the cost of making a component part is Rs.20, the same is available in the market at Rs.18 with an assurance of continuous supply.

Give a suggestion whether to make or buy this part. Give also your views in case the supplier reduces the price from Rs.18 to Rs.16

The cost information is as follows

Material	Rs.7.00
Direct Labour	Rs.8.00
Other variable expenses	Rs.2.00
Fixed expenses	Rs.3.00
Total	<u>Rs.20.00</u>

The first point to be found out that the contribution of the transaction. The cost of manufacturing should be compared with the price of the product which is available in the market.

To find out the worth of the transactions, first the cost of manufacturing should be found out

Material	Rs.7.00
Direct Labour	Rs.8.00
Other variable expenses	<u>Rs.2.00</u>
Total	<u>Rs.17.00</u>

The cost of manufacturing a component is Rs.17.00. While calculating the cost of manufacturing a component, the fixed expenses were not considered. The fixed expenses were not considered for computation. Why?

The costs will be incurred irrespective of the production status of the firm; for which the expenses should not be added.

If the company manufactures the product/component at Rs.17 which will facilitate to book profit Re 1 from the price of Rs.18 which is available from the market.

The next stage is decision criteria.

Worth of Production

Cost of the production < Price of the product available in the market.

The firm is better advised to take the course of production rather than purchase of the product.

Worth of Purchase

Cost of the production > Price of the product available in the market

The product available in the market is same cheaper than the manufacturing of a product. The firm is better advised to buy the product rather than the manufacturing of a product. If the product price comes down to the price of Rs.16 facilitates the firm to save 1 Re from the cost of manufacturing.

Illustration 3

A refrigerator manufacturer purchases a certain component @ Rs.50 per unit. If he manufactures the same product he has to incur a fixed cost of Rs.20,000 and variable cost per unit is Rs.40/- when can the manufacturer make on his own or when he can buy from outside?

When the requirements is Rs.5,000 units, will you advise to make or buy?

The very first point to be found that Break even point in units.

The break even point in units at which the cost of buying is equivalent to the cost of manufacturing .

The cost of purchase per unit – Rs 50/-

If the same product is manufactured, what would be the total cost of manufacture?

Total cost of manufacture = Total fixed cost + Variable cost

The cost of buying is felt that an exorbitant one than the cost of manufacturing. Having observed, as a manufacturer undergoes for the manufacturer of a component. If he manufactures a component, he could save Rs.10= (Rs.50-Rs.40) Which in other words known as contribution per unit

Before finding out the Break even point in units, the contribution of the product should be found out.

Contribution margin per unit = Selling price in the market – Cost of manufacture

Contribution margin per unit is nothing but the amount of savings to the manufacture.

Amount of savings out of the manufacture = Purchase price – Variable cost

Though the firm enjoys savings, it is required to additionally incur fixed cost of operations Rs.20,000

$$\text{Break even point in units} = \frac{\text{Fixed Cost}}{\text{Purchase Price} - \text{Variable Cost}} = \frac{\text{Rs.20,000}}{\text{Rs.50} - \text{Rs.40}} = 2,000 \text{ units}$$

At 2,000 units, the firm considers both alternatives are incurring equivalent volume of Cost in manufacturing.

Cost of buying for 2,000 units

$$= 2,000 \text{ units} \times \text{Rs.}50 \text{ per unit} = \text{Rs. } 1,00,000$$

Cost of Buying

$$= \text{Rs.}20,000 + 2,000 \text{ units} \times \text{Rs.}40 = \text{Rs.}1,00,000$$

Break even in Rupees

From the above, it obviously understood that both are bearing equivalent amount of costs. It means both are neither profitable nor non-profitable.

Which one is better for the firm?

No of Units	Manufacturing cost	Buying cost	Decision
@ 2,001 units	Rs.20,000 + Rs.80,0040 = Rs.1,00,040	2001 × Rs.50 = Rs.1,00,050	Manufacturing cost < Buying cost Advisable to manufacture
@ 1,999 units	Rs.20,000 + Rs.79,960 = Rs.99,960	1,999 × Rs.50 Rs.99,950	Manufacturing cost > Buying cost Advisable to Buy

The next step is to identify the worth of either manufacturing the units or buying the units at 5,000. If the manufacturer buys from the outsider = $5,000 \times \text{Rs.}50 = \text{Rs.}2,50,000$.

If the same manufacturer produces the component instead of buying

$$= \text{Rs.}20,000 + \text{Rs.}2,00,000 = \text{Rs.}2,20,000$$

From the above, the company is finally advised to manufacture the component due to low cost of manufacture.

Selecting the Suitable Product Mix

In the market, dealership is offered by the various companies to the individual intermediaries in promoting the sale of products. Before reaching an agreement with the company to act as a dealer, normally every individual consider the profitability of the product mix offered by the firm. For e.g., There are two different companies brought forth their advertisements in offering the dealership to the individual trading firms viz HCL and IBM.

The profitability under the dealership banner should be appropriately considered prior to take decision. To take rational decision, the firm should compare the profitability of both different dealership of two different giant industrial brands. The greater the share of the profitability in volume will be selected and vice versa

Illustration 4

From the following information has been extracted of EXCEL rubber products ltd

Direct materials A	Rs 16
Direct Materials B	Rs12
Direct wages A	24 Hrs at 50 paise per hour
Direct wages B	16 Hrs at 50 paise per hour
Variable overheads	150% of wages
Fixed overheads	Rs. 1,500
Selling price A	Rs.50
Selling price B	Rs.40

The directors want to be acquainted with the desirability of adopting any one of the following alternative sales mixes in the budget for the next period

- (a) 250 units of A and 250 units of B
- (b) 400 units of B only
- (c) 400 units of A and 100 units of B
- (d) 150 units of A and 350 units of B

State which of the alternative sales mixes you would recommend to the management?

The first step is to determine the contribution margin per unit of A and B.

The determination of the contribution of product A and B are through the preparation of Marginal costing statement.

Particulars	Product A (Rs)		Product B (Rs)	
Selling price		50		40
Less: Direct Materials	16		12	
Direct wages	12		8	
Variable overheads	18		12	
Variable cost		46		32
Contribution		4		8

The next step is to determine the profit level of every mix.

- (a) 250 units of A and 250 units of B

The first step is to determine the total contribution of the mix. Why the total contribution has to be found out?

The main reason is to determine the profit level of the mix through the deduction of the fixed overheads

Product of A	250 units × Rs.4	Rs.1,000
Product of B	250 units × Rs.8	Rs.2,000
Contribution		Rs.3,000
Fixed overheads		Rs.1,500
Profit		Rs.1,500

- (b) 400 units of B only

Product B Contribution	400 units × Rs.8 =	Rs.3,200
Fixed overheads		Rs.1,500
Profit		Rs.1,700

(c) 400 units of A and 100 units of B

Product of A	400 units × Rs.4	Rs.1,600
Product of B	100 units × Rs.8	Rs.800
Contribution		Rs.2,400
Fixed overheads		Rs.1,500
Profit		Rs.900

(d) 150 units of A and 350 units of B

Product A	150 units × Rs.4	Rs.600
Product B	350 units × Rs.8	Rs.2,800
Contribution		Rs.3,400
Fixed overheads		Rs.1,500
Profit		Rs.1,900

Mix	A	B	C	D
Contribution	Rs.1,500	1,700	900	1,900

The profit level among the given various mixes, the mix (d) is able to generate highest volume of profit over the others.

Check Your Progress

- How is selling price of a product calculated?
- True or False:
 - Marginal cost is called in other words as variable cost
 - Direct Material is not included in variable cost.

10.5 LET US SUM UP

Marginal costing is one of the important tools of management not only to take decision, but also to fix an appropriate price and to assess the level of profitability. Marginal cost is nothing, but a change occurred in the total cost due to small change in the quantity produced.

The cost-volume-profit analysis is a tool to show the relationship between various ingredients of profit planning. The crucial step in this analysis is the determination of break-even point. BEP is defined as the sales level at which the total revenue equals total cost.

10.6 KEYWORDS

Marginal Cost: Change occurred in the cost of operations due to change in the level of production.

BEP (Units): It is the level of units at which the firm neither incurs a loss nor earns profit.

BEP (Volume): It is the level of sales in Rupees at which the firm neither incurs a loss nor earns profit.

Fixed Cost: It is a cost which is fixed or remains the same for irrespective level of production.

Variable Cost: It varies along with the level of production.

Contribution: It is an amount of balance available after the deduction of variable cost from the sales.

Key Factor: Factor of influence on the component of contribution.

PV Ratio: Profit volume ration which is nothing but the ratio in between the contribution and sales.

Desired Profit: It is a profit level desired by the firm to earn at the given level of sales volume.

10.7 QUESTIONS FOR DISCUSSION

1. Define marginal cost.
2. Define marginal costing.
3. What is Break Even Point Analysis?
4. Explain the Graphic approach of BEP analysis.
5. Briefly explain the profit volume ratio.
6. Explain the various kinds of managerial decisions.
7. Elucidate the key factor analysis.
8. List out the advantages of marginal costing.
9. Highlight the limitations of marginal costing.

Check Your Progress: Model Answers

1. Selling Price of the Product = Marginal Cost + Contribution
2. (a) True (b) False

10.8 SUGGESTED READINGS

M.P. Pandikumar, *Accounting & Finance for Managers*, Excel Books, New Delhi.

R.L. Gupta and Radhaswamy, *Advanced Accountancy*.

V.K. Goyal, *Financial Accounting*, Excel Books, New Delhi.

R. Narayanswamy, *Financial Accounting - A Managerial Perspective*, HPI.

Nitin Balwani, *Accounting & Finance for Managers*, Excel Books, New Delhi.

UNIT IV

UNIT IV

LESSON

11

BUDGETING AND BUDGETARY CONTROL

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- 11.0 Aims and Objectives
- 11.1 Introduction
- 11.2 Budgetary Control
- 11.3 Classification of Budgets and Preparation of Budget
 - 11.3.1 Production Budget
 - 11.3.2 Materials/Purchase Budget
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- 11.4 Classification of the Budget in accordance with the Flexibility
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- 11.5 Zero Base Budgeting (ZBB)
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 - 11.5.2 Steps involved Zero Base Budgeting
 - 11.5.3 Benefits of Zero Base Budgeting
 - 11.5.4 Criticism of Zero Based Budgeting
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- 11.8 Questions for Discussion
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11.0 AIMS AND OBJECTIVES

After studying this lesson, you will be able to:

- Prepare the budgets as guide for future course of an action
- Exercise the control through comparison with actual performance
- Facilitate to identify the causes and means of deviations in between the actual and standard

11.1 INTRODUCTION

Budget is an estimate prepared for definite future period either in terms of financial or non-financial terms. Budget is prepared for any course of action or business or state or Nation, as a whole. The budget is usually expressed in terms of total volume.

According to ICMA, England, a budget is as follows “a financial and or quantitative statements prepared and approved prior to a defined period of time, of the policy to be pursued during the period for the purpose of attaining a given objective”. It is in other words as “detailed plan of action of the business for a definite period of time”

What is meant by Budget?

It is a statement of financial affairs/quantitative terms of an activity for a defined period, to achieve the enlisted objectives.

What is budgeting?

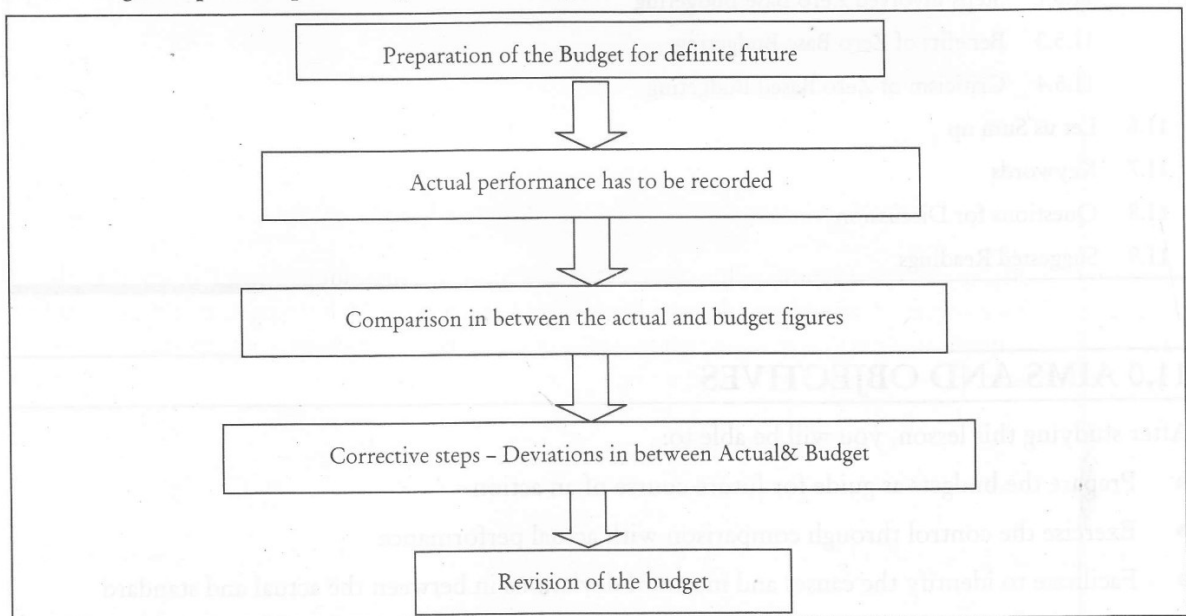
Budgeting is the course involved in the preparation of budget of an activity.

11.2 BUDGETARY CONTROL

What is Budgetary Control?

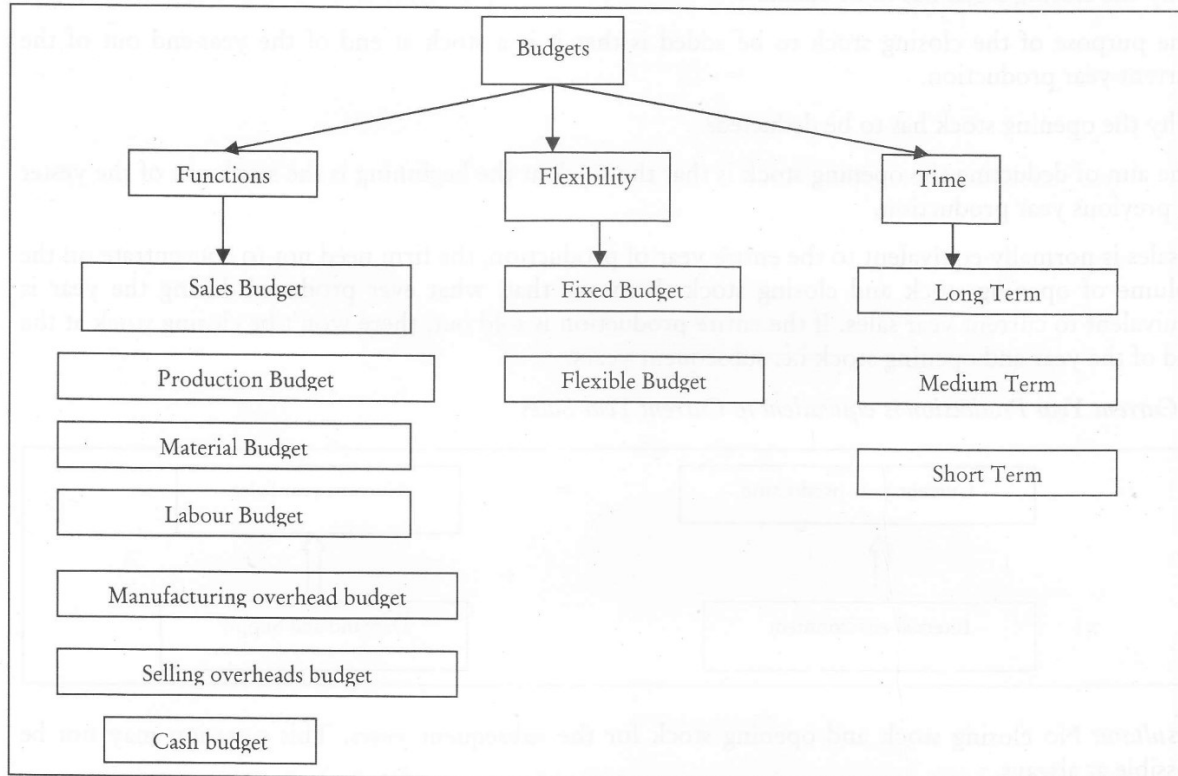
Budgetary control contains two different processes one is the preparation of the budget and another one is the control of the prepared budget. According to ICMA, England, a budgetary control is the, “the establishment of budgets relating to the responsibilities of executives to the requirements of a policy and the continuous comparison of actual with budgeted results, either to secure by individual action the objectives of that policy or to provide a basis for its revision”.

According to J.Batty, “Budgetary control is a system which uses budgets as a mans of planning and controlling all aspects of producing and/or selling commodities and services”.



11.3 CLASSIFICATION OF BUDGETS AND PREPARATION OF BUDGET

On functional basis, the budgets can be classified into three categories.



11.3.1 Production Budget

The preparation of the production budget is mainly dependent on the sales budget. The production budget is a statement of goods, how much should be produced. It may be in terms of quantities, Kilograms in monetary terms and so on.

Uses of Production Budget

The ultimate aim of the production budget is to find out the volume of production to be made during the year based on the sale volume. The production and sales volume should hand in hand with each other, otherwise the firm would require to face the acute problem on holding unnecessary excessive stock or inadequate stock to meet the needs of the buyers in time; which will disrepute in the supply of goods in time to them as already agreed upon.

$$\text{Units to be produced} = \text{Budgeted Sales} + \text{Closing Stock} - \text{Opening Stock}$$

Methodology of the production budget: The methodology of production budget includes three different components viz sales closing stock and opening stock.

Sales has to be added with the stock of the year at the end and to be deducted the opening stock.

Why sales has to be given paramount importance in the preparation of production budget?

The major sales of the business enterprise is being regularly made out of only through the current year production.

Why the closing stock has to be added?

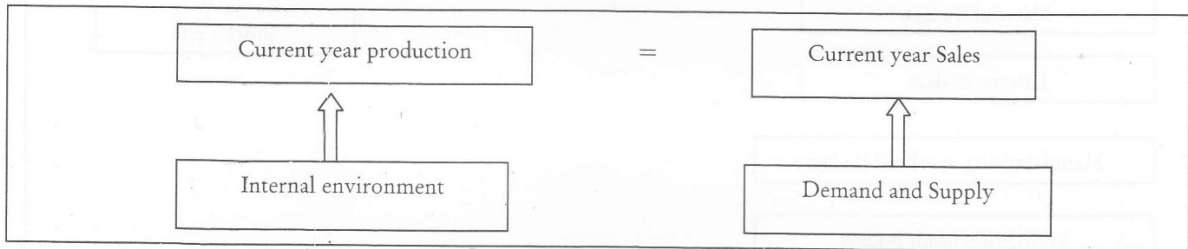
The purpose of the closing stock to be added is that it is a stock at end of the year-end out of the current year production.

Why the opening stock has to be deducted?

The aim of deducting the opening stock is that the stock at the beginning is the stock out of the yester or previous year production.

If sales is normally equivalent to the entire year of production, the firm need not to concentrate on the volume of opening stock and closing stock. It means that, what ever produced during the year is equivalent to current year sales. If the entire production is sold out, there won't be closing stock at the end of the year and opening stock i.e. subsequent years.

If Current Year Production is equivalent to Current Year Sales

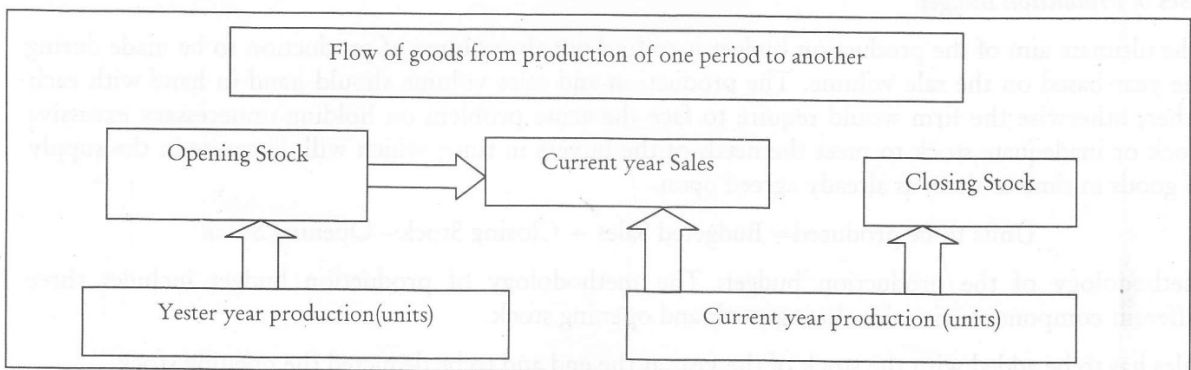


Resultant: No closing stock and opening stock for the subsequent years. This situation may not be possible at always.

Why it is not possible at always?

The production volume is connected to the internal environment of the firm, which can be maintained through a systematic approach, but the sales cannot be easily administered by the firm which is being highly influenced by the demand and supply factors of the goods.

If the Current Year Production is not Equivalent to the Current Year Sales



Why the closing stock arises in the business?

The closing stock is stock due to the excessive production over the sales volume.

The reasons for excessive production are as follows:

- Ineffective study of market potential through market research leads to the expression of excessive demand from the market, which signals the Production department to produce to the tune of MR conducted.
- Due to price fluctuations in the market may affect the volume of sales
- Due to meet the future demand
- The excessive production due to the cheaper availability of raw materials, which leads to greater amount of closing stock. If the storage cost is more than the hike takes place on the cost of raw materials leads to abnormal storage of the stock.

The above diagram clearly illustrates that the emergence of the opening stock and closing stock during the year out of sales and production volume of the enterprise.

Illustration 1

Prepare a production budget for three months ending March 31, 1996 for a factory manufacturing four different articles on the basis of the following information:

Type of the Product	Estimated Stock on Jan 1, 1996 Units	Estimated sales during Jan-Mar, 1996 Units	Desired Closing Stock on Mar 31, 1996 Units
AA	2000	10,000	5,000
BB	3000	15,000	4,000
CC	4000	13,000	3,000
DD	5000	12,000	2,000

Solution:

Production Budget for Three months ending March 31, 1996

Particulars	AA Units	BB Units	CC Units	DD Units
Estimated Sales	10,000	15,000	13,000	12,000
Add: Desired closing stock	5,000	4,000	3,000	2,000
	15,000	19,000	16,000	14,000
Less: Opening Stock	2,000	3,000	4,000	5,000
Estimated Production	13,000	16,000	12,000	9,000

11.3.2 Materials/Purchase Budget

This budget takes place only after identifying the number of finished products expected to produce to the tune of production budget, in meeting the needs and demands of the customers and consumers during the season.

In order to produce to the tune of production budget to meet the market demands, the raw materials for the production should be maintained sufficient to supply them without any interruption.. To have uninterrupted flow of production, the firm should go for the immediate procurement of raw materials through the multiplication of raw material required to produce for a single product with number of units expected to produce.

Why the stock of raw materials is deducted from the expected volume of materials procured for production to the tune of production budget?

If there is any existing stock of raw materials i.e. opening stock of raw materials available from the yester seasons or years should be deducted from the volume of materials required for production to be ordered and placed. The remaining volume should be the volume to be ordered for production.

Illustration 2

From the following figures extracted from the books of KPZ ltd, Prepare raw materials procurement budget on cost.

Particulars	A	B	C	D	E	F
Estimated stock on Jan 1	16,000	6,000	24,000	2,000	14,000	28,000
Estimated stock on Jan31	20,000	8,000	28,000	4,000	16,000	32,000
Estimated consumption	1,20,000	44,000	1,32,000	36,000	88,000	1,72,000
Standard price per unit	25 p	.10p	.50p	.30p	.40p	.50p

Material Procurement Budget

Particulars	A	B	C	D	E	F
Estimated consumption	1,20,000	44,000	1,32,000	36,000	88,000	1,72,000
Add: Estimated stock on Jan31	20,000	8,000	28,000	4,000	16,000	32,000
	1,40,000	52,000	1,60,000	40,000	1,04,000	2,04,000
Less: Estimated stock on Jan 1	16,000	6,000	24,000	2,000	14,000	28,000
Estimated purchases(units)	1,24,000	46,000	1,36,000	38,000	90,000	1,76,000
Rate per unit	25 p	.10p	.50p	.30p	.40p	.50p
Estimated Purchase Cost	31,000	4,600	68,000	11,400	36,000	88,000

11.3.3 Sales Budget

Sales Budget is an estimate of anticipation of sales in the near future prepared by the responsible person for the sale of a product by considering the various factors of influence. Sales budget is usually prepared in terms of quantity and value. The following factors are normally considered for the preparation of sales budget of a firm.

- Yester sales figures
- Estimates of the salesmen who is frequently operating in the market, known much greater than any body in the market
- Capacity of the plant and machinery to produce

- Funds availability
- Availability of raw materials to the tune of demand in the respective time period
- Changes in the taste and preferences of the customer or consumer
- Changes in the competition structure – Monopoly to Perfect competition – Previously BSNL was known as DOT as a monopoly in the market in affording the services till early 2000. Then later, the changes taken place in the market environment i.e. competition due to invasion of new entrants like Reliance, Hutch, Bharti tele ventures and so on; warrants careful preparation of sales budget of number of telephone connection expected to sell.

Illustration 3

Reynolds Pvt. Ltd manufactures two brands of pen Light & Elite. The sales department of the company has three departments in different regions of the country.

The sales budgets for the year ending 31st Dec, 1996 Light department I-3,00,000; department II 5,62,500; department III 1,80,000: Elite – department I-4,00,000; department II-6,00,000; department III 20,000.

Sales prices are Rs.3 and Rs1.20 in all departments.

It is estimated that by forced sales promotion the sales of Elite in department I will increase by 1,75,000. It is also expected that by increasing production and arranging extensive advertisement, department III will be enabled to increase the sale of Elite by 50,000.

It is recognized that the estimated sales by department II represent an unsatisfactory target. It is agreed to increase both estimates by 20%

Prepare a sales budget for the year 1996.

Solution:

Sales budget should be prepared to the tune of various influences of forth-coming seasons' sales. The expected increase or decrease in the sales volume should be incorporated at the time of preparing the sales budget from the yester periods sale figures.

- There is no change in the volume of existing sales of the department of I Light; the existing sales of the department I of the Light should be retained as it is for the computation of the budgeted figures, but there is a change expected to occur in the existing volume of sales of the department I of the Elite. The change expected amounted to increase 1,75,000 units in addition to the volume of existing sales i.e. the total volume of sales is equivalent to 4,00,000 units of existing volume of sales + 1,75,000 units expectation of increase = 5,75,000 units for Elite Department I.
- In the II department of both Light & Elite expected to have an increase on the volume of existing sales amounted is 20% i.e. 20% increase on the Department II of Light 5,62,500 units amounted 6,75,000 units and similarly in the case of Department II of Elite 6,00,000 units amounted 7,20,000 units
- In the III department of Light does not have any change in the volume of existing sales, it means that 1,80,000 units has to be retained as it is in the computation of the budgeted figure but in the case of Elite, department III expected to have an increase in the volume of sales which amounted 20,000 units i.e. 70,000 units.

Sales Budget for the year 1996

Selling Price	Light Rs.3		Elite Rs.1.20		Total
	Quantity	Rs	Quantity	Rs	Rs
DepartmentI	3,00,000	9,00,000	5,75,000	6,90,000	15,90,000
DepartmentII	6,75,000	20,25,000	7,20,000	8,64,000	28,89,000
DepartmentIII	1,80,000	5,40,000	70,000	84,000	6,24,000
	11,55,000	4,65,000	13,65,000	16,38,000	51,03,000

11.3.4 Capital Budgeting/Cash Budget

Cash budget is nothing but an estimation of cash receipts and cash payments for specified period. It is prepared by the head of the accounts department i.e. chief accounts officer.

Uses

The utility of the cash budget is as follows:

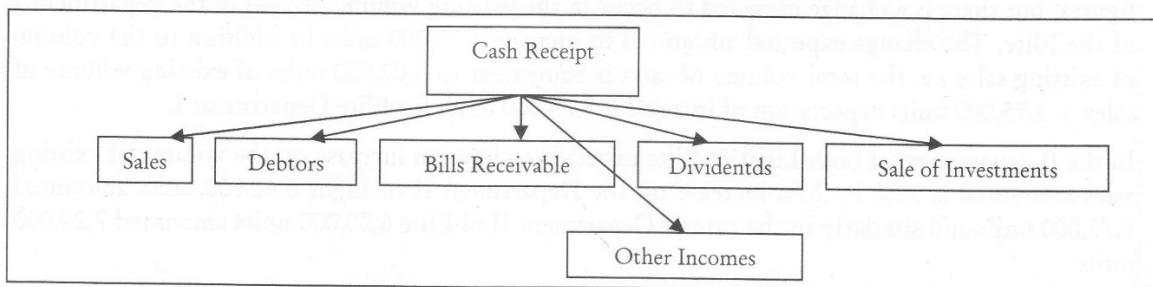
- To meet the revenue and capital expenditures with adequate funds
- It should highlight the additional requirement cash whenever the need arises
- Keeping of excessive funds available in the business firm wont fetch any return to the enterprise but this estimate of future cash needs and resources will guide the firm to plan for an effective investment out of the surplus funds estimated; enhances the wealth of the investors through proper investment planning out of the future funds available.

Capital Budgeting Different Method

Cash budget can be prepared in three different ways

- Receipts and payments method
- Adjusted profit and loss account
- Balance Sheet Method

Cash receipts can be classified into various categories



Cash payments are as follows:

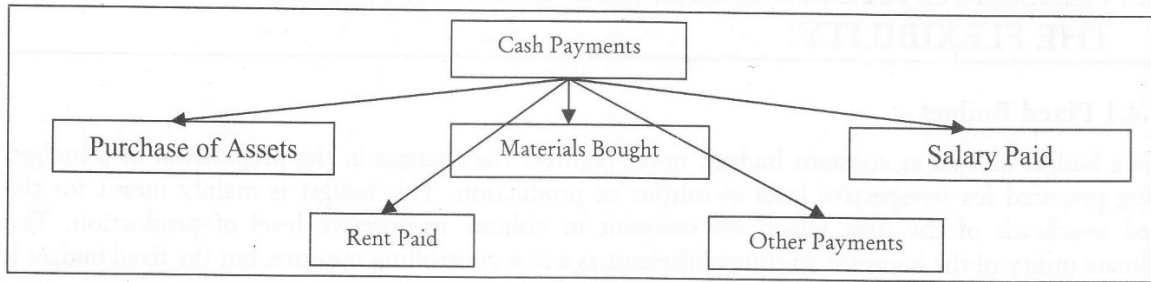


Illustration 4

From the following information prepare a cash budget for the months of June and July

Month	Credit sales	Credit purchase	Manufacturing Overheads	Selling overheads
April	80,000	60,000	2,000	3,000
May	84,000	64,000	2,400	2,800
June	90,000	66,000	2,600	2,800
July	84,000	64,000	2,000	2,600

Additional Information:

- Advance tax of Rs 4,000 payable in June and in December 1994
- Credit period allowed to debtors is two months
- Credit period allowed by the vendors or suppliers
- Delay in the payment of other expenses one month
- Opening balance of cash on 1st June is estimated as Rs.20,000/-

Cash Budget for the Months of June and July 1998

Particulars	June	July
Opening balance	20,000	26,800
Receipts: Sales	80,000	84,000
Total Cash Receipts I	1,00,000	1,10,800
Payments: Purchases	64,000	66,000
Manufacturing Overheads	2,400	2,600
Selling Overheads	2,800	2,800
Tax payable	4,000	-----
Total Payments II	73,200	71,400
Balance I-II	26,800	39,400

11.4 CLASSIFICATION OF THE BUDGET IN ACCORDANCE WITH THE FLEXIBILITY

11.4.1 Fixed Budget

It is a budget known as constant budget, never registers the changes in the preparation of a budget, being prepared for irrespective level of output or production. This budget is mainly meant for the fixed overheads of the firm which are constant in volume irrespective level of production. The ultimate utility of the budget is to control the cost as a cost controlling measure, but the fixed budget is meaningless in having comparison with the actual performance.

11.4.2 Flexible Budget

Flexible budget is prepared for any level of production as an estimate of statement of all expenses i.e. the expenses are classified into three categories viz variable, semi-variable and fixed expenses. The structure of the budget for any output is only to the tune of the actual performance achieved. This is the budget facilitates not only to have comparison in between various levels of production but also to identify the level of lowest production cost.

Utilities of the flexible budget:

- This budget is most useful tool of analysis in studying the sales at when the circumstances are not warranting to predict.
- It is mostly suited to the seasonal business, where the sales volume is getting differed from one period to another due to changes taken place in the taste and preferences of the buyers.
- The production is being done on the basis of demand of the products in the market. The demand of the products is studied only through demand forecasting. The flexible budget is more applicable in the case of products, which are greatly finding difficult to forecast the demand.
- The budget is prepared only during the time of acute shortage of resources of production viz Men, Material and so on.

Difference between Standard Costing and Budgetary Control

Standard cost is a predetermined cost, which is estimated from management's standard of efficient operation and the relevant necessary expenditure. Budgetary control contains two different processes one is the preparation of the budget and another one is the control of the prepared budget.

Illustration 5

Draft a flexible budget for overhead expenses on the basis of following information and determine the overhead rates at 70% 80% and 90% plant capacity.

Particulars	70% Plant Capacity	80% Plant Capacity	90% Plant Capacity
Direct Material	₹ 1000	₹ 1200	₹ 1400
Direct Labour	₹ 2000	₹ 2400	₹ 2800
Overhead Expenses	₹ 3000	₹ 3600	₹ 4200
Total	₹ 6000	₹ 7200	₹ 8400

Particulars	70% capacity	80% capacity Rs	90% capacity
Variable Overheads			
Indirect Labour	-----	24,000	-----
Stores including spares	-----	8,000	-----
Semi-variable overheads		40,000	-----
Power(30% fixed ,70%)			
Repairs and maintenance 80% fixed and 20% variable	-----	4,000	-----
Fixed Overheads			
Depreciation	-----	22,000	-----
Insurance	-----	6,000	-----
Salaries	-----	20,000	-----
Total overheads	-----	1,24,000	-----

Flexible budget for the period

Particulars	70% capacity	80% capacity	90% capacity
Variable overheads			
Indirect labour	21,000	24,000	27,000
Stores including spares	7,000	8,000	9,000
Semi-Variable Expenses			
Power* Fixed 30%	8,000	8,000	8,000
**Variable	28,000	32,000	36,000
Repairs and maintenance			
***Fixed 80%	3,200	3,200	3,200
****Variable 20%	700	800	900
Fixed Overheads			
Depreciation	22,000	22,000	22,000
Insurance	6,000	6,000	6,000
Salaries	20,000	20,000	20,000
Total Overheads	1,15,900	1,24,000	1,32,100

11.4.3 Master Budget

Master Budget: Immediately after the completion of functional or departmental level budgets, the major responsibility of the budget officer is to consolidate the various budgets together, which is detailed report of all operations of the firm for a definite period.

11.5 ZERO BASE BUDGETING (ZBB)

Zero base budgeting is one of the renowned managerial tool, developed in the year 1962 in America by the Former President Jimmy Carter. The name suggests, it is commencing from the scratch, which never incorporates the methodology of the other types of budgeting in determining the estimates. The Zero base budgeting considers the current year as a new year for the preparation of the budget but the yester period is not considered for consideration. The future activities are forecasted through the zero base budgeting in accordance with the future activities.

Peter A Pyher “ A planning and budgeting process which requires each manager to justify his entire budget request in detail from scratch (Hence zero base) and shifts the burden of proof to each manger to justify why he should spend money at all . The approach requires that all activities be analysed in “decision packages” which are evaluated by systematic analysis and ranked in order of importance”.

This type of budgeting requires the manager to reason out the aim of spending, but in the case of traditional budgeting is unlike, which are never emphasize the reasons of spending in terms of expenses.

11.5.1 Traditional Budgeting vs Zero Base Budgeting

Basis of Difference	Traditional Budgeting	Zero Base Budgeting
Emphasis	It is accounting oriented; emphasis on “How Much”	It is more decision oriented; emphasis on “Why”
Approach	It is monitoring towards the expenditures	It is towards the achievement of objectives
Focus	To study the changes in the expenditures	To study the cost benefit analysis
Communication	It operates only Vertical communication	It operates in both directions horizontally and vertically
Method	It is based on the extrapolation i-e from the yester figures future projections are carried out	Its decision package is totally based on the cost benefit analysis.

11.5.2 Steps involved Zero Base Budgeting

- The very first step is to prepare the Zero Base Budgeting is to enlist the objectives.
- The extent of application should be decided in the next phase of the ZBB.
- The next important stage is to prioritize the activities.
- The Most important step involved in the process of ABB is cost benefit analysis.
- The final step is to select, approve the decision packages and finalise the budget.

11.5.3 Benefits of Zero Base Budgeting

- It acts as guide for the management to allocate the resources more accurately depends upon the priority for an effective implementation.
- It enhances capability of the managers who prepares the budget for future action.
- It paves way for optimum utilization of resources available.

- It is a technique of utilitarian of the resources with reference to the activity involved.
- It is dome shaped only towards the achievement of organizational goals.

11.5.4 Criticism of Zero Based Budgeting

- Non financial matters cannot be considered for the cost & benefit analysis.
- Difficulties involved in the process of ranking of the decision packages.
- It needs more time span for preparation and cost of operations is more and more.

Check Your Progress

1. What is the main objective of production budget?
2. True or False:
 - (a) The preparation of the production budget is mainly dependent on the sales budget.
 - (b) Budgetary control is a system which uses budgets as a means of planning and controlling all aspects of producing.

11.6 LET US SUM UP

Budget is an estimate prepared for definite future period either in terms of financial or non-financial terms. Budgetary control contains two different processes one is the preparation of the budget and another one is the control of the prepared budget.

The production budget is a statement of goods, how much should be produced. The ultimate aim of the production budget is to find out the volume of production to be made during the year based on the sale volume. Sales Budget is an estimate of anticipation of sales in the near future prepared by the responsible person for the sale of a product by considering the various factors of influence. The expected increase or decrease in the sales volume should be incorporated at the time of preparing the sales budget from the yester periods sale figures. Cash budget is nothing but an estimation of cash receipts and cash payments for specified period. It is prepared by the head of the accounts department i.e. Chief Accounts Officer. It is a budget known as constant budget, never registers the changes in the preparation of a budget, being prepared for irrespective level of output or production. This budget is mainly meant for the fixed overheads of the firm, which are constant in volume irrespective level of production. Zero base budgeting is one of the renowned managerial tool, developed in the year 1962 in America by the Former President Jimmy Carter. The Zero base budgeting considers the current year as a new year for the preparation of the budget but the yester period is not considered for consideration. The future activities are forecasted through the zero base budgeting in accordance with the future activities.

11.8 KEYWORDS

Budget: A financial statement prepared for specified activity for future periods.

Budgeting: Activity of preparing the budget is known as budgeting.

Budget Control: Quantitative controlling technique to assess the performance of the organization.

Cash Budget: It is a statement prepared by the organization to identify the future needs and receipts of cash from the yester activities.

Flexible Budget: It is a financial statement prepared on the basis of principle of flexibility to identify the cost of the unknown level of production from the existing level of operational capacity.

11.9 QUESTIONS FOR DISCUSSION

1. Define budget.
2. Define budgetary control.
3. Highlight the various types of budgets.
4. Elucidate the process of production budget.
5. Illustrate the methodology of purchase budget.
6. Draw the process of preparing the cash budget.
7. Distinguish between tradition budgeting and zero base budgeting. Discuss the advantages and disadvantages of Zero Base Budgeting.

Check Your Progress: Model Answers

1. The ultimate aim of the production budget is to find out the volume of production to be made during the year based on the sale volume.
2. (a) True
(b) True

11.10 SUGGESTED READINGS

M.P. Pandikumar, *Accounting & Finance for Managers*, Excel Books, New Delhi.

R.L. Gupta and Radhaswamy, *Advanced Accountancy*.

V.K. Goyal, *Financial Accounting*, Excel Books, New Delhi.

R. Narayanswamy, *Financial Accounting - A Managerial Perspective*, HPI.

Nitin Balwani, *Accounting & Finance for Managers*, Excel Books, New Delhi.

UNIT V

LESSON

12

COMPUTER ACCOUNTING AND ALGORITHMS

CONTENTS

- 12.0 Aims and Objectives
- 12.1 Introduction
- 12.2 Introduction to Computer Accounting
- 12.3 Coding
- 12.4 Master Files, Transaction Files and Documents used for Data Collection
- 12.5 Processing of Different Files and Outputs Obtained
- 12.6 Reports and Types and Uses of Report
- 12.7 Let us Sum up
- 12.8 Keywords
- 12.9 Questions for Discussion
- 12.10 Suggested Readings

12.0 AIMS AND OBJECTIVES

After studying this lesson, you will be able to:

- Understand the concept of computer accounting
- Discuss the meaning of transaction file and master file

12.1 INTRODUCTION

Accounting is the art of recording, summarizing, reporting, and analyzing financial transactions. Similarly, a computerized accounting system can be a simple, utilitarian check register, or, as with computer accounting, it can be a full record of all the activities of a business, providing details of every aspect of the business, allowing the analysis of business trends, and providing insight into future prospects.

12.2 INTRODUCTION TO COMPUTER ACCOUNTING

In the past two decades the way accounting data is entered, stored and processed has changed noticeably. This is with the advent of the computerized accounting packages. It is no longer required for large companies to have big store rooms full of ledgers and records but now days all information can be stored in computer hard disks. Accounting packages give various advantages over manual systems, for instance entries do not have to be recorded in multiple ledgers. A single entry is made and

the package will update all the proper accounts automatically. Computerized accounting packages also make it probable for people in other departments, not just accounting to enter data. It does not need a vast amount of accounting knowledge for a pay role clerk to enter wages details into the accounts. Just a basic understanding of how to use the package is required.

12.3 CODING

Computer accounting depends on coding to record, store, classify and retrieve financial data. Computer systems most often use numeric codes or alphanumeric codes for processing accounting transactions. The various uses of coding are as follows:

1. uniquely identifies transactions and accounts
2. aids in classification process
3. conveys special meanings
4. compresses data

Various coding systems are as follows:

- Mnemonic Codes give visible clues regarding the objects they represent
- Sequence Codes are the simplest type of coding scheme that assign numbers or letters in consecutive order
- Block Codes assign a series of numbers within a sequence to entities or events having common features
- Group Codes reveal two or more dimensions or facets related to an object.

The various considerations in coding are as follows:

- Codes should **plan** for future expansion
- Codes should serve some **useful purpose**
- Codes should be **consistent**
- Codes should be **standardized** throughout the organization

12.4 MASTER FILES, TRANSACTION FILES AND DOCUMENTS USED FOR DATA COLLECTION

Master files contains ongoing information pertaining to an entity that is carried over from one period to the next. For instance, *accounts receivable master file*, *inventory master file*, and *general ledger master file*. Whereas transaction files represent a group of transactional data, for instance sales transactions, awaiting posting (updating) to the master files affected by the transaction. Examples may be *sales transaction file*, *payroll transaction file*, *collections-on-account transaction file*, *receiving transaction file*.

The other documents used for data processing may be:

- **History Files:** It contain transactions that have been already posted to the master files affected by the transaction. After transactions are posted, they are appended to history files, so that the firm will have an "audit trail" record of all transactions undertaken. These files help to generate a number of reports analyzing past transactions, like sales analysis reports.

- **Open Transaction Files:** These files represent in-process transactions that do not yet represent a completed accounting transaction. The most common example could be *open purchase order file*, which depicts purchases on order but have not yet been received. When the goods are received, additional data will be entered to reflect that receipt, and the transactions in the open file will move to a completed transaction file that will be posted to all master files impacted by the transactions.

12.5 PROCESSING OF DIFFERENT FILES AND OUTPUTS OBTAINED

The processing of files can be in two ways explained as follows:

- **Batch data processing-** It involves the processing of data in groups (or batches) of like transactions at periodic intervals. It is widely used when transaction activity is low or periodic.
- **Real-time processing-** It consists of processing each transaction as it arises and is captured.

After the processing of files, the outputs obtained may be in the form of reports. Report generation is the process of generating pre-defined or ad hoc reports from files or combinations of files in the system. The reports obtained may be displayed on the screen or output to a printer.

12.6 REPORTS AND TYPES AND USES OF REPORT

A computerized accounting system adapted to be used by at least first and second groups of users. The system comprises a host accounting system, an overlay system, a host report system, and an overlay report system. The host accounting system allows users to store transaction data representing financial transactions. The overlay system allows users in the second group of users to store overlay adjustment data representing adjusting journal entries related to the financial transactions. The host report system allows users to generate host reports based on the transaction entries. The overlay report system allows users in the second group of users to generate overlay reports based on the transaction entries and the overlay journal entries. The reports obtained are used as a basis of various financial analysis.

An Efficient System of Organization

The box 12.1 depicts the details of efficient system of the organization.

Box 12.1: L Efficient System of Organization

Double-entry accounting is a system of organization that records financial transactions in an efficient process that has been used by private enterprise for over 500 years. It has been said by some that the industrial revolution could not have occurred without the system of organization created by double-entry accounting. The famous author Johann Wolfgang Von Goethe wrote about double-entry accounting in 1796:

"Double-entry bookkeeping is one of the most beautiful discoveries of the human spirit... It came from the same spirit which produced the systems of Galileo and Newton and the subject matter of modern physics and chemistry. By the same means, it organizes perceptions into a system, and one can characterize it as the first Cosmos constructed purely on the basis of mechanistic thought... Without too much difficulty, we can recognize in double-entry bookkeeping the idea of gravitation, or the circulation of the blood and of the conservation of matter."

Microsoft Office Accounting combines double-entry accounting with the personal computer to create a complete, easy-to-use computerized accounting system.

Source: <http://office.microsoft.com/en-us/support/what-is-accounting-HA010102445.aspx>

Check Your Progress

1. What are two ways in which processing of files can be done?
2. State whether the following statements are true or false:
 - (a) Open transaction files represent in-process transactions that do not yet represent a completed accounting transaction.
 - (b) History files contain transactions that have been already posted to the master files affected by the transaction. A process needs to communicate only with OS.

12.7 LET US SUM UP

In the present scenario the way accounting data is entered, stored and processed has changed noticeably. This is with the advent of the computerized accounting packages. Computer accounting depends on coding to record, store, classify and retrieve financial data. Computer systems most often use numeric codes or alphanumeric codes for processing accounting transactions. *Master files* contains ongoing information pertaining to an entity that is carried over from one period to the next.

12.8 KEYWORDS

Open Transaction Files: These files represent in-process transactions that do not yet represent a completed accounting transaction.

History Files: It contains transactions that have been already posted to the master files affected by the transaction.

12.9 QUESTIONS FOR DISCUSSION

1. What do you understand by computer accounting?
2. Write a short note on various types of files.

Check Your Progress: Model Answers

1. Real-time processing and Batch data processing
2. (a) True
(b) True

12.10 SUGGESTED READINGS

M.P. Pandikumar, *Accounting & Finance for Managers*, Excel Books, New Delhi.

R.L. Gupta and Radhaswamy, *Advanced Accountancy*.

V.K. Goyal, *Financial Accounting*, Excel Books, New Delhi.

R. Narayanswamy, *Financial Accounting - A Managerial Perspective*, HPI.

Nitin Balwani, *Accounting & Finance for Managers*, Excel Books, New Delhi.