Revenue structure & Break-Even Analysis

10.1 REVENUE CONCEPTS : TOTAL, AVERAGE AND MARGINAL REVENUES

When a firm undertakes the task of production and purchases inputs it incurs cost. Having produced the output, on selling it the firm earns some income. **The income receipt by way of sale proceeds is the revenue of the firm**. Further, as we studied the concept of cost by distinguishing between total cost, average cost and marginal cost so also we can study the concept of revenue by distinguishing between total revenue, average revenue and marginal revenue.

Total Revenue

Total revenue is the sale-proceeds or the aggregate receipts obtained by the firm for selling its product. **Each unit of output sold in the market fetches a price and when this price is multiplied by the number of units sold we obtain the total revenue. Thus the total revenue depends on two factors**:

i) the price of the product (P)
ii) the units of output sold (Q)

Thus Total Revenue = Price x Quantity sold

TR = P x Q

For example, if the price of one text book is Rs.125/- and the publisher sells 1000 units then the total revenue of the publisher is Rs. 125 X 1000 = Rs. 1,25,000/.

Average Revenue

Average Revenue is the revenue derived by the firm per unit of its output sold. It is obtained by dividing the total revenue by the number of units of output sold.

$$\text{Average Revenue} = \frac{\text{Total Revenue}}{\text{Output Sold}}$$

$$\therefore \ AR = \frac{TR}{Q}$$

Now $TR = P \times Q$

$$\therefore \ AR = \frac{P \times Q}{Q}$$

$$\boxed{\therefore \ AR = P}$$

Thus, average revenue is nothing but the price of the product.

Marginal Revenue

Marginal revenue is the additional revenue from selling additional unit of output. For instance when a firm sells 10 units of chairs and earns Rs. 2000/- as total revenue and on selling 11 units of chairs earns Rs. 2200/- as total revenue then the 11th chair gets Rs. 200/- for the firm. This additional Rs. 200/- for the 11th chair is the marginal revenue of the firm.

Thus the Marginal Revenue of the 11th unit is obtained by subtracting from Total Revenue of 11 units, the total revenue of earlier ten chairs. In other words if

MR_{11th} represents Marginal Revenue of 11th unit

TR_{11} represents Total Revenue of 11 chairs

TR_{11-1} represents Total Revenue of 10 chairs then

$$MR_{11th} = TR_{11} - TR_{11-1}$$

we can generalize this formula for any extra units "n" viz.

$$MR_{nth} = TR_n - TR_{n-1}$$

This formula is applied only when there is unit change in sale of the output, i.e. the number of chairs sold has been increased from 10 chairs to 11 chairs

but if the amount of change is more than one at a time then we used the following formula to calculate marginal revenue.

$$MR = \frac{\Delta TR}{\Delta Q}$$

10.2 RELATION BETWEEN TR, AR AND MR

When we are analyzing the revenue aspects of a firm it is necessary to know the nature and structure of the market under which the firm is operating. If the firm is operating under perfect competition then it is just one among infinite number of producers. It will not be able to exercise any influence on the market price which is determined by the forces of demand and supply in the market. In such a case the firm is a price-taker. The revenue structure is given to the firm under perfect competition. On the other hand if the market is dominated by a single producer, the firm enjoys monopoly and is able to fix its own price. It is thus obvious that the revenue structures will be different under different market categories. We shall first try to understand the nature of revenue structure in case of a firm under perfect competition and then discuss at length the nature of monopoly. In fact the revenue structure under oligopoly (that market category in which there is competition among few sellers) is quite distinct and possesses an element of uniqueness, which will be considered separately.

A. Revenue structure of a Firm under Perfect Competition

One of the distinguishing characteristics of perfect competition is the presence of an infinite number of firms producing homogeneous product. The number of firms is so large that a single firm's contribution to the total output of the product in the market is insignificant or microscopic. **The firm under perfect competition can neither influence the price nor the output in the market**. In fact, it has to take the going-market price, i.e. the price prevailing in the market as is determined by the forces of demand and supply. It is in this context that **the firm under perfect competition is referred to as price-taker and not a price maker**. The revenue structure of the firm under perfect competition is influenced by this characteristic of perfect competition.

Let us assume that the price of the product X as determined in the market by the forces of demand and supply is Rs. 5/- per unit and that the firm, working under perfect competition has no other option but to sell its product also at the going market price i.e. Rs. 5/-. When it sells one unit it will get Rs. 5/- as total revenue. We can thus proceed to prepare the revenue schedule of the firm as follows:

Revenue Schedule

Units of x	TR	AR	MR
1	Rs.5	Rs.5	Rs.5
2	Rs.10	Rs.5	Rs.5
3	Rs.15	Rs.5	Rs.5
4	Rs.20	Rs.5	Rs.5
5	Rs.25	Rs.5	Rs.5

The revenue schedule indicates that as the firm goes on selling more and more units its total revenue goes on increasing. Each unit is being sold at Rs. 5/-. The price is given and constant and thus the AR (which is equal to price) remains the same. Besides every additional unit of X is also sold at Rs. 5/- the Marginal Revenue (additional revenue from additional unit) also remains Rs. 5/-.

Let us now translate the revenue schedule into revenue curves. The Total Revenue curve starts from the origin and slopes upwards from left to right. But the **AR curve is horizontal** and what is still more important is that the **MR curve coincides with the AR curve**. There is no difference between AR and MR. For a firm under perfect competition AR = MR. Thus, **the horizontality of AR curve is the acid test of a firm under perfect competition**. In other words if any firm is facing a horizontal AR curve then we can at once conclude that it is working under the condition of perfect competition. The **AR** curve explains the price and output relationship and **is thus also the demand curve of the firm's product**. It is important to note that the demand curve of the firm is different from the industry demand curve. The industry demand curve is downward sloping, i.e. it slopes downwards from left to right indicating that for the industry to sell more of its

output the price should be low. At lower price, more units of industry's product will be demanded in the market.
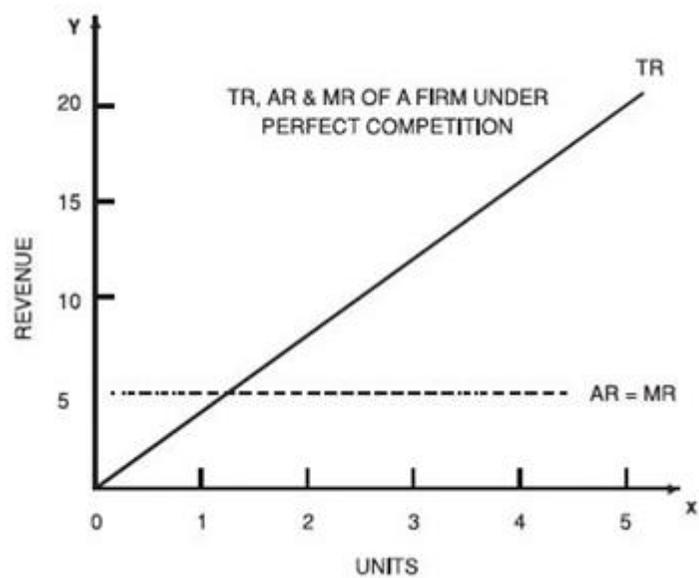
But the demand curve of a firm is horizontal, as explained above, as the firm under perfect competition is just a price-taker. Whatever number of units it sells it will have to sell it at the going market price for the industry's product which is determined by the interaction of the forces of demand and supply of the product of the industry in the market. It is obvious that the industry's demand curve represents a much larger quantity compared to that represented by the firm's demand curve.
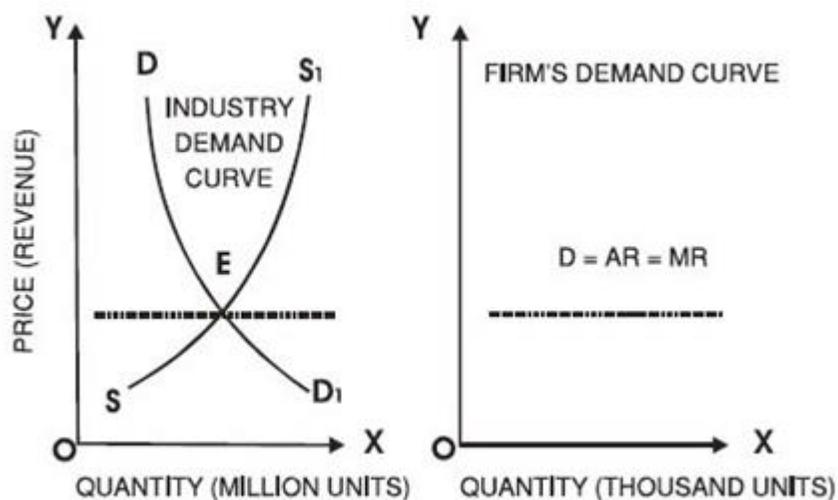

Fig. 10.2 Demand Curve of Industry & Film

A. Revenue structure under Monopoly

Monopoly is that market category in which a single seller dominates the market. There is only one producer (firm) and there are no substitutes for its product. Since under monopoly there is just one firm producing a particular product there is no element of competition. Besides in the absence of any other firm producing homogeneous product the firm itself constitutes the industry. Hence it is futile to make any effort to distinguish between a firm and an industry under monopoly. **Under Monopoly, firm is**

itself an industry.

The revenue structure under monopoly is bound to be different from that in case of a firm under perfect competition. Under perfect competition, the firm is a price-taker and not a price maker and its AR curve is horizontal denoted by perfectly elastic demand curve. But **a monopolist is not a price-taker; he is price-maker.** In order to sell more of his output he will lower the price. As the monopolist supplies more and more units of his product the price gets slightly reduced. The Total Revenue increases but a diminishing rate. The average revenue goes on falling. The marginal revenue too is falling.

Revenue Schedule

Units of x	Total Revenue	Average Revenue	Marginal Revenue
1	10	10.0	10
2	19	9.5	9
3	27	9.0	8
4	34	8.5	7
5	40	8.0	6
6	45	7.5	5
7	49	7.0	4

In fact the marginal revenue is falling at a rate faster than the average revenue. When we transform the average revenue and marginal revenue readings from the Revenue Schedule into a graph, we observe;
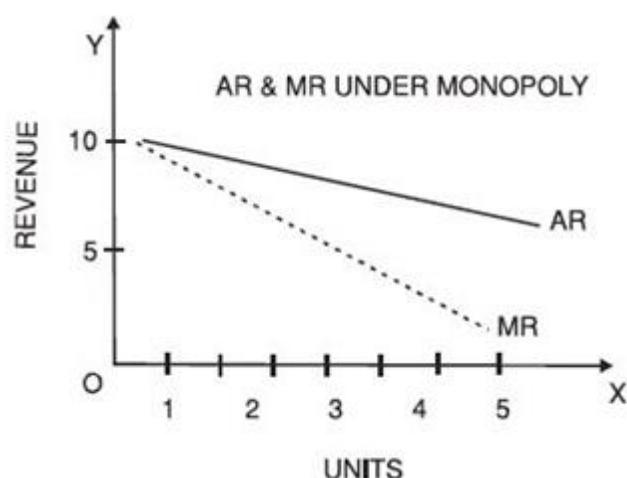

ii) MR curve lies below AR curve and MR curve is steeper than the AR curve.

Besides this simple relation between AR and MR under monopoly there are a few significant observations which need to be highlighted.

I. The Average Revenue curve cannot cut X-axis, Marginal Revenue curve can. The explanation is rather simple. Average revenue, as we saw earlier, is nothing but the price. If the average revenue curve touches X-axis then the

price for every unit of total output is reduced to zero and if, even by mistake, the average revenue curve cuts the X-axis and goes below X-axis then the price would become negative. This would be absurd and irrational. Thus the average revenue curve cannot cut the X-axis. However, the marginal revenue curve can cut the X-axis. This is because by the very definition marginal revenue is the additional revenue from the additional unit of the output sold. The last unit could be given away free. This does happen in bulk purchases e.g. if a consumer purchases 100 units of X for Rs. 1000/- then he may be given 101st unit of X free. This implies that the Marginal Revenue of 101st unit is zero. Hence, it must be noted that the AR cannot cut X-axis, MR can.

Under Monopoly, if AR is in the form of a straight line then MR lies exactly halfway between AR and the Y-axis.
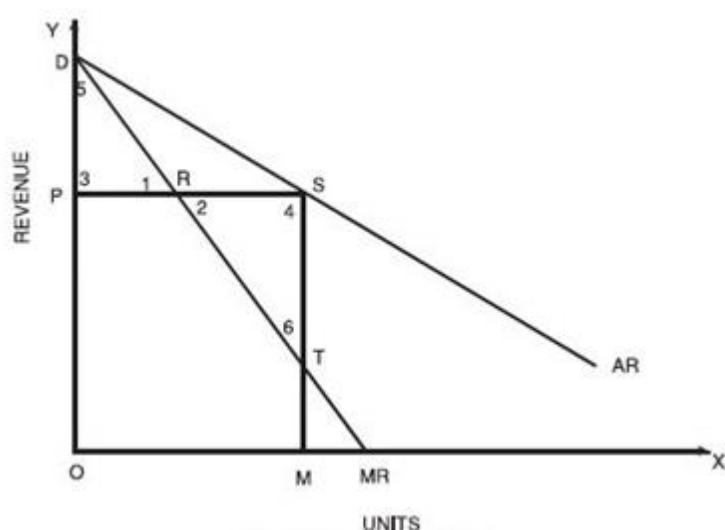
There exists some unique geometrical relationship between AR and MR. In case when average revenue is in the form of a straight line i.e. if AR is a straight line then MR lies half way between AR and the Y-axis.

Let AR be the given average revenue curve. MR lies below it. Select the price OP and quantity of output OM. We may now proceed to show that since AR is a straight line, MR lies way between AR and Y-axis.

To Prove that: PR = RS

Proof: Total Revenue = P x Q

$\therefore$ TR = OP x OM

= area PSMO ...I

Similarly,

Total Revenue = Sum of all MRs

= area DRTMO ...II

From I & II we get,

area PSMO = area DRTMO

But PSMO = PRTMO + RST

and DRTMO = PRTMO + DPR

PRTMO + RST = PRTMO + DPR

area RST = area DPR

Now in the $\triangle$ s DPR and RST we observe :

1 = 2 (Vertically Opposite angles)

3 = 4 .... (Right angles) and

5 = 6 .... (Alternate angles)

Thus the three angles of one triangle are respectively equal to the three angles of the other triangle.

Hence the triangles DPR and RST are equal in all respects.

PR = RS

Thus when the AR is a straight line then MR lies 1/2 way between AR and Y-axis.

10.3 RELATION BETWEEN AR, MR, AND ELASTICITY OF DEMAND

Average Revenue, Marginal Revenue and Elasticity of demand are closely related concepts. Let us proceed to derive the formula to express their interrelationship.

Let us assume that linear demand function is represented by DD_1. Using the point elasticity method, elasticity of demand at point T on DD_1 is given as:

$$\therefore E \text{ at pt } T = \frac{DT}{DT}$$

$$e = \frac{A}{A-M}$$
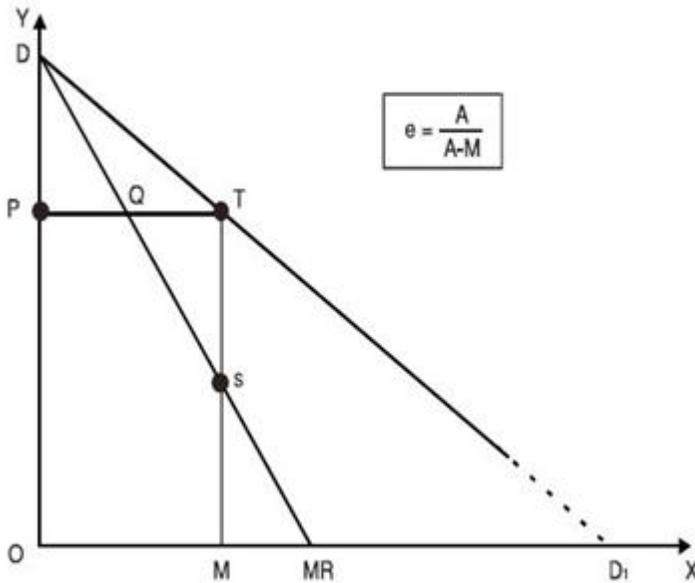
UNITS OF X
Fig. 10.5 AR, MR & Ed

$$\therefore e = \frac{DT}{DT}$$

Consider ∆DPT and ∆TMD$_1$. They are similer triangles and as in similar s the ratios of the sides are equal.

$$\therefore \frac{DT}{DT} = \frac{TM}{DP}$$

$$\therefore e = \frac{D_1T}{DT} = \frac{TM}{DP} \quad \text{............I}$$

Further, the∆ s DPQ and QTS are equal in all respects

$$\therefore \ DP = TS$$

Substituting the value of DP = TS in conclusion I, we get,

$$\therefore e = \frac{D_1T}{DT} = \frac{TM}{DP} = \frac{TM}{TS}$$

$$\therefore e = \frac{TM}{TS}$$

But TS = TM−SM

Now TM represents the Average Revenue and SM represents the Marginal Revenue.

$$e = \frac{\text{Average Revenue}}{\text{Average Revenue - Marginal Revenue}}$$

$$\therefore e = \frac{A}{A - M}$$

This is a very important relationship which we have obtained relating the average and marginal revenues with elasticity of demand.

Since $e = \dfrac{A}{A - M}$ We can express this formula in terms of M as follows:

$$e = \frac{A}{A - M}$$

$$\therefore eA - eM = A$$

$$\therefore eA - eM = eM$$

$$\therefore \frac{A(e-1)}{e} = M$$

$$\therefore M = \frac{A(e-1)}{e}$$

Further

$$A = M \frac{e}{(e-1)}$$

The above derivations have immense practical utility. We can use these interrelationships to work out some important exercises under monopoly.

10.4 OBJECTIVES OF A FIRM

Normally, the objective of the firm is to maximize profits. Any producer, who behaves rationally is assumed to be working for procuring maximum profits. Thus profit maximization has been the traditionally accepted objective of the firm.

Empirical observations, however, have shown that profit maximization is not the only objective nor is it the most important one for a firm. To quote **G. L. Nordquist, "Like an ill-fated ship, the theory of the firm came under fire almost immediately after being launched. The chief trouble with the traditional theory of the firm lies in the assumption that the firm is motivated by the objective of profit maximization. The criticisms for this conventional assumption range from the assertions that firms typically maximize something other than profit to claims that they do not maximize, cannot maximize and do not even care to maximize."**

Often it is found that the entrepreneurs do not care to maximize profits but strive to earn a satisfactory return. **Prof. Herbert Simon**, thus, indicates that instead of 'profit maximisation' the firm adopts goal of '**satisfactory return.**' This is more meaningful as it makes allowances for all kinds of '**psychic income**' derived by the entrepreneur from his business activity. How can one justify the creation of art films? What the producer gets here is the psychic income and not maximum monetary gain. **Gaining reputation as a good businessman** in eyes of the people more than compensates for not earning maximum profits. Similarly **serving quality product** and **maximizing sales** gives immense psychological satisfaction to the entrepreneur.

In fact, business goals which are manifold seem to vary from firm to firm. According to **K. Rothschild**, the primary objective of a firm is **long-run survival**. Thus business firms are interested in '**safety margins of profits**' rather than its maximization. **Peter Drucker** argues that; "the guiding principle of business economics… is not the maximization of profits, it is the **avoidance of loss**." Whereas **Prof. Hicks** maintains: "**the best of all monopoly profits is a quiet life.**" The objectives thus vary from time to time and from firm to firm. No one objective can be singled out as the only motive of the firm. Let us, therefore, analyse some of the important objectives of a firm.

A. Profit Maximization

Traditionally, profit maximization was assumed to be the only objective of a firm. The price-output policy of the firm will be so adjusted that the firm should earn maximum profits. Profits depend on the Cost and the Revenue structures of the firm. If π represents profit, then

$$= R - C$$

i.e. producer aims at maximizing the difference between revenue and the cost. (For detailed analysis regarding the conditions necessary and sufficient to maximize profit refer to the next section).

In practice, however, firms rarely work to maximize profits. This could be due to a number of **reasons**:

i) If the firm maximizes profits then it will attract many more such producers to enter that field of production. It may thus attract rival producers.

ii) It may arouse public opinion against itself because the consumers may get the feeling that the firm is maximizing profits at their cost. The consumers may develop a feeling of being exploited.

iii) It may even attract the attention of the government. The tax-axe may be sharpened to fall heavily on such a firm or there is also a threat that the government may resort to nationalization or enter the same line of production.

iv) Profit maximization may imply that the reputation of the firm is at stake. It could be at the cost of personal reputation or shading off of the goodwill.

v) The producer who only chases profits, loses out perhaps on leisure. He invites risks and deprives himself of the pleasure of leading a quiet life. Thus he may rest content with safety margins of steady profits that should allow him to enjoy quiet-life.

B. Sales Maximization

Prof. W. J. Baumol, based on his experience as a management consultant, has suggested that the **firms strive to maximize sales revenue subject to the realization of some minimum level of profit**. 'Once a minimum profit level is achieved, sales rather than profits become the overriding goal.' By sales maximization Baumol does not mean the maximum sales of physical units of output but he implies the maximum total revenue from the sale of the output. To quote Baumol, "**Sales maximization under a profit constraint does not mean an attempt to obtain the largest possible physical volume. Rather, it refers to maximization of total revenue which, to the businessman, is the obvious measure of the amount he has sold**."

One of the implications of Baumol's sales maximization theory is that price will be lower and output greater under sales maximization than under profit maximization. Thus the oligopolists' behaviour, motivated by Baumol's principle will increase consumer's welfare because in the market larger output will be sold at lower price. Attempts have been made to criticize the sales maximization model yet despite criticism, Prof. William Baumol's Sales Maximization Hypothesis has emerged as one of the most realistic objectives of the firm.

C. Quiet-Life and Stable Profits

Prof. J. R. Hicks has been one of the first to express doubts about the firm's desire to maximize profits especially under monopoly conditions. He believes that people in monopolistic positions are likely to exploit their advantage much more by not bothering to get very near the position of maximum profit, than by straining themselves to get very close to it. **The best of all monopoly profits is a quiet life**. It may also be pointed out that instead of just maximizing profits once in several years and then under the uncertainty conditions suffering losses or struggling to keep up positive profits it would be worthwhile if the firm aims at stable and secured profits over a long period of time. **Prof. K. W. Rothschild** in his analysis on Price Theory and Oligopoly states "**there is another motive which cannot be so lightly dismissed and which is probably of a similar order of magnitude as the desire for maximum profits : the desire for secure profits**." His contention is that profit maximization no doubt is the master key motivating the firm under perfect competition, monopoly and monopolistic competition but under oligopoly he argues that secure and stable profits should be emphasized.

D. Long-Run Survival and Growth

Some firms which aim at long-term survival and gains prefer to keep their prices down in the short-run. Some companies keep down the prices in order **to retain the 'goodwill' of the customers**. It is assumed that such good-will is worthwhile from the point of view of long-run gains. The best way to long-run profit is to survive in the short-run. The firms must have a sufficiently large clientele. It may have to undertake publicity, spend on advertisements, build up a goodwill, offer hire-purchase facilities etc. After overcoming the teething trouble of mere survival, the firm then derives growth. The long-run survival and growth have been regarded as other alternative objectives of the firm.

E. Growth Maximisation

Growth maximization as the prime objective of a firm was originally mentioned by **E. T. Penrose**. A more systematic argument elaborating the objective of growth maximization was developed by **Robin Marris**.

The manager of a large firm **aims at maximizing the growth and promoting security of his firm**. The high salary of the manager in a large

firm provides incentive to enhance the size of the firm beyond the profit maximizing size.

Marris has introduced a **steady-state growth model**. Under this, managers decide upon a constant rate of growth at which the sales, profits, assets etc. of the firm should grow. A choice of a higher growth rate necessitates increasing expenditure on advertisement, research and development etc. Such growth promoting activities will be financed through retaining higher proportion of profit. A consequent decline in dividend causes a reduction in the market value of shares. Hence, the managers prefer to achieve that rate of growth at which the market value is enhanced.

F. Other Alternative Approaches

i) Balance-sheet Homeostasis: Boulding tried to revise the theory of the firm by introducing the ideal of 'balance-sheet homeostasis'. The concept of homeostasis supposes that there is **some desired set of accounting ratios** that management attempts to maintain, for an equilibrium of the balance sheet. **Stability gains prime consideration** and thus quest for 'profit max' assumes a secondary role.

ii) Behavioural Theory: In recent years, a movement to develop a theory of the firm on **'behavioural' lines** has received considerable attention. The names of **R.M. Cyert** and **J. G. March** are associated with this approach. The theory assumes full understanding of **internal operations of the firm as well as its external environment**. Unlike the conventional theory of the firm with a single goal of profit maximization, the behavioural theory does not assume that the firm has a single goal of profit maximization. The Behavioural theory does not assume that the firm has only a single goal to achieve. Instead, according to **Cyert and March, a business firm has several goals**; (1) production goal; (2) inventory goal; (3) sales goal; (4) market share goal and (5) profit goal. To achieve these goals an organizational coalition is presupposed.

iii) The Utility Index Theory: Some economists like **Higgins, Scitovsky**, feel that the objective function of the firm be defined in terms of **an ordinal utility index** rather than profit. **J. Encarnacion** points out that in modern business, management behaves rationally to **achieve a set of well defined ordered preferences and tries to maximize a multivariate preference function subject only to certain constraints which inhabit the effort.**

Thus, the desire for leisure, the need for liquidity and the quest for profit are all incorporated in management's generalized problem of constrained maximization. The Utility Index Hypothesis has the advantage of placing the theory of the firm on an equal footing with the theory of consumer choice. In this connection let us consider satisfaction maximization and staff maximization axioms.

a) Satisfaction Maximization: Scitovsky, Higgins and others attach greater significance to **satisfaction maximization** as an objective of the firm in place of profit maximization. It is suggested that, like any other individual, an entrepreneur is also influenced by the motive to maximize satisfaction.

Maximization of satisfaction does not come from profit but involves a **comparison between work and leisure. According to Hicks, leisure or 'quiet life**' is an essential aspect of an individual's welfare. As the income increases an entrepreneur is observed to **prefer leisure to more work**. The greater the activity, efforts and work to maximize the profit, the less will be the leisure enjoyed. It is necessary to incorporate the preference for leisure while analyzing the behaviour of the entrepreneur for maximizing satisfaction to more work for maximization of profits.

b) Staff Maximization: In modern times, large corporations are run by professional managers. A firm is not necessarily one-man managed concern. There is now separation between ownership and control. Under such circumstances **Berle and Means** indicate that **the managers instead of maximizing profits try to justify their own utility by employing more than necessary staff**. Under such circumstances the managers may trade-off some profits for employing more staff. This is the utility maximization theorem.

To conclude in words of **Gerald Nordquist; "Neither of these approaches, however, has yet produced an alternative which has sustained enough recognition to replace the traditional theory of the firm. Despite the scores of assaults on it over a period of more than twenty years, the battered and bruised neo-classical theory somehow manages to stand as the principal model of the firm's output, cost and price behaviour."** As long as a suitable replacement of a workable dynamic framework for analyzing business decision is developed, the conventional theory of firm with all its shortcomings is not likely to be totally discarded.

10.5 BREAK-EVEN ANALYSIS

The traditional objective of a firm is to maximize profits. Maximum profit and Minimum cost do not necessarily coincide. Profit maximization output cannot be known beforehand and even if it is known, it cannot be achieved at the outset. Thus, often in practice the firms begin their activity even experiencing a loss so as to gain the anticipated profit in future.

Break-even analysis has to do with the understanding of the concepts of Total Revenue and Total Cost. It so happens in the process of production that the firm may have to start incurring costs even before actual production begins; most of these costs are in the nature of fixed cost and hence the Total Cost Function will be an intercept on the y-axis. Even when output is zero some cost element will exist. But when no unit is sold then revenue is zero. Thus cost is higher than the revenue. There is an element of loss. But as unit after unit of the product gets sold, revenue starts accruing. The producer experiences a situation where he heaves sigh of relief. i.e. the TR will just cover TC. i.e. TR = TC. The output at the level of which TR = TC, after having experienced losses earlier in the working of the firm is indicative of Break-even point. In other words, the **Break-even point is defined as that point where the level of output is so reached that TR = TC; and hence the net income equals zero**.

For a firm producing a single product, the BEP may be computed either in terms of units of product or in terms of total rupee sales. The **Break-even volume is the number of units of product that must be sold in order to generate enough Revenue just to meet all expenses, both fixed and variable**.

We can explain the Break-even point concept with the help of the following diagram:
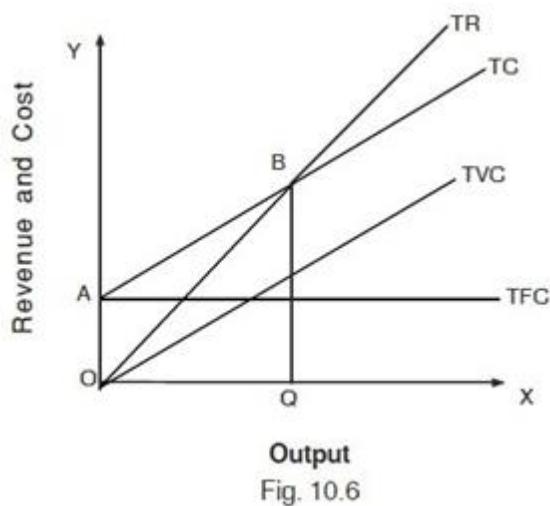
Output
Fig. 10.6

On the X-axis let us represent the output and on Y-axis we have the Revenue and Cost. TFC represents total fixed cost; making an intercept on y-axis. TVC represents total variable cost. TC represents the total Cost. TR is the Total Revenue Curve. Till the output level is OQ, the total cost is more than total revenue and therefore the area ABO indicates the area of losses. But as output reaches OQ, TR = TC at pt. B. Once the output goes beyond OQ, TR is more than TC and hence the area of profit begins. Thus, **point B is called the breakeven point**.

Algebraically, the Break-even volume is given by the formula:

$$\text{Break - even volume} = \frac{\text{Total Fixed Cost}}{\text{Price - Variable Cost}}$$

$$\text{Break - even product} = \frac{\text{Fixed Cost}}{\text{Marginal Contribution per unit}}$$

$$\text{Break - even volume} = \frac{\text{Total Fixed Cost}}{\text{Price - Variable Cost}}$$

$$\text{Break - even product} = \frac{\text{Fixed Cost}}{\text{Marginal Contribution per unit}}$$

Let us consider an illustration:

If the fixed cost of a firm is Rs. 14,000.

Variable cost per unit is Rs. 30/-

Price per unit is Rs. 100/-

At what level of output will the firm break-even?

$$BEP = \frac{\text{Fixed Cost}}{\text{Price - Variable Cost}}$$

$$= \frac{14,000}{100 - 30}$$

$$= \frac{14,000}{70}$$

$$= 200 \text{ units}$$

In accounting sense,

Sales Value is Rs. 100 X 200 = 20,000

Cost is : FC Rs. 14,000

VC Rs. 30 X 200 = 6,000

Total Cost is Rs. 14,000 + Rs. 6,000

TC is Rs. 20,000

Thus Sale value of Rs. 20,000 = Cost of Rs. 20,000.

TR = TC

i.e. Rs. 20,000 = Rs. 20,000

Total Profit is nil.

Thus 200 units is Break-even level of output.

Assumptions underlying Break-even analysis

i) The behaviour of Costs and Revenues can be reliably determined and remain linear over the relevant range.

ii) Costs can be classified into fixed and variable components.

iii) FC must remains constant over the range of the output.

iv) VC vary proportionately with the volume of output.

v) Selling prices do not alter.

vi) Prices of factors remain unaltered.

vii) Productivity and efficiency remain unchanged

viii) Volume is the only factor affecting cost.

ix) There is uniformity in the value of Rupee at production point and at sales point.

x) The volume of sales and the volume of production are equal.

Limitations of Break-even analysis

According to Joel Dean:

The limitations of BEA arise from various sources such as "errors of estimating the true Static Cost function, over-simplification of the Static Revenue function, dynamic forces that shift and modify these static functions and managerial adaptations to the altered environment."

a) With costs the analysis is weak because the linear relationships do not hold good for all levels of output.

b) With increase in sales, the firm uses the plant and equipment beyond capacity.

c) New plant added or O.T. done increases costs sharply.

d) Over period of time the product undergoes changes in quality.

e) Depreciation estimates are quite arbitrary.

f) Matching time of output and cost is a serious limitation because output in a particular period may not be the result of cost of that period. It becomes tedious to synchronise such costs with the output.

g) The linear break-even analysis assumes selling price constant over the range of output.

h) Changes in pattern of demand, concessions, mix product impair the accuracy of the analysis.

i) Break-even analysis is essentially static in nature. Dynamic forces impose added restrictions of break-even analysis. It assumes technology, scale of plant and efficiency constant and does not make adjustments to provide for changes in factor prices.

j) Break-even charts are based on the assumption that profit is the function of output and has nothing to do with sales effort.

k) The simple type of BEA does not consider elements of uncertainty due to changes in tax structure.

Uses of BEA

1. BEA is a useful tool of managerial planning and decision-making.

2. It is a simple and inexpensive device.

3. It is useful as a frame of reference and a vehicle for expressing the over- all performance in situations where no such information is available.

4. It is useful to management because it provides information for decision- making.