

Chapter -five

Economic Analysis of Industrial Operations

IV. Economic Analysis of Industrial Operations

- ❖ The basic objective is to formulate techniques for obtaining the maximum economic efficiency of an operation.
- ❖ What is cost? It is the amount of expenditure incurred or attributable to a given thing.
- ❖ According to the nature or elements of costs can be broadly classified as:
 - Direct costs and
 - Indirect costs.

❖ **Direct costs:** are the costs which can be conveniently identified with and collect to a particular unit of final product. Such costs are treaded as **the costs of unit produced.**

E.g. Labor cost, raw material cost, & other direct expenses

❖ The direct costs can further be classified as:

i) direct material

ii) direct labor

iii) direct expenses

❖ All expenses that are other than direct material or direct labor that are specifically incurred for a particular job, product or a process are called direct expenses.

Indirect Costs

- ❖ Many costs are of indirect nature and are not easily associated with the output of a particular unit of product or service.
- ❖ One should note that indirect costs are costs which are not easily related to the cost of a particular product.
- ❖ But it does not mean it is unproductive, useless, or unbeneficial.
- ❖ Indirect costs consist of **three elements**:

1. Factory Expenses: These costs include salaries of foremen and factory office workers; expenses of maintenance staff; depreciation of factory equipment and buildings; and payment for power, water, telephone, telex, etc.

2. Administrative Expenses: These expenses include salaries of administrative personnel; expenses for office supplies, telephone, telex and postage; depreciation of office equipment and buildings; and insurance fee, etc.

3. Selling Expenses: They include salaries and commissions of salesmen; and advertising and traveling expenses for sales promotion.

Total Cost

- ❖ The total cost of a product may be calculated in at least two different ways, by breaking it into its basic cost components.
- ❖ Total cost is the sum of manufacturing cost and selling expenses.

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Total Cost = Manufacturing cost + Selling Expenses(SE)

Manufacturing Cost = Factory Cost + Administrative Expenses

$$MC = FC + AE$$

Factory Cost = Prime Cost + Factory Expenses

$$FC = PC + FE$$

Prime Cost = Direct Labor + Direct Material Costs

$$PC = DL + DM$$

Finally total cost is the sum of direct labor, direct material, factory expense, administrative expense and selling expenses.

$$TC = DL + DM + FE + AE + SE$$

- ❖ The total cost can also be calculated as the sum of fixed cost and variable costs

$$\textit{Total Cost} = \textit{Fixed Cost} + \textit{Variable cost}$$

$$TC = FC + VC = (FE + AE + SE) + (DM + DL)$$

❖ Production costs includes fixed cost and variable cost.

1. Fixed costs: are expenses which are independent of the volume of output (i.e. constant for any level of production output).

Examples of the fixed costs include cost of factory building, insurance, lighting expenses, etc.

2. Variable costs: are expenses which vary or change proportionally with the level of output (i.e. increases as the level of production increases).

Examples are direct labor costs, expenses of raw material, electrical power to operate the production machines, etc.

- ❖ Therefore, every industrial operation must be carefully scrutinized to establish the most efficient way in which it can be performed.
- ❖ We shall formulate and illustrate numerous techniques for obtaining the maximum economic efficiency of an operation

1. Location of Break-even points

In general, the term break-even point denotes the point in a diagram at which two lines intersect. For example, it refers to the point at which revenue from the sale of a commodity is equal to the cost of producing the commodity, or the point at which the cost of production is identical under two alternative methods of manufacture.

Example: Two companies A & B, manufacture the same commodity. Company A uses a mechanized process, and company B relies mainly on manual labor. The **fixed cost** is \$ 40,000 per month for A and \$ 15,000 per month for B. The **directly varying cost** is \$ 14 per unit for A and \$ 52 per unit for B. The **selling price** is \$ 85 per unit for each company.

- a) At **what volume** of production are the unit costs of the two companies identical?
- b) How many units must each company sell each month merely to **avoid a loss**”

Solution:

Let: X = number of units produced and sold per month

C = total cost of producing X units

U = unit cost

P = monthly profit

For each company:- total cost and profit function will be:-

Cost Function

$$CA = 40,000 + 14X \dots (a)$$

$$CB = 15,000 + 52X \dots (b)$$

Profit Function

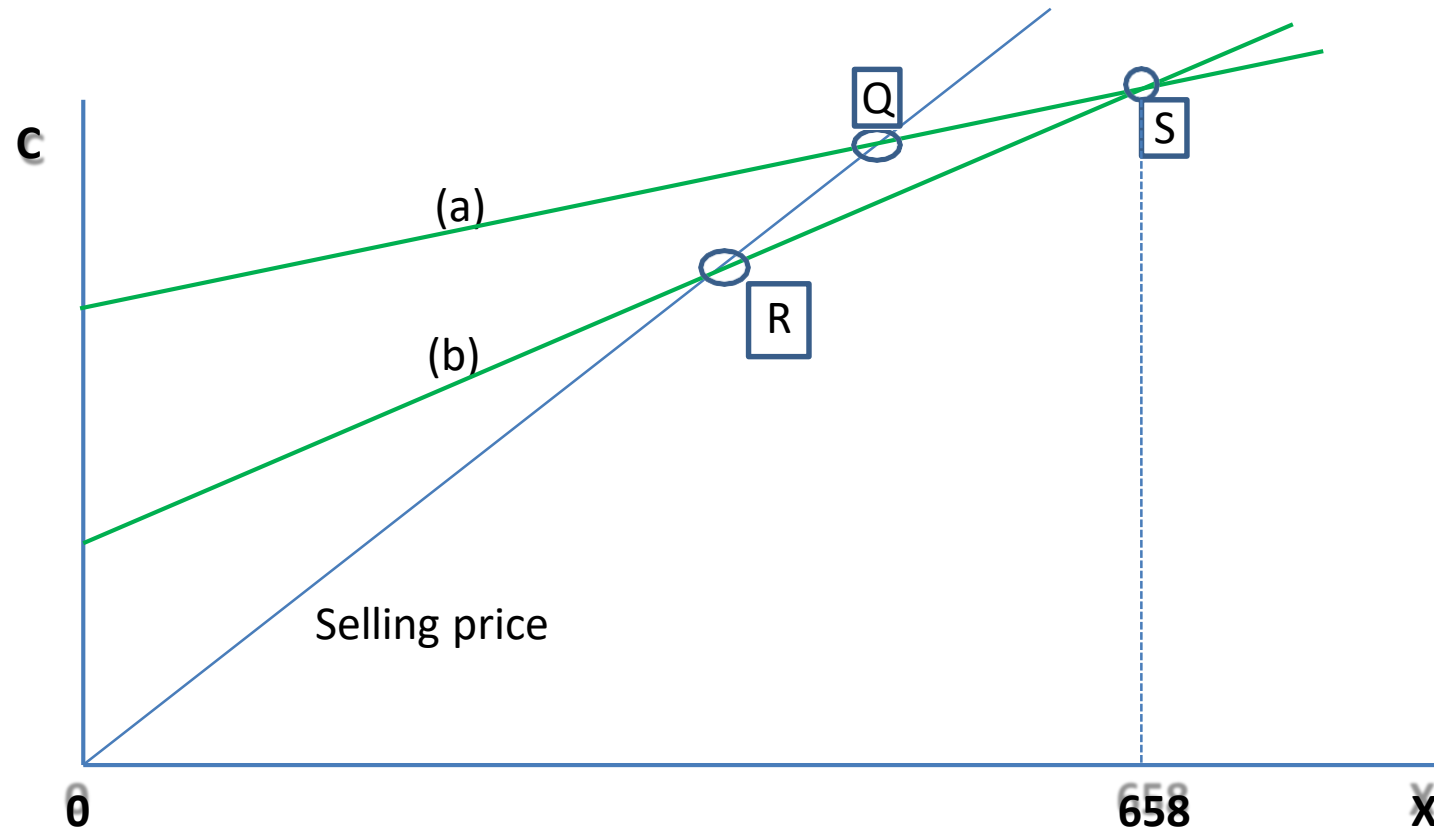
$$PA = 85X - (40,000 + 14X) = 71X - 40,000$$

$$PB = 85X - (15,000 + 52X) = 33X - 15,000$$

a) If the unit cost of production of the two are equal, then the volume of production will be:

$$CA = CB; 40,000 + 14X = 15,000 + 52X;$$

Solving for X : $X = 658$ units/month (**point S**)



Point S in the figure is the break-even point in the respect that it reveals the minimum production that is needed to justify use of mechanized process

b) Each company must sell each month in order to avoid loss can be calculated as:

i) For mechanized process , it is finding the value of X at point Q

At point Q: cost of production= Selling price

Therefore $CA=SA$; $40,000+14X=85X$

Solving for X: $X_A=563$ units/month

ii) Similarly for manual process, it is finding the value of X at point R

At point R: $CB=SB$; $15,000+52X=85X$

Solving for X: $X_B=455$ units/month

Thus, companies A and B must sell 563 and 455 units per months, respectively to avoid loss.

Points Q and R are break-even points in the respect that they reveal the minimum number of units each firm must sell **to cover expenses**.

Thank you!!!

Please don't forget reading!