Module 2.

Cost Volume Profit Analysis

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Cost Volume Profit (CVP)

- Introduction
- Fixed costs
- Variable costs
- Semi-variable costs
- Contribution margin
- Break even point
- PV Ratio

CVP Analysis

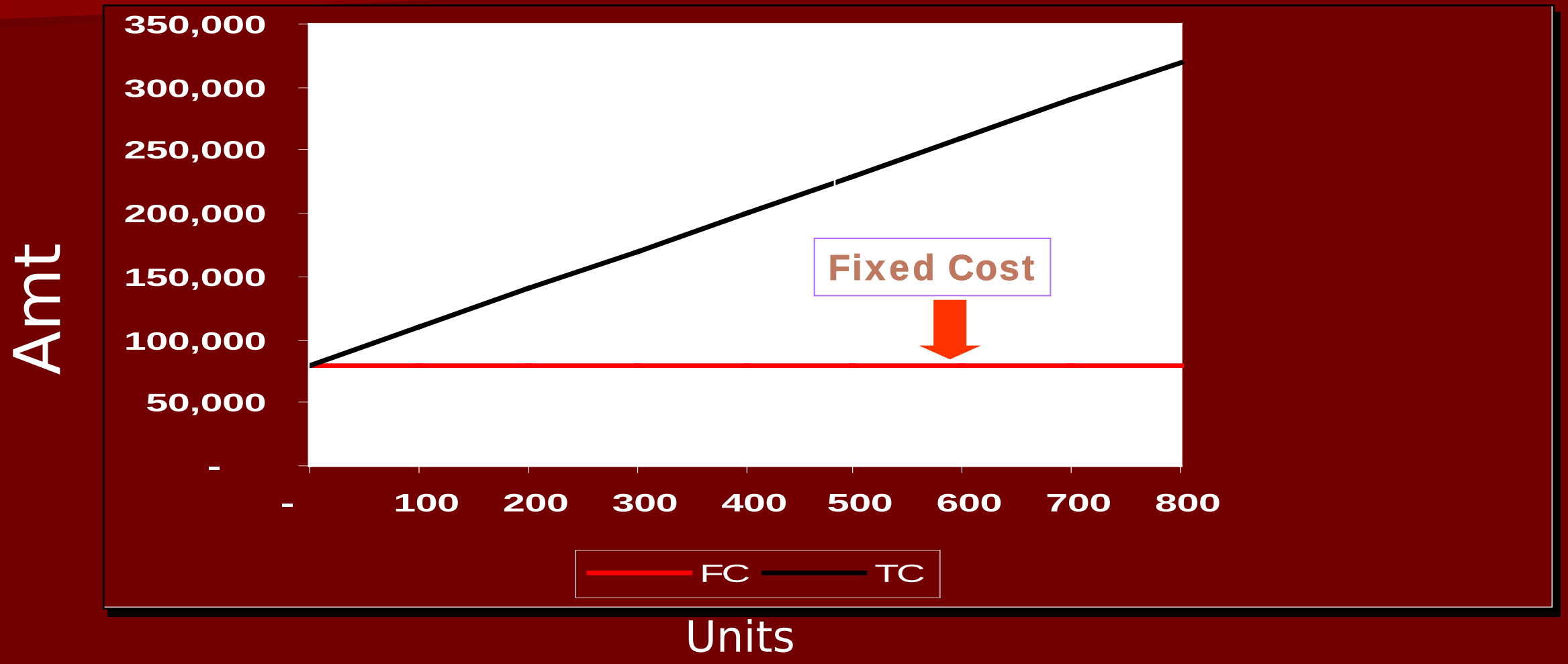
CVP analysis is the analysis of three variable viz. cost, volume and profit. Such analysis explores the relationship existing amongst costs, revenue, activity level and resulting profit. It aims at measuring variation of cost with profit.

Fixed Cost

These are the costs which incurred for a period and which within certain output and turnover limits, tend to be unaffected by fluctuations in the levels of activity (Output or turnover).

For example: Rent, insurance of factory building etc. remain the same for different levels of production.

Fixed Cost Graph

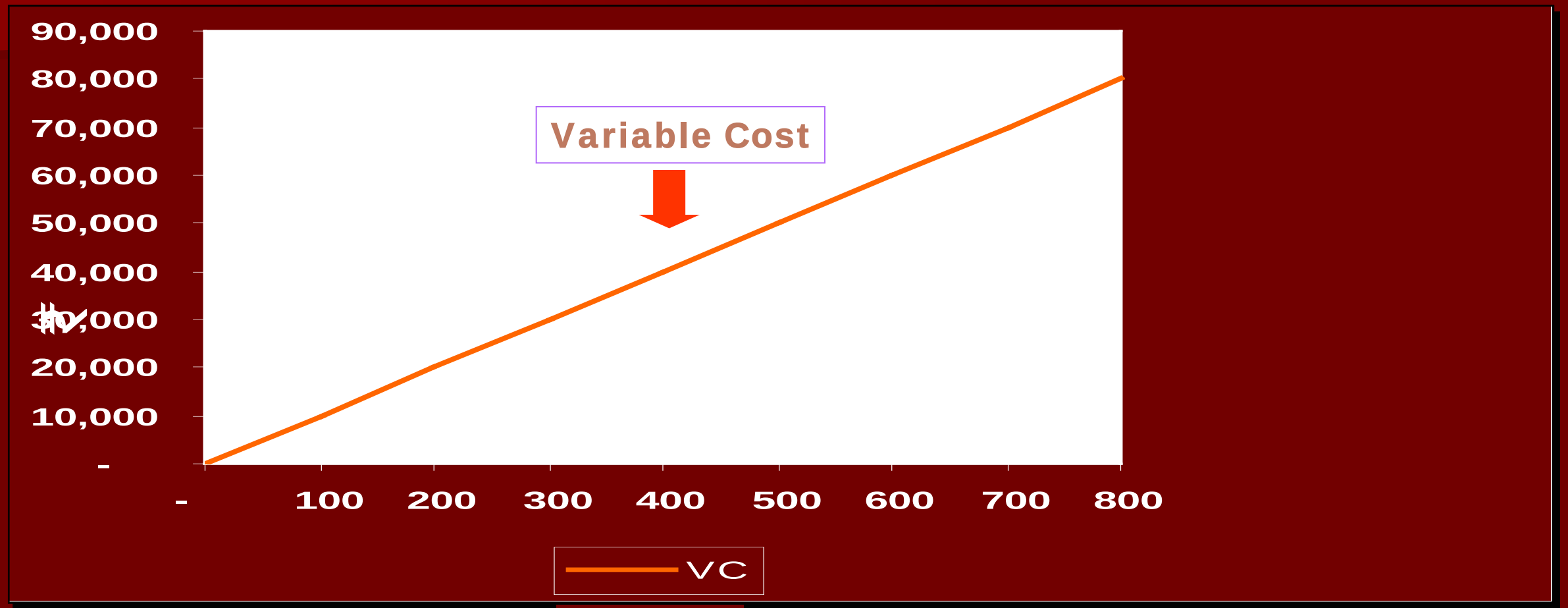


Variable Cost

These costs tend to very with the volume of activity. Any increase in activity results in an increase in the variable cost and vice versa.

For example: Cost of direct labour, direct material, etc.

Variable Cost Graph

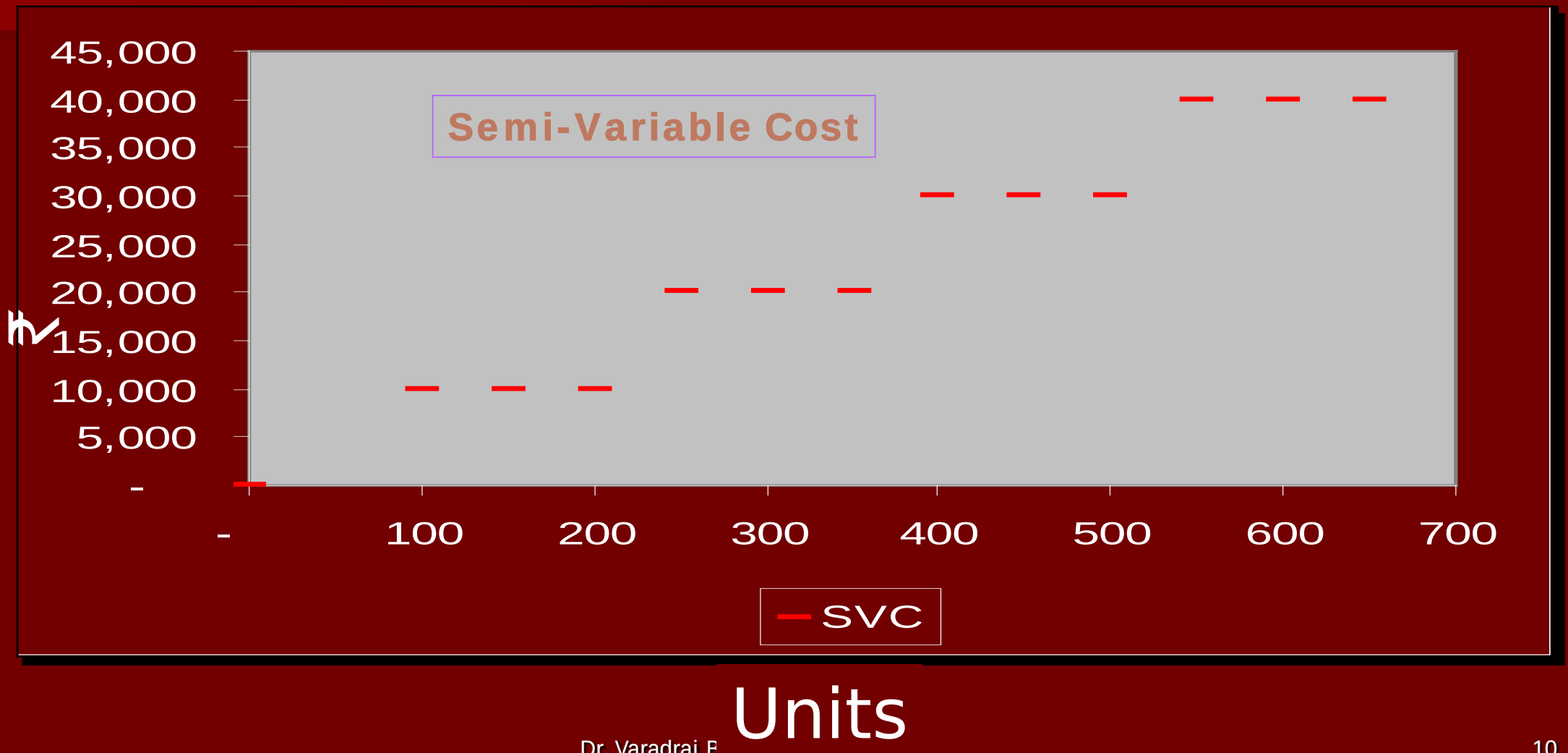


Semi-Variable Cost

These costs contain both fixed and variable components and thus partly affected by fluctuation in the level of activity.

Examples of semi variable costs are telephone bill, gas and electricity etc.

Semi-Variable Cost Graph



Cost-Volume-Profit Analysis

CVP analysis:

- Takes into account
  - the total costs (fixed and variable)
  - the total sales revenues
  - desired profits vis-a-vis the sales volume

It is used for forecasting or predicting how the changes in costs and sales volume affect profit. It is also known as 'Break-Even Analysis'.

CVP analysis could be helpful in the following situations:

Budget planning: for forecasting profit by considering cost and profit relation, and volume of production volume. This will help in determining the sales volume required to make a profit.

–To make decisions regarding pricing and sales volume.

Determining the sales mix of different products, in what proportions each of the products can be sold.

– Preparing flexible budget considering costs at different levels of production

Objectives of CVP Analysis

- Understand the interaction among
  - Prices of products
  - Volume or level of activity
  - Per unit variable cost
  - Total fixed cost
  - Mix of product sold

Assumptions of CVP Analysis

- Expenses can be classified as either variable or fixed.
- CVP relationships are linear over a wide range of production and sales.
- Sales prices, unit variable cost, and total fixed expenses will not vary within the relevant range.

- Volume is the only cost driver.
- The relevant range of volume is specified.
- Inventory levels will be unchanged.
- The sales mix remains unchanged during the period.

Profit Volume Ratio (PV)

The contribution margin ratio (CMR) i.e. PV ratio is the percentage by which the selling price (or revenue) per unit exceeds the variable cost per unit, or contribution margin as a percentage of revenue.

Calculations

- **Profit Equation and Contribution Margin**

1. Profit =Sales -Total costs
2. Profit = Sales -Total variable costs - Total Fixed costs
3. Contribution margin = Total revenue – Total variable costs

Sales	XX
-Variable Cost	(XX)
Contribution	XX
-Fixed Cost	(XX)
Profit	XX

- Profit = (S-V)*Q – FC
- $Q = \frac{(FC + \text{Expected Profit})}{(S-VC)}$
- Q is the no. of units required to be sold to obtain target profit.
- S=Selling Price p.u. VC=Variable cost p.u. FC=Fixed Cost

BEP analysis

- Breakeven analysis is used to find the minimum level of production required
- Evaluates both fixed and variable costs

- Uses:
  1. To find a suitable product mix
  2. To find the sales required to reach a desired revenue.
  3. The profits at certain price level and sales

Break even Point (BEP)

A CVP analysis can be used to determine the BEP, or level of operating activity at which revenues cover all fixed and variable costs, resulting in zero profit.

In other words, this is the point where no profit or losses have been made

Break even Applications

- **Pricing decisions:-** Enables to study the effect of changing price and volume relationship on total profits.
- **Make or Buy Decision:-**
- **Temporary Shut Down:-**

- **Modernizations or automation decisions:-**
- Analysis the profit in implication of a modernization or automation programme.
- **Expansion Decisions :-**
- studies the aggregate effect of a general expansion in production and sales.
- **New Product decisions :-**
- Enables to determine the sale volume required for a firm (or an individual product) to breakeven , given expected sales price and expected costs.

Formulae

- BEP in units = $\dfrac{\text{Total fixed costs}}{\text{(Sales price – variable cost p.u.)}}$

  = $\dfrac{\text{Fixed cost}}{\text{Contribution per unit}}$

- BEP in sales value = $\dfrac{\text{Fixed cost}}{\text{PV Ratio}}$

Cost-Volume-Profit Graph

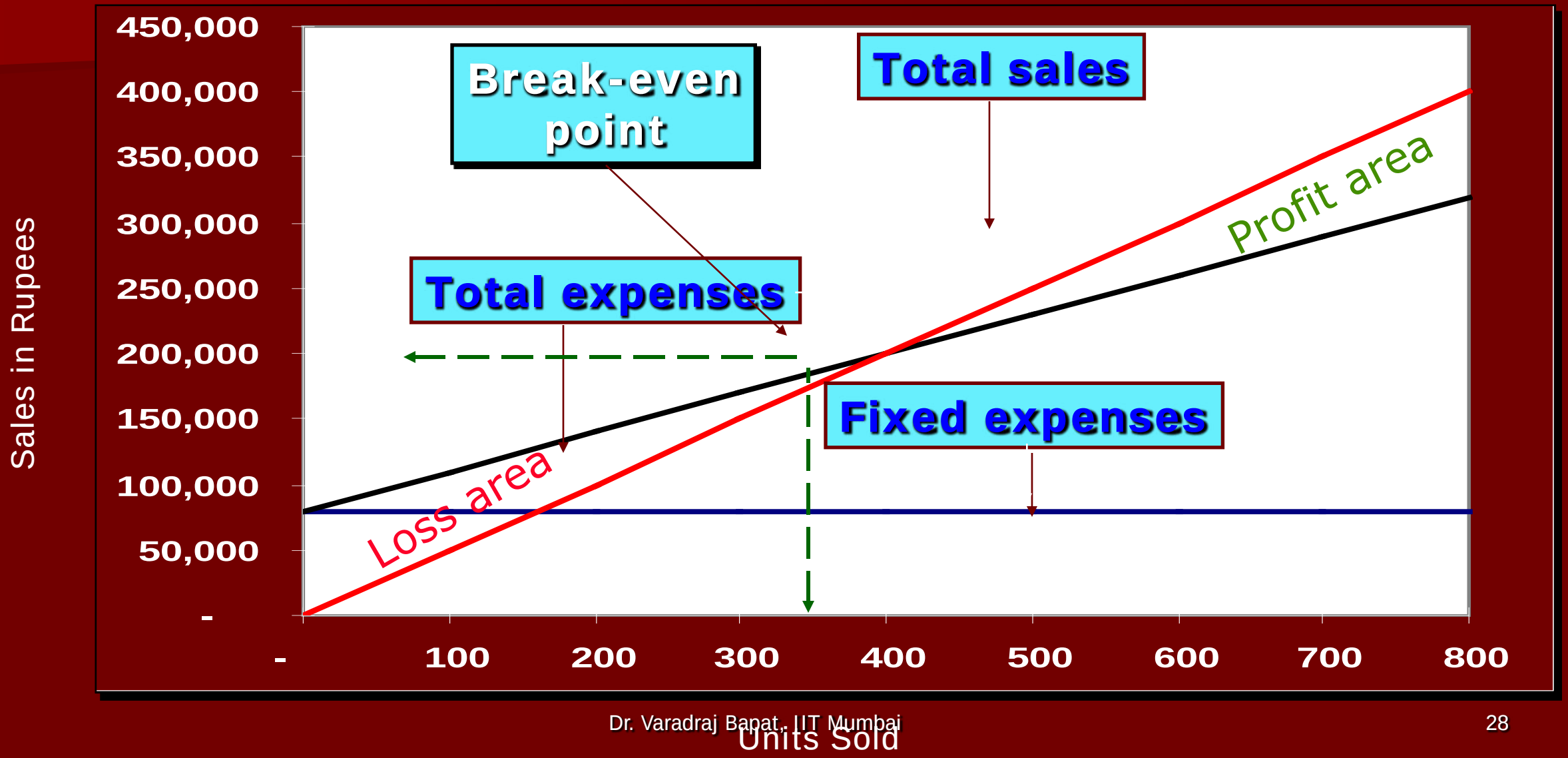


Illustration 1

Suppose that Krishna Games wants to produce a new toy bike and has forecast the following information.

- Price per bike = ₹800
- Variable cost per bike = ₹ 300
- Fixed costs related to bike production = ₹ 55,00,000
- Target profit = ₹ 2,00,000
- Estimated sales = 12,000 bikes

Kindly determine

1. the quantity of bikes needed for break even and to earn the target profit
2. PV Ratio
3. BEP in Amount
4. Estimated Profit

We determine the quantity of bikes needed for the target profit as follows:

Contribution per unit = SP – VC pu

= 800 – 300 = 500

1. Break Even (Q) = Total FC/ Contr pu.

= 5500000/500

= 11000 bikes

1. Target Quantity = (₹55,00,000 + ₹2,00,000) / (₹800 - ₹300) = 11,400 bikes

2. PV RATIO = Contribution pu/ SP
= 500/800 = 0.625

3. Break Even (Amt) = Total FC/ PV Ratio
= 5500000/0.625
= Rs. 8800000

4. Estimated Profit = Estimated Q* Contr pu – FC

= 12000*500 - 5500000

= 6000000 – 5500000

= 500000

Margin of safety

- Margin of Safety= Actual Sale – BEP Sale
- Margin of Safety (%) = (Sales - BEP)/Sales x 100

- Represents the safety available to the business at the current level of sales.

Illustration2

- M/s. Prabha Devi Ornaments
- Sales 5000 units
- Sales price per unit Rs. 50
- Variable cost per unit Rs. 30
- Fixed cost Rs. 35000
- Compute BEP Quantity and Amount and MOS (%)

Therefore, contribution per unit = 50-30 =Rs. 20

1. BEP in units = FC/Contr. Pu = 35000/20
   = 1750 units
2. BEP in sales value = 1750 * 50 = Rs. 87500

- BEP in sales value = FC/PV Ratio
  = 35000*20/50
  = Rs. 87500

- Margin of Safety (%) = (Sales - BEP)/Sales x 100
- Margin of safety = $\frac{(5000-1750)}{5000}$

  =65%
- Hence even if the sales decrease by 65%, the business wont face any loss


Thank You!