

Break Even Point ANALYSIS BEP



OBJECTIVES:



After studying this unit you should be able to:

1. understand the concept of break even analysis, impact of change in sales volume, price, variable cost, fixed costs on profits;

2. apply cost-volume profit relationship for profit planning;
3. BEP Calculations (in Units / in Value) .
4. BEP Interpretations

PREREQUISITE:

- ✓ *Variable cost method,*
- ✓ *Linear representation.*

DEFINITION :

It is a point where sales revenue equals the costs to make and sell the product and no profit or loss is reported. In the words of Keller and Ferrara, “**the break even point of a company or a unit of a company is the level of sales income which will equal to the sum of its fixed costs and variable costs.**”

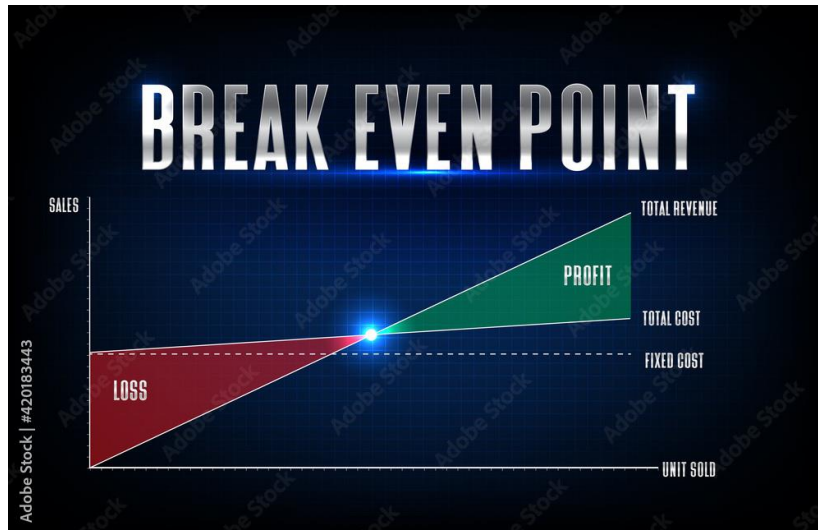
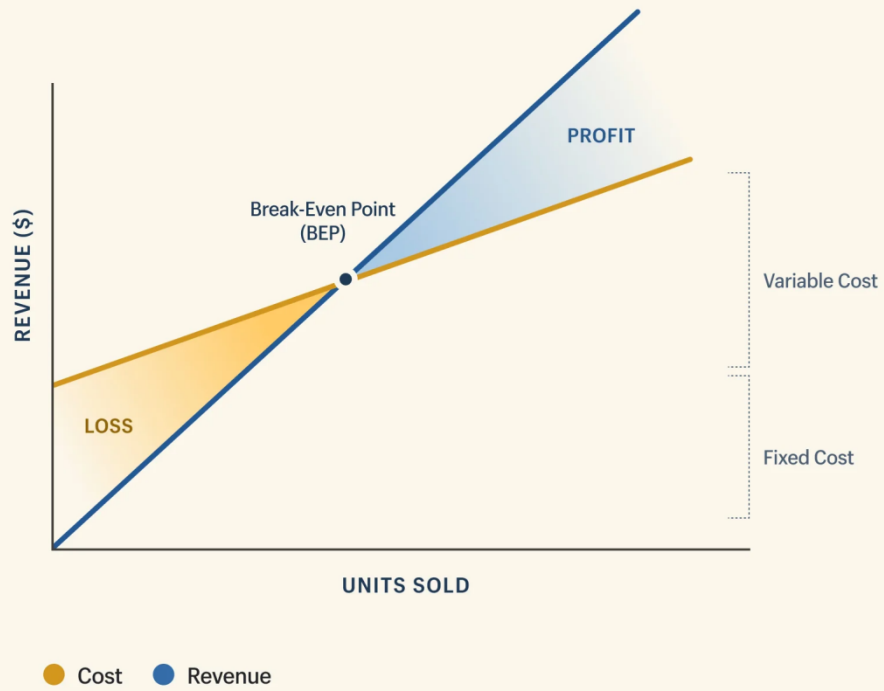
Charles T. Horngren define it, “**the break even point is that point of activity (sales volume) where total revenues and total expenses are equal, it is the point of zero profit and zero loss.**”

Breakeven point can be determined in terms of:

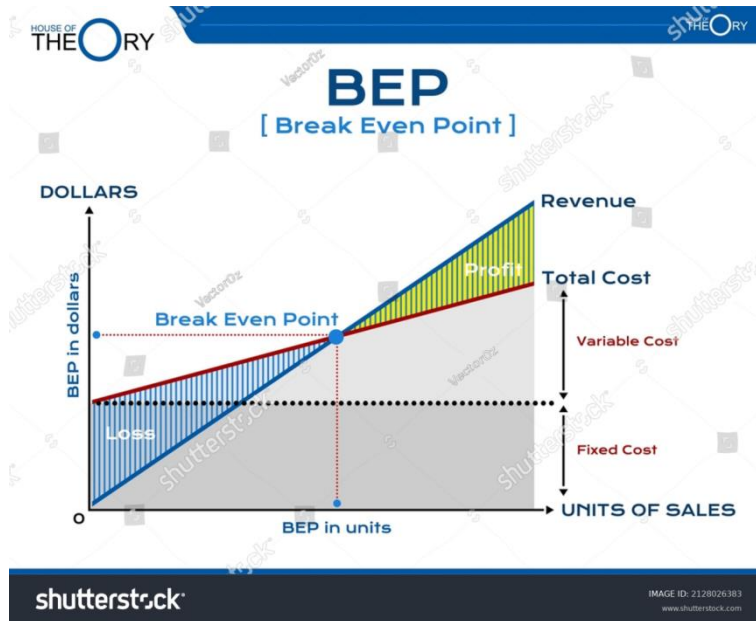
- **Sales revenue** : *how much revenue do you need to generate to start making profit? Break Even in Value*
- Units of **sales** : *how many units of your product will you will be able to sell before making profit? Break Even in units*
- **Time or Duration:** *how long will you be in business to be able to start making profit*

*Revenues of the business are **equal to its total costs** and its **contribution margin equals its total fixed costs***

Break-Even Analysis



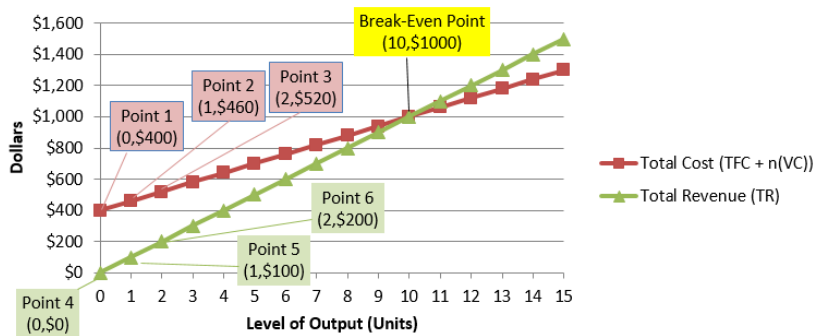
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Break-Even Point Illustrated through Total Cost and Total Revenue



Formula BEP

Number of units required to break- even =	$\text{Fixed costs} / \text{Contribution margin}_{\text{ per unit}}$
Sales revenue required to break- even =	$(\text{Fixed costs}) \times (\text{unit selling price}) / \text{Contribution margin}_{\text{ per unit}}$
Number of sales _(value) needed to earn a target profit =	$(\text{Fixed costs} + \text{Target Profit}) / \text{Contribution margin ratio}$
Number of units needed to earn a target profit =	$(\text{Fixed costs} + \text{Target Profit}) / \text{Contribution margin}_{\text{ per unit}}$
Break-even point, _{in units} =	$\text{Fixed costs} / \text{Contribution margin}_{\text{ per unit}}$
Break-even point _(value) =	$\text{Fixed costs} / \text{Contribution margin ratio}$
Contribution margin =	$\text{Sales revenue} - \text{variable costs}$
Contribution margin _{per unit} =	$\text{Sales price}_{\text{ per unit}} - \text{variable costs}_{\text{ per unit}}$
Contribution margin ratio =	$\text{Contribution margin}_{\text{ per unit}} / \text{sales price}_{\text{ per unit}}$
Margin of safety, _(value) =	$\text{Expected sales} - \text{Break-even sales}$
Margin of safety, _{in percent} =	$(\text{Expected sales} - \text{Break-even sales}) / \text{Expected sales}$

Application

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Star Symphony would like to perform for a neighboring city. Fixed costs for the performance total \$5,000. Tickets will sell for \$15 per person, and an outside organization responsible for processing ticket orders charges the symphony a fee of \$2 per ticket. Star Symphony expects to sell 500 tickets.

1. How many tickets must Star Symphony sell to break even?
2. How many tickets must the symphony sell to earn a profit of \$7,000?
3. How much must Star Symphony have in sales dollars to break even?
4. How much must Star Symphony have in sales dollars to earn a profit of \$7,000?
5. What is the symphony's margin of safety in units and in sales dollars?

Note: All solutions are rounded.

Solution

1. Target profit= \$7000
2. Total fixed costs=5,000
3. Selling price per unit=\$15
4. Variable cost per unit=\$2

$$1. \text{ (Total fixed costs + Target profit) } / (\text{Selling price per unit} - \text{Variable cost per unit}) = \\ (5,000 + 0) / (15 - 2) = 385 \text{ units}$$

The symphony must sell 385 tickets to break even:

$$2. \text{ (Total fixed costs + Target profit) } / (\text{Selling price per unit} - \text{Variable cost per unit}) = \\ (5000+7000)/ (15 - 2) = 923$$

The symphony must sell 923 tickets to make a profit of \$7,000

$$3. \text{ (Total fixed costs + Target profit) } / (\text{Contribution margin ratio}) \\ = (5,000 + 0) / (15 - 2) \div 15 = 5,769$$

The symphony must make \$5,769 in sales to break even:

$$4. \text{ Total fixed costs + Target profit} / (\text{Contribution margin ratio}) \\ = (5,000 + 7,000) / (15 - 2) \div 15 = 13,846$$

The symphony must make \$13,846 in sales to earn a profit of \$7,000

$$5. \text{ Margin of safety} = \text{Projected sales} - \text{Break-even sales} \\ 115 \text{ tickets} = 500 \text{ tickets} - 385 \text{ tickets} \\ \$1,725 \text{ in sales} = (500 \times \$15) - (385 \times \$15)$$

The symphony's margin of safety is 115 units or \$1,725 in sales:

Application

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	Inkjet	Laser	Color Laser	Total
Selling price per unit	\$250	\$400	\$1 600	
Variable cost per unit	\$100	\$150	\$ 800	
Expected unit sales (annual)	12 000	6 000	2 000	20 000
Sales mix %	60	30	10	

Total annual fixed costs are \$5,000,000. Assume the sales mix remains the same at all levels of sales.

1. How many printers in total must be sold to break even?
2. How many units of each printer must be sold to break even?
3. How many printers in total must be sold to earn an annual profit of \$1,000,000?
4. How many units of each printer must be sold to earn an annual profit of \$1,000,000?

Note: All solutions are rounded.

Solution

1. *IPM must sell 20,408 printers to break even:*
(Total fixed costs + Target profit) / Weighted average contribution margin per unit =

$$(\$5,000,000 + \$0) / (\$150 \times 0.60) + (\$250 \times 0.30) + (\$800 \times 0.10) = 20,408 \text{ printers}$$

2. As calculated previously, 20,408 printers must be sold to break even. Using the sales mix provided, the following number of units of each printer must be sold to break even:
- Inkjet: 12,245 units = $20,408 \times 0.60$
 - Laser: 6,122 units = $20,408 \times 0.30$
 - Color laser: 2,041 units = $20,408 \times 0.10$

3. IPM must sell 24,490 printers to earn \$1,000,000 in profit
(Total fixed costs + Target profit) / Weighted average contribution margin per unit =
 $(\$5,000,000 + \$1,000,000) / (\$150 \times 0.60) + (\$250 \times 0.30) + (\$800 \times 0.10) = 24,490 \text{ printers}$

As calculated previously, 24,490 printers must be sold to earn \$1,000,000 in profit. Using the sales mix provided, the following number of units for each printer must be sold to earn \$1,000,000 in profit:

- Inkjet: 14,694 units = $24,490 \times 0.60$
- Laser: 7,347 units = $24,490 \times 0.30$
- Color laser: 2,449 units = $24,490 \times 0.10$

