

Unit 28 :

Break-Even Analysis

1. **Break-even point** : level of output where total costs and total revenue are exactly the same : neither a profit nor a loss is made.

$$\text{Break-even point} = \frac{\text{Fixed cost}}{\text{Selling price-Variable cost per unit}}$$

For example : MR.A has a contract with a house builder to install fire alarms in state-owned council houses. Mr.A charges 25 Baht for each installation. Fixed costs are 20,000 Baht and Variable cost are 5 baht per installation. How many alarms have to be installed before the business breaks even?

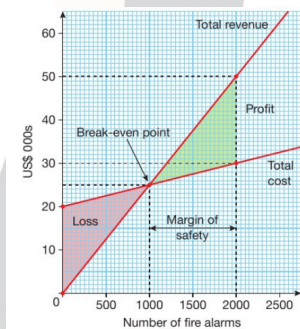
How to solve : Break-even point = $\frac{\text{Fixed cost}}{\text{Selling price-Variable cost per unit}}$

$$= \frac{20,000}{25-5}$$

$$= 1,000 \text{ units}$$

2. Break-even point chart

- Break-even point chart : graph that shows total cost and total revenue ; break-even point is where total cost and total revenue intersect.
- Margin of safety : amount of output available to be sold above the break-even point where the business makes a profit.



▲ Figure 28.1 Break-even chart for Ed Winchester

3. Constructing a break-even chart

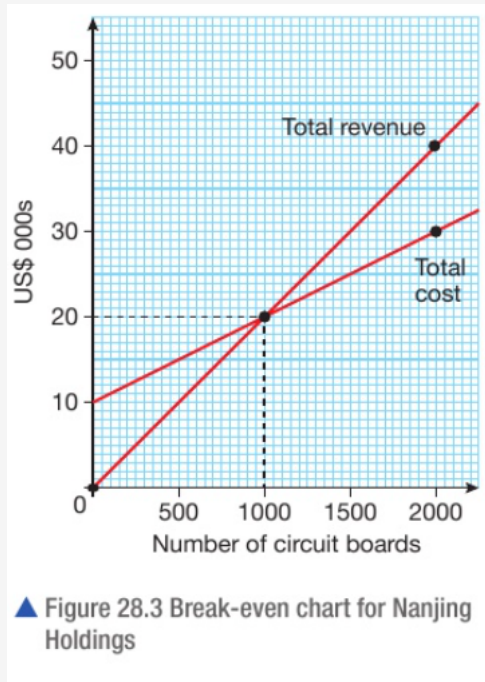
For example : Mr.B assembles circuit boards to go inside electronic devices. Fixed costs are 10,000 Baht, Variable cost 10 Baht / unit and assembled boards are sold for 20 Baht each.

Step	Details									
Step 1	Calculate the break-even point first : $\frac{10,000}{20-10}$: 1,000 Unit									
Step 2	Construction the line - It is necessary to choose two level of output and work out the total cost and total revenue at each level <ul style="list-style-type: none"> • Choosing 0 - If output is 0, TC will be 10,000 & TR = 0 • Choosing second point , choose a value that is double the break-even point. - In this case, output will be 2,000 unit - When output is 2,000, TC = $10,000 + (10 \times 2,000) = 30,000$ - When output is 2,000, TR = $20 \times 2,000 = 40,000$ <table border="1" style="margin: 10px auto;"> <thead> <tr> <th>OUTPUT</th> <th>TC</th> <th>TR</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>US\$10 000</td> <td>US\$0</td> </tr> <tr> <td>2000</td> <td>US\$30 000</td> <td>US\$40 000</td> </tr> </tbody> </table>	OUTPUT	TC	TR	0	US\$10 000	US\$0	2000	US\$30 000	US\$40 000
OUTPUT	TC	TR								
0	US\$10 000	US\$0								
2000	US\$30 000	US\$40 000								

Step 3

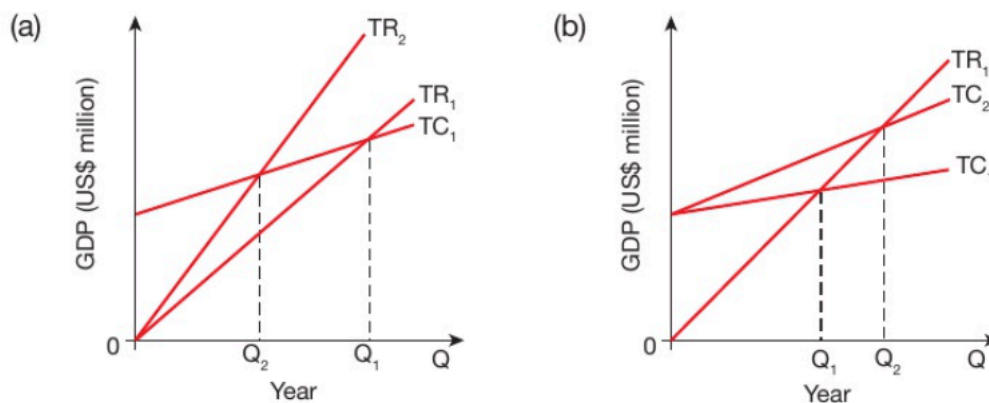
The value shown in the table represent two sets of co-ordinates, which can be used to plot TC and TR for the break-even point chart.

- Output is measured on the horizontal axis and goes up to 2,000
- Costs, revenue, profit are measured on the vertical axis and go up to 40,000 baht
- TC are be drawn by placing the co-ordinates (0,20,000) and (2000, 30,000) on the chart and joining them with a straight line.
- TR can be down by placing the co-ordinates (0,0) and (2,000,40,000)



4. Effect of changes in price and costs on the break-even chart

- If price is higher, TR will be steeper and the break-even point will shift to the left. This is shown in (a)
- If price is lower, the TR will be flatter and the break-even point will shift to the right
- If FC is higher, TC will move upward with the steepness unchanged and the break-even point will shift to the right.
- If VC is higher, TC will be steeper and the break-even point will shift to the right. This is shown in B.



5. The limitations of a break-even chart

A break-even chart shows

- How much output a business has to produce in order to break even
- The costs, revenue and profit at different levels of output
- The margin of safety

However, the chart does have some limitations

- The TC and TR shown as shown as straight lines. In practice, they may not be straight lines.
- It is assumed that all output is sold and no stocks are held. Many businesses hold stocks of finished goods to be able to cope with changes in demand.
- The accuracy of the break-even chart depends on the quality and accuracy of the data used to construct total cost and total revenue.