

Lesson 8. Long and Short-term Planning

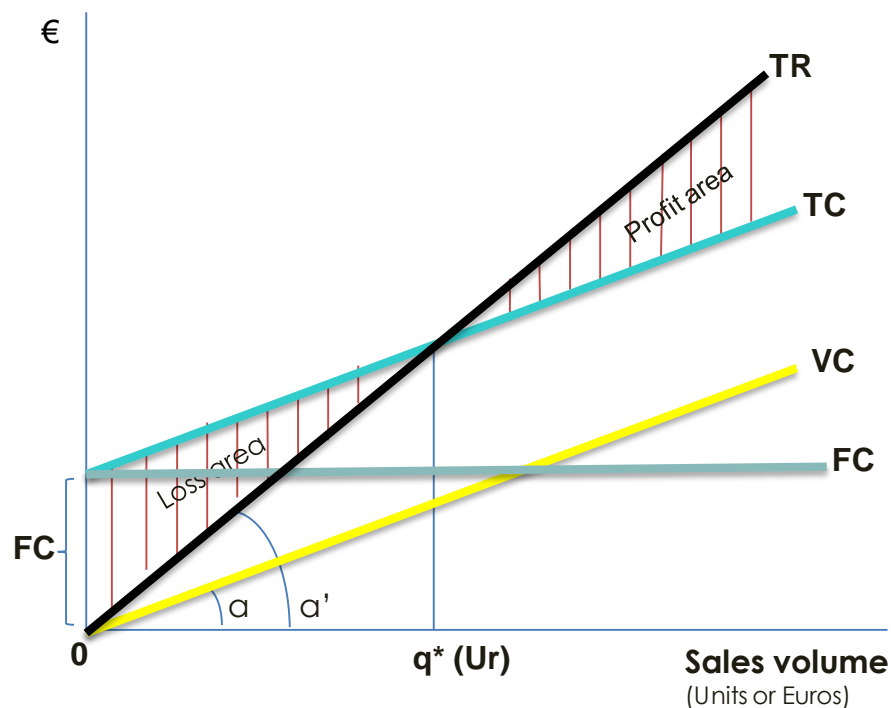
COMPLEMENT: BREAK-EVEN POINT

Basic references:

- Heizer, J. & Render, B. (2014): Operations Management. New Jersey: Pearson Prentice Hall
- Slack, N; Brandon-Jones, A (2019) :Operations Management. 9th ed, Pearson

By Professor Emilio Camarena Gil

Break-even point



TR Total revenues

TC: Total costs (CF+CV)

VC: Variable costs

FC: Fixed costs (structural costs)

α : CVu: UNIT VARIABLE COST

α' : PVu: UNIT SALES COST

q^* : Sales level where $TR = TC$

BREAK-EVEN POINT

- SALES LEVEL WHERE PROFIT IS ZERO
- $U_R = FC / (PVu - CVu)$

EXAMPLE

- FC=100,000 EUROS.
- CVu=20 EUROS
- PVu=30 EUROS
- $U_R = 100,000 / (30 - 20) = 10,000$ UNITS

Break-even point

Below is another way to calculate break-even point (BP).

The contribution margin of the example is:

$$\text{Margin} = (\text{sales price} - \text{variable cost}) / \text{sales price} = (30 - 20) / 30 = 0.333$$

i.e. 33.3 % of the sales price is the margin.

The BP will be:

$$\text{BP} = \text{fixed costs} / \text{margin in \%} = 100,000 / 0.333 = \text{€}300,000.$$

We need to sell €300,000 to have a contribution margin of

$$\text{€}300,000 * 0.333 = \text{€}100,000 \text{ to cover fixed costs}$$

Break-even point

What if the company sells different products?

First, we need to calculate the weighted margin.

Example:

Suppose a company selling three product lines, whose margins are:

33.3 % for product line 1

25 % for product line 2

15% for product line 3

Sales of these product lines are 50%, 30%, and 20% of overall sales, in euros.

Weighted margin = $(33.3\% * 0.5) + (25\% * 0.3) + (15\% * 0.2) = 27.15\%$

We then proceed as in the previous slide:

BP = fixed costs / margin in % = $€100,000 / 0.2715 = €368,324$

Break-even point

Let's see with an example:

Le Bistro, like most other restaurants, makes more than one product and would like to know its break-even point in dollars. Information for Le Bistro follows. Fixed costs are \$3,000 per month.

ITEM	ANNUAL FORECASTED SALES UNITS	PRICE	COST
Sandwich	9,000	\$5.00	\$3.00
Drinks	9,000	1.50	0.50
Baked potato	7,000	2.00	1.00

The restaurant is open 312 days a year

Break-even point

Let's see with an example:

Item	Annual forecast sales (units)	Selling price, USD	Variable cost, USD	Contribution per unit, USD	Contribution per dollar, %	Annual forecast Sales, USD	% of sales	Weighted contribution, %
Sandwiches	9000	5	3.00	2 (5 - 3)	40 % (2 / 5)	45,000 (9000*5)	0.621 (45000/ 72500)	0.248 (0.40 * 0.621)
Drinks	9000	1.50	0.50	1	67 %	13,500	0.186	0.125
Baked Potatoes	7000	2.00	1	1	50 %	14,000	0.193	0.097
						72,500	1,000	0.470

$$\text{Then, BP} = \frac{3000 * 12}{0,470} = \frac{36,000}{0,470} = 76,596 \text{ USD}$$

The management of Le Bistro now knows that it must generate average sales of \$245.50 per day (\$76,596/312 days) to breakeven.

V Management also knows that if the forecasted sales of \$72,500 are correct, it will lose
 D money, as break-even is \$76,596.

Break-even point

The management of Le Bistro now knows that it must generate average sales of \$245.50 per day (76,596/312 days) to breakeven.

Management also knows that if the forecasted sales of \$72,500 are correct, it will lose money, as break-even is \$76,596.

Le Bistro also wants to know what is break-even point for the number of sandwiches that must be sold every day.

$$\frac{0.621 * 245.50}{5} = \textit{number of sandwiches} = 30.5 \rightarrow 31 \textit{ sandwiches per day}$$