

EXERCISES. MARGINAL COST AND BREAK EVEN ANALYSIS

1. We have to build precast slabs and we would like to study the best option for it. In this case, we are using cranes assisted by different labourers for lifting and receiving the concrete planks. We have made a time study of these works and the production results are as follows:

Combination	No. cranes	Labourers lifting	Labourers receiving	m ² per day
A	1	1	1	50
B	1	1	2	110
C	1	1	3	130
D	1	1	4	140
E	1	2	4	145

- a) Considering that a hiring a crane is £500/day, and the salary of one labourer is £150/day, calculate unit cost, marginal cost and decide about the best solution.

Combination	Total cost GBP/day	Unit cost GBP/m ²	Marginal cost
A	800	16.00	16.00
B	950	8.63	2.50
C	1,100	8.46	7.50
D	1,250	8.93	15.00
E	1,400	9.66	30.00
The best solution is C with the cheapest unit cost			

- b) Additionally, we know that the variable cost to produce concrete slab planks is £50/m² and fixed costs of our company are £400/day. Using the previous optimum solution, establish the total unit cost per m².

$$\frac{400\text{GBP/day}}{130\text{ m}^2/\text{day}} = 3.08\text{GBP/m}^2$$

$$\text{Unit cost} = 50 + 3.08 = 53.08\text{GBP/m}^2$$

- c) Considering you want to have a benefit of 10%, how much is the total price per m²?

$$\text{Total price} = 53.08 \times 1.1 = 58.39\text{GBP/m}^2$$

- d) With this price, what is the minimum quantity of m² to put per day to obtain £0 profit?

$$\frac{400}{58.39 - 50.00} = 47.7 \rightarrow 48\text{m}^2$$

- e) To be competitive in the market, we are suggested reducing this price £3. Is it possible?

$$8.39 - 3 = 5.39\text{GBP/m}^2$$

$$\frac{400}{5.39} = 74.2 \rightarrow 75\text{m}^2$$

Yes, we can accept it as we can make up to 130 m²/day

2. We hire a crane to £50/hour. The driver's fixed salary is £2,500/month (160 hours/month) and the depreciation calculated for this equipment is £3,000/month. Extra hours are paid apart (£30/hour). Other fixed expenses (insurance, fuel, etc.) are calculated in £1,000/month. We want to obtain 10% profit.

- a) How many hours do we need to hire this crane per month to obtain this profit and cover all expenses?

$$\text{Costs to cover} = (2,500 + 3,000 + 1,000) \times 1.1 = 7,150 \text{GBP}$$

$$\frac{7,150}{50} = 143 \text{ hours to work}$$

- b) What is the minimum hiring hours to obtain £0 profit?

$$\frac{6,500}{50} = 130 \text{ hours to work}$$

- c) One month we hired this equipment only 100 hours. Did we lose or earn money?
We lose money

- d) The following month we hired it 180 hours (paying extra hours). Can we compensate with the previous month?

Minimum to work in these 2 months: 130+130 hours = 260 hours

We work 100+180=280 hours, so we compensate and earn some money (1,000GBP)

- e) To be competitive we are suggested to reduce this price to £45. Is it possible?

$$\frac{6,500}{45} = 144.5 \text{ hr we need to work for zero profit}$$