

SITE PRODUCTION AND PROJECT MANAGEMENT

COST ANALYSIS

COSTING AND BREAK EVEN ANALYSIS

Juan Antonio Ferriz Papí





UNIT COSTING

FIXED (INDIRECT) COSTS

Periodic cost that remains more or less unchanged irrespective of the output level or sales revenue

- Insurance
- Interest
- Rent
- Salaries
- Permanent services required by the company

It considers short term cost accounting



UNIT COSTING

VARIABLE (DIRECT) COSTS

Periodic cost that varies in step with the output or the sales revenue of a company

- Raw material
- Energy
- Labour
- Distribution costs (moving goods from the point of production to the point of consumption)

It considers short term cost accounting



UNIT COSTING

UNIT (AVERAGE) COSTS

Expenditure incurred in producing one unit of a good or service

Fixed costs + Variable costs

Total Output



UNIT COSTING

EXAMPLE

In one month (20 days work, 8 hours/day), the company achieves to finish 900 m² of concrete slab on site. The costs are the following:

Labour: 5 workers. £6.80/hour

Materials: £40,950

Plant: £1,200

Administration: £1,200

- 1.- Determine which are fixed or variable costing
- 2.- Calculate the unit cost for one m² of this concrete slab.



UNIT COSTING

MARGINAL COSTING

Increase or decrease in the total cost of the production run for making one additional unit of an item.

It is an estimate of how economic cost would change if output changed

It depends on the market

It is due to variable costs

Major problem: fluctuation in the short term period

These marginal costing have big influence in tenders



UNIT COSTING

MARGINAL COSTING

Examples

In production, it is the cost of making one additional unit.

When we buy a car, marginal costing is the increase or decrease of fuel in future.

When we calculate a budget for a bid, marginal costing is the possible variation of the price of materials and labour in future



UNIT COSTING

MARGINAL COSTING

EXAMPLE

One labourer can finish 10 m² of a brickwall in one day (8 hours/day). He is now earning £500 a week, but next year will earn £540. Which is the marginal cost?

$$£540 - £500 = £40 \text{ a week}$$

$$10 \text{ m}^2 \times 5 \text{ days a week} = 50 \text{ m}^2/\text{week}$$

$$£40/50 = £0.8 \text{ marginal cost per m}^2$$



UNIT COSTING

MARGINAL COSTING

We obtain marginal cost with the difference between the previous and the last cost, and dividing the result into the additional output produced by the last unit

$$\text{Marginal cost} = \frac{\text{Change in total cost}}{\text{Change in output}}$$



UNIT COSTING

MARGINAL COSTING

EXAMPLE

One labourer earns £500 a week (38 hours a week), and can put 3 m² of ceramic tiles per hour. With the help of another labourer, they can put 8 m².

Calculate the resulting marginal cost.

Change in total cost: £1,000 - £500 = £500

Change in production: 304m² - 114m² per week = 190 m² per week

Marginal cost = £500/190m² = £2.63/m²



UNIT COSTING

MARGINAL COSTING

EXAMPLE

We want to study the unit cost for the construction of an element in building, and we establish different combinations depending on the quantity of labourers that are dedicated to this job.

In this table we can see the square metres that can be achieved with every combination of workers every week. Everyone of them earns £500/week.

Labourers	m ² made
1	20
2	60
3	120
4	140
5	150
6	160
7	165
8	163



UNIT COSTING

MARGINAL COSTING

EXAMPLE

In this case, the labour cost (variable cost) depends on the number of labourers.

We calculate the marginal physical product (difference between the total production and the production with one labourer less)

Labourers	m ² made	Marginal physical product (m ² made)
1	20	20
2	60	40
3	120	60
4	140	20
5	150	10
6	160	10
7	165	5
8	163	-2



UNIT COSTING

MARGINAL COSTING

EXAMPLE

But the variable costs are more, as we have more labourers. So we calculate the unit cost in every case.

Labourers	m2 made	Marginal physical product (m ² made)	Unit cost (£/m ²)
1	20	20	25.00
2	60	40	16.67
3	120	60	12.50
4	140	20	14.29
5	150	10	16.67
6	160	10	18.75
7	165	5	21.21
8	163	-2	24.54



UNIT COSTING

MARGINAL COSTING

And finally, the marginal cost is calculated with the total cost increase of labour work divided into the variation of production in each case

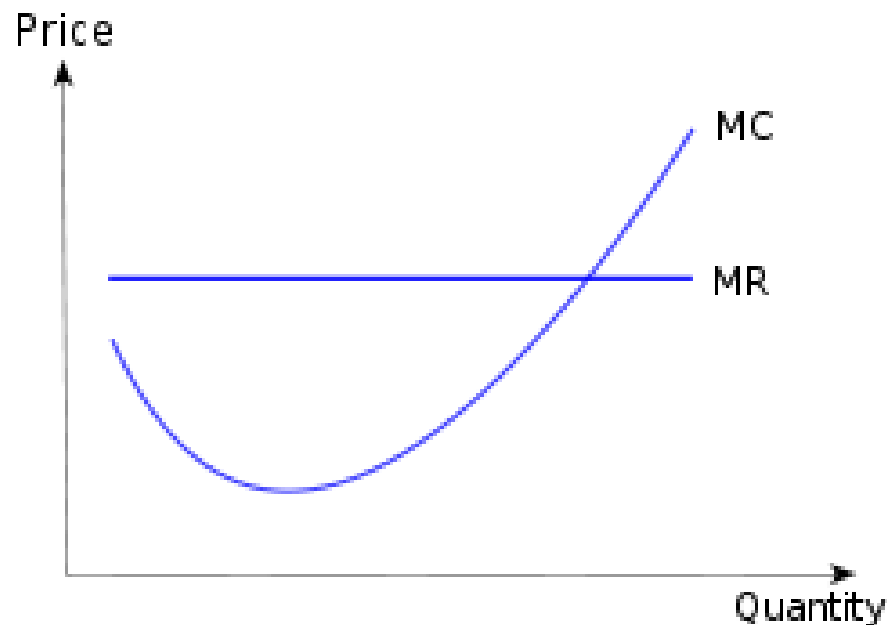
Labourers	m ² made	Marginal physical product (m ² made)	Unit cost (£/m ²)	Marginal cost (£/m ²)
1	20	20	25.00	25.00
2	60	40	16.67	12.50
3	120	60	12.50	8.33
4	140	20	14.29	25.00
5	150	10	16.67	50.00
6	160	10	18.75	50.00
7	165	5	21.21	100.00
8	163	-2	24.54	-250.00



UNIT COSTING

MARGINAL COSTING

If we represent marginal cost, we can see that this is a U-shaped function. We can see the optimum solution in which we have less expenses for production.





STANDARD COSTING

STANDARD (NORMAL) COST

An estimated or predetermined cost of performing an operation or producing a good or service, under normal conditions

Used as target costs (or basis for comparison with the actual costs)

Developed from historical data analysis

They vary from actual costs (unpredictable factors)

Elemental cost plan (approx. gross floor area: 950 m²)

Element	Cost (£/m² floor area)	Total cost
Substructure	70	66 500.00
Superstructure:		
Frame	86	81 700.00
External Walls	48	45 600.00
Floors	28	26 600.00
Roof	65	61 750.00
Internal walls/doors	39	37 050.00
Windows and external doors	29	27 550.00
	295	280 250.00
Finishes		
Walls	26	24 700.00
Floors	46	43 700.00
Ceilings	19	18 050.00
	91	86 450.00
Fittings/furnishings	35	33 250.00
Services		
Sanitary/services	62	58 900.00
Electrical work	82	77 900.00
Other services	50	47 500.00
	194	184 300.00
External works	95	90 250.00
Sub-total		654 550.00
Preliminaries (say 12%)		78 546.00
Contingency		20 000.00
Total anticipated cost		£753 096.00

Total cost/m² = £792.73



ABSORPTION COSTING

ABSORPTION COSTING

The cost of a good or service will be the sum of:

1. Variable costs per unit
2. Proportion of fixed costs per unit, for overheads which can be specifically identified with the good or service (direct costs)
3. Proportion of fixed costs per unit, for overheads which cannot be attributable to any particular good or service (indirect costs)

But how to allocate the cost of overheads?

We calculate percentages



ABSORPTION COSTING

ABSORPTION COSTING

Indirect costs:

- Office expense (rent or lease, office supplies, utilities, furniture, etc.)
- Staff salaries (executives, purchasing staff, estimators, administrative, etc.)
- Miscellaneous (travel expenses, legal fees, marketing, auditors, club or association dues, charitable donations, etc.)
- Depreciation (percentage written off for any equipment used)



ABSORPTION COSTING

ABSORPTION COSTING

Indirect costs:

One contractor does £1,000,000 in business per year. He calculates his annual expenses for operating that business to be £40,000.

As a percentage, his indirect overhead costs are 4%.



ABSORPTION COSTING

ABSORPTION COSTING

Direct costs:

Known too as Job overhead costs

They are charged to a specific project

- Project specific salaries (wages, payroll taxes and incentive benefits, etc.)
- Temporary office facilities
- Other temporary enclosures (on site expenses like tool sheds, container storage, ramps, protections, etc.)
- Temporary utilities (water, heat, electricity, generators, etc.)
- Sanitation facilities



BREAK EVEN ANALYSIS

Bottom-up budgeting

This approach begins at the bottom of the income statement

What net income is necessary to earn to produce £0 profit?

For that, we have to find the breakeven point



BREAK EVEN ANALYSIS

Calculation of Breakeven point

We have to know variable and fixed costs

For example, we have a work to develop, and we know that

Variable costs: £10,000

Fixed costs: 5% of variable costs

Total cost: £10,500



BREAK EVEN ANALYSIS

Calculation of Breakeven point

We also know that the total fixed costs of the company are £5,000

To absorb this quantity, we need to develop 10 works like this, and so we achieve benefit £0



BREAK EVEN ANALYSIS

Calculation of Breakeven point

With this balance, we can start to analyse prices for this work.

The main objective with it is to absorb costs and to know the range in which we are going to start to have benefits



BREAK EVEN ANALYSIS

Calculation of Breakeven point

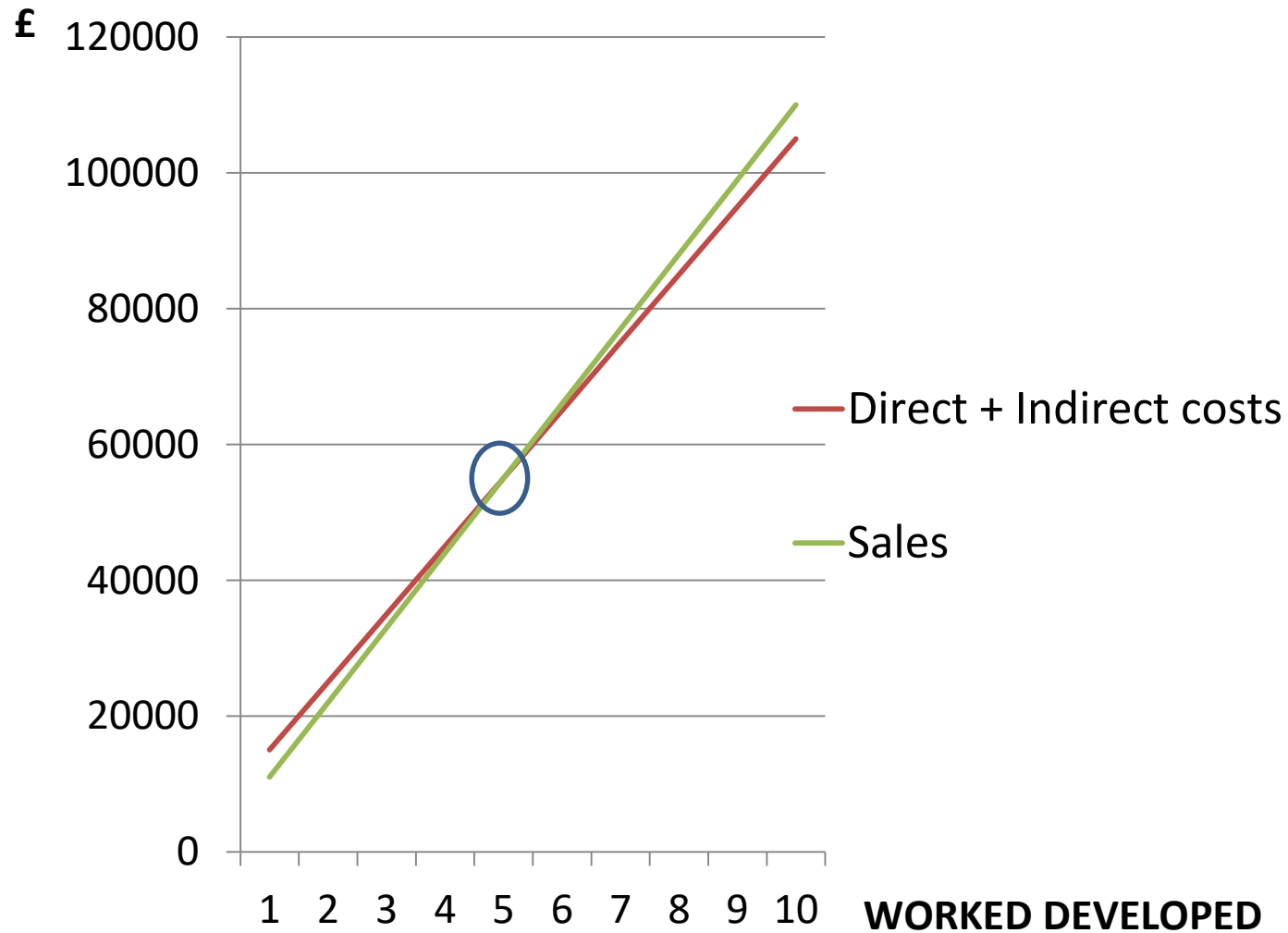
We think about increasing price 10%

$$£10,000 \times 10\% = £11,000$$

If we do that, we can know the breakeven point when we obtain again £0 benefit



BREAK EVEN ANALYSIS





BREAK EVEN ANALYSIS

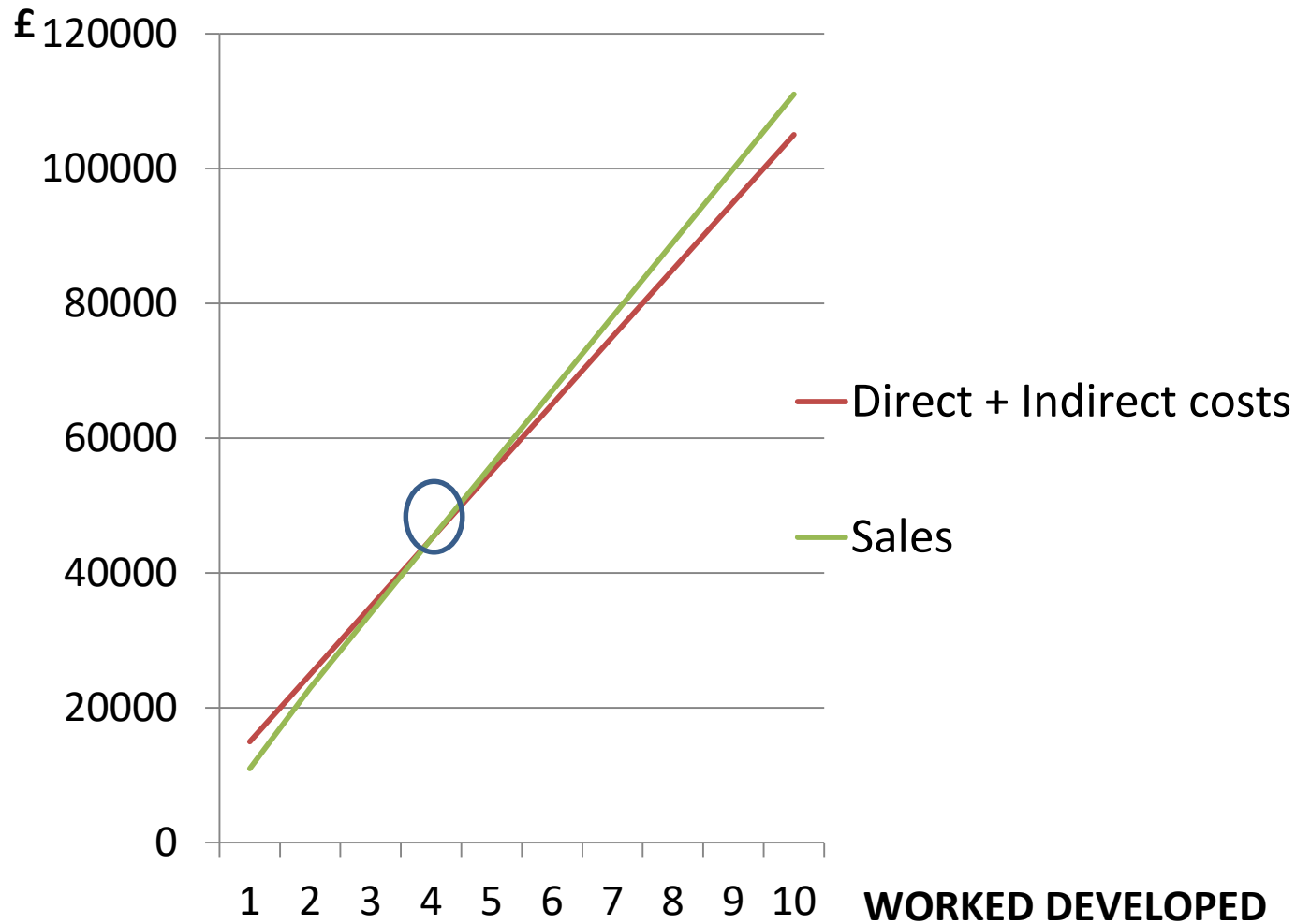
Calculation of Breakeven point

We think NOW about increasing price 20%

$$£10,000 \times 20\% = £12,000$$



BREAK EVEN ANALYSIS





BREAK EVEN ANALYSIS

EXERCISE

We are a subcontractor that produce concrete slabs. The unit cost per m² is £60/m².

5% of it corresponds to fixed costs.

We also know that the total annual fixed costs of the company are £10,000.

How many m² of concrete slab do we have to build per year to have a £0 benefit?

$$£60 \times 5\% = £3$$

$$£60 - £3 = £57$$

$$£10,000 / £3 = \mathbf{3,333 \text{ m}^2}$$



BREAK EVEN ANALYSIS

EXERCISE

We want to rise the price £1. If we do that, **how many m² do we have to build for a £0 balance?**

$$£10,000/£4 = \mathbf{2,500\ m^2}$$

Which will my benefit be is I build 5,200m²?

$$5,200\ m^2 - 2,500\ m^2 = 2,700\ m^2$$

$$2,700\ m^2 \times £4 = \mathbf{£10,800}$$



BREAK EVEN ANALYSIS

EXERCISE

The market price now is £59. **Can I work to this price?**

How many m² should I make annually to achieve at least a £0 benefit?

£2 would be for fixed costs

$$£10,000/£2 = \mathbf{5,000\ m^2}$$