

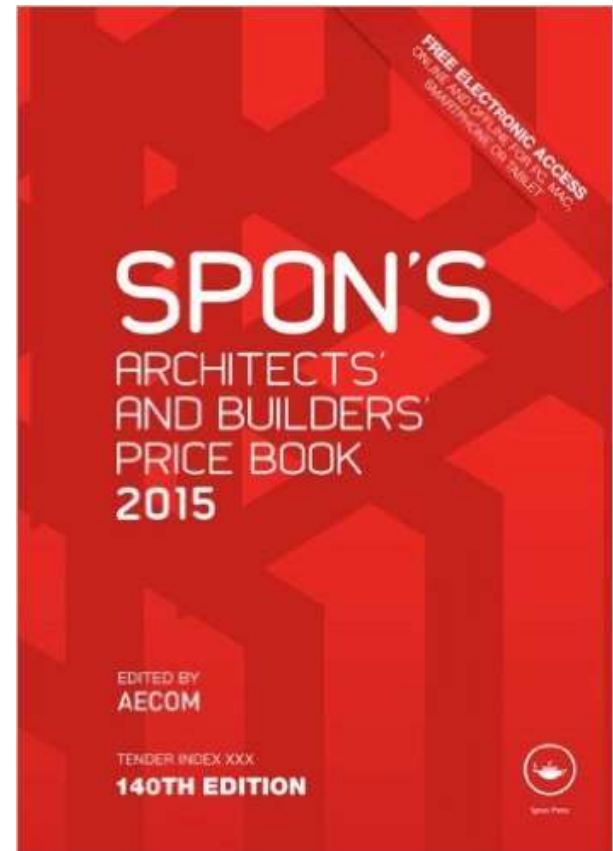
SITE PRODUCTION AND PROJECT MANAGEMENT

7 PRODUCTIVITY



SOURCES OF COST INFORMATION

- Published price books
 - SPON'S Architects' and Builders' Price book
 - BCIS Schedule of Rates (RICS)
 - Planning Planet (wiki)
- Previous projects
- Subcontractors/other companies
- Cost analysis and cost models





LABOUR'S PRODUCTION RATE

Number of units of work produced by a person in a period of time

Expressed by labour-hours or labour-days

This value varies in each project depending on:

- Labourer
- Resources available
- Weather conditions
- Job supervision
- Complexity of operation
- Etc.



LABOUR'S PRODUCTIVITY

Ratio of input (work hours) versus the respective output (amount of work produced)

Construction Productivity

Quantity of work produced in a given amount of time by a worker/gang

$$\text{Construction Productivity} = \frac{\text{Quantity of work produced}}{\text{time duration}}$$



EXERCISE

A bricklayer has a production rate of laying 500 bricks in 8 hours.
How much is the productivity of this bricklayer?



LABOUR'S PRODUCTIVITY

Information about labour's productivity can be obtained from the same sources as cost information

Item	PC £	Labour hours	Labour £	Plant £	Material £	Unit	Total rate £
EXCAVATION – cont							
Excavating by machine – cont							
Trenches; width not exceeding 0.30 m							
maximum depth not exceeding 0.25 m	–	0.26	3.25	2.72	–	m ³	5.97
maximum depth not exceeding 1.00 m	–	0.28	3.50	2.72	–	m ³	6.22
maximum depth not exceeding 2.00 m	–	0.33	4.12	3.16	–	m ³	7.28
maximum depth not exceeding 4.00 m	–	0.40	4.99	3.88	–	m ³	8.87
maximum depth not exceeding 6.00 m	–	0.46	5.75	4.62	–	m ³	10.37
Trenches; width exceeding 0.30 m							
maximum depth not exceeding 0.25 m	–	0.23	2.87	2.42	–	m ³	5.29
maximum depth not exceeding 1.00 m	–	0.25	3.13	2.42	–	m ³	5.55
maximum depth not exceeding 2.00 m	–	0.30	3.75	2.93	–	m ³	6.68
maximum depth not exceeding 4.00 m	–	0.35	4.37	3.44	–	m ³	7.81
maximum depth not exceeding 6.00 m	–	0.43	5.37	4.40	–	m ³	9.77
Extra over trench excavating for commencing level exceeding 0.25 m below existing ground level							
1.00 m below	–	0.03	0.38	0.51	–	m ³	0.89
2.00 m below	–	0.05	0.63	0.74	–	m ³	1.37
3.00 m below	–	0.06	0.75	0.95	–	m ³	1.70
4.00 m below	–	0.09	1.13	1.25	–	m ³	2.38



LABOUR'S PRODUCTIVITY

Labour hours per unit production

$$\text{Labour hours} = \frac{\text{Total labour hours of the gang}}{\text{daily output}}$$

Example

One gang of 3 plasterers and 2 assistants can produce an average of 70 m² working 8 hours. What is the total labour hours?

$$Lh = \frac{(3 + 2) \times 8 \text{ hr}}{70 \text{ m}^2} = 0.57 \text{ hr/m}^2$$



LABOUR'S PRODUCTIVITY

Weighted Wage Rate

$$\text{Weighted Wage Rate} = \frac{\text{Total labour cost}}{\text{number of labourers}}$$

Example

Every plasterer is £26.65 per hr, and every assistant earns £22.35.
What is the weighted wage rate?

$$\text{WWR} = \frac{(3 \times £26.65) + (2 \times £22.35)}{3 + 2} = £24.93/\text{hr}$$



LABOUR'S PRODUCTIVITY

Labour Unit Cost

$$\text{Labour Unit Cost} = \frac{\text{Weighted Wage Rate} \times \text{total labour hours}}{\text{daily output}}$$

Example

$$\text{LUC} = \frac{\text{£}24.93/\text{hr} \times 40\text{hr}}{70 \text{ m}^2} = \text{£}14.25/\text{m}^2$$



LABOUR'S PRODUCTIVITY

Unit production rates

Used for estimation of work duration

Variable with every gang

Need to make time studies

Experience can give us average estimations for these rates

$$\text{Work duration} = \frac{\text{Quantity of work}}{\text{number of gangs} \times \text{production rate}}$$

Example

We need to paint one wall of 440m² using 2 gangs. Their production rate is 11m²/hr. Calculate the time needed for this work.

$$\text{WD} = \frac{440\text{m}^2}{2 \times 11\text{m}^2/\text{hr}} = 20\text{hr}$$