SBQ 2423

Estimating the Cost of Labour

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- Estimating the Cost of Construction Labour

Lecture Topic

- Estimating the Cost of Labour

Lecture Contents

- Introduction to Construction Labour
- Types of construction labour
- Components of Labour Costs
- Basic principle for Estimating Labour
- Monetary factors
- Labour productivity

Construction Labour

- Construction industry is a very labour-intensive industries.
- In Malaysia, due to heavy reliance on traditional construction method, the usage of construction labours are much more compared to the European countries.
- The labour cost components of a building project often ranges from 30% - 50% from total overall cost. In some conditions, it can goes as high as 60% from total costs.
- Hence, it is a vital component of a construction project.

Test yourself

- How many type of construction labour available in Malaysia/ your country?
- Duration: 1 minute
- Answers:

Types of Construction Labour

- Construction output is made up of several different systems such as the structural system, exterior closure system, HVAC system etc.
- These systems can be broken down into many more subsystems and sub subsystems.
- This results in several work packages and therefore the works (package) can be completed by either individual or a group of gang (crew).
- Additionally, there are 3types of construction labour namely;
  - Skilled workers
  - Unskilled workers
  - General labours

Components of Labour Costs

- Labour costs are determined by 2 factors.

Monetary

- Hourly wage rates
- Wage premiums
- Insurance
- Fringe benefits
- Taxes (Levy)

Productivity

- Ratio of input Vs. Respective Output
- Eg. Work hours of a workers (bricklayer) Vs. Amount of work produced (laying 500 bricks)

Components of Labour Costs

- Construction Productivity = quantity of work produced ÷ time duration

- Eg. If a bricklayer can lay 500 bricks in 8 hours, hence the associated construction productivity is thus,
- 500 ÷ 8 = 62 bricks

Components of Labour Costs

- Although most items associated with the monetary factor remain relatively constant over a short period of time ie. During the construction phase, productivity on the other hand can fluctuate wildly.
- To accurately estimate productivity, an estimator not only needs a good historical record, but a lot of experience.

Basic principles for Estimating Labour

- The formula for computing the total cost of labour is quite simple.It requires knowledge of the total hour or labours needed to perform all the tasks and apply it to the corresponding wage rates.

- Total cost of labour = ∑ total work hour **x** wage rate

- Determining the total work hours for a task involves a knowledge of the quantity of work required for the task and the productivity rate for the specific crew that will be performing the work.
- The quantity of work associated with the material quantity is determined by the quantity take off discussed in previous lecture.

Basic principles for Estimating Labour (cont'd)

- Try it yourself:

Hours		Straight Time Rate (RM/hr)	Total cost
Bricklayers	3 bricklayers x 3 days x 8 hr/day = 72 hrs	RM 50	?
General labour	2 general labour x 3 days x 8hr/day = 48 hrs	RM 20	?
Total			?

Basic principles for Estimating Labour (cont'd)

Hours		Straight Time Rate (RM/hr)	Total cost
Bricklayers	3 bricklayers x 3 days x 8 hr/day = 72 hrs	RM 50	RM 3,600.00
General labour	2 general labour x 3 days x 8hr/day = 48 hrs	RM 20	RM 960.00
Total			RM 4560.00

Monetary Factors

- Pricing labour is one of the most difficult components of cost estimate as it includes many more variables.
- Theses are several factors that affect pricing of labour namely;
  I. Base wage rates
  II. Fringe benefits, insurance and taxes (levy)
  III. Wage premiums

Monetary Factors (cont'd)

I. Base wage rates – This is a dollars per hour paid to an employee for each straight-time hour workers.

– Straight-time hours or normal hours refers to the regular working hours of 8 hours per day Mon – Fri. therefore 40 hours per week.

– Base wage rates vary by;
  - ✓ location
  - ✓ craft
  - ✓ type of work within a craft

Monetary Factors (cont'd)

- Labours (workers) are classified into 3 established labour classifications with different base rate as follows;
  - General workers – serves as a benchmark
  - Skilled labour – receives a certain percentage more than general workers
  - Supervisor – receives a certain percentage more than skilled labour and sometime receives fixed amount on top of the base of the skilled labour and also know as 'kepala'.

Monetary Factors (cont'd)

- Other additions to the base wage rate are sometimes provided for special skills, such as operating an equipment or for working in remote locations and dangerous work conditions such as working on high ground or close to voltage.

Monetary Factors (cont'd)

II. Fringe benefits, insurance and taxes (levy) – the contractor must pay various fringe benefits for the workers. It may include contributions such as health and welfare. Some examples for fringe benefits are SOCSO and Levy.

Monetary Factors (cont'd)

III. Wage premiums – a wage premium is extra money paid to workers for overtime work (OT). It is paid at a minimum of time and half or 150% over the base rate. However, overtime premiums of 200% or double time may be required for overtime work on Sunday or Public Holidays.

– Wage premium for hazardous work conditions or unusually strenuos work are typically paid as a fixed increase over the base wage rate.

Monetary Factors (cont'd)

- Sample calculations for a loaded labour cost per hour

Cost Element		RM/hour
Base Wage		8.75 @ RM70 per day)
SOCSO		0.20 @ RM 40 per month
Levy		0.55 @ RM 100 per month
	Gross Hourly wage rate	RM 9.50
	Percent Increase Over Base Rate	8.57%

Sources for Labour Rate and Trend

- CIDB publications
- JKR publications
- Building Cost Indexes

Labour Productivity

- Labour productivity rates are characterized by their tendency to vary from;
  - Individuals
  - Day to day
  - Project to project
- As a result, it becomes one of the most inaccurate aspects of estimating.

Activity 2

- Discuss what will influence the productivity of a labour

Labour Productivity (cont'd)

- Factors affecting labour productivity

External Factor	Internal Factor
• Market conditions • Climatic conditions	• Work conditions • Management conditions

Labour Productivity (cont'd)

- **External Factor**
  - ***Market conditions*** – when the economy is blooming with lots of construction work, workers can be scarce.
  - Likewise, when the neighboring countries stop exporting immigrant workers, the workers can also be scarce.
  - The condition can results in influx of less trained or unskilled workers into the market and hence require more time to complete the work.
  - However, when construction work is scarce (few), there will be fewer unskilled workers in the market due to competition for jobs and a limited amount of work.
  - The contractor will become more selective and hire only the most skilled workers and that labours (workers) are more motivated to work to remain on the job.

Labour Productivity (cont'd)

- **External Factor**
  - ***Climatic conditions –*** refers to temperature, wind and rainfall. Typically, any weather extremes will affect the productivity of labour.
  - Too hot could lead to exhaustion
  - Too cold could impair motor skills
  - Rain and strong wind could affect workers' ability to see
  - Hence it could all resulted in slowing down or stopping the project.

Labour Productivity (cont'd)

- **Internal Factor**
  - ***Work conditions –*** refers to workspace, site layout and organisation, lighting and noises.
  - Workers working in ample space will work faster than those working in a confined or limited workroom.
  - This also could due to the accelerated work which puts more men on the job and lead to site congestion.
  - The problem will be even worse should the storage area (for materials) are located away from the work where the workers need to spend more time moving back and forth to get materials and therefore spent less time on productive work.
  - Hence, proper material storage and good site layout planning is needed to ensure ample workspace and better productivity.

Labour Productivity (cont'd)

- **Internal Factor**
  - ***Management conditions –*** referring to consturction support such as schedulling, procurement and information support.
  - Schedulling of work activities onsite affects workflow and the amount of activities on site.
  - Proper scheduling of activities can minimise disruptions and facilitate workflow, thus improving productivity.
  - Management can also improve productivity by making sure that all materials, tools, equipment and labour are adequately provided to carry out the work in an efficient manner.

Labour Productivity (cont'd)

- ***Productivity sources*** can be referred to;
- Building Consturction Cost Data
- Builder's Publication (REHDA)
- Text books (but mostly referring to UK or USA's productivity)

Labour Productivity (cont'd)

- Adjusting productivity – the productivity rates that are derived from historical data are often for average or standards projects.
- Therefore, the productivity rates need to be modified to take into consideration how the new project deviates from the standard condition.
- Example of how to adjust productivity as follows;
  - Weighted Wage Rate (Bare Cost) = $\frac{3(RM26.65) \times 2 (22.35)}{3 \times 2}$

    = RM 24.93/hr

Labour Productivity (cont'd)

- Adjusted productivity rate = standard productivity rate **x** productivity factor

- Productivity factor can be determined for a single variable such as weather. Eg. Productivity rate for a worker during a very hot day is 0.9.
- So, it on normal day the worker could lay 100 m2 of concrete, then on 0.9 factor, he or she could only lay 90 m2 of concrete during a very hot day.

Productivity impact and the cost of overtime

- Overtime is the most common method used on site to expedite progress of work.
- However, scheduling overtime for more than several weeks can result in huge productivity losses.

Productivity impact and the cost of overtime (cont'd)

Days per week	Hours per day	Week 1 (%)	Week 2 (%)	Week 3 (%)	Week 4 (%)	Average 4 weeks (%)
5	8	100	100	100	100	100.00
	10	100	95	90	85	92.50
	12	90	85	70	60	76.25
6	8	100	100	95	90	96.25
	10	95	90	85	80	87.50
	12	90	80	65	60	73.75

Reference and further readings

- Edition,Peurifoy,R.L and Oberlander, G.D. – Estimating Construction Costs, 5th Edition Mc-Graw-Hill, 2002.
- Popescu, C.M, Phaobunjong, K, Ovararin, N – Estimating Building Costs, Marcel DekkerInc 2003.

The end. Thank you for your attentions.