



**The Hong Kong Institute of Surveyors**

**Cost Management of  
Engineering Projects from  
Quantity Surveyor's Perspective**



## Cost Management of Construction Projects

Cost management is about the planning, monitoring and controlling the budget of a construction project. It includes planning, estimating, budgeting, financing, managing, and controlling costs so that the project can be completed within the approved budget. From the QS's perspective, the cost management covers the full cycle of a construction project from the initial planning phase towards measuring the actual cost performance and project completion.

## Cost Planning, Estimating and Budgeting

Two approaches:

1. A broad brush approach starts with something known and with abundant allowances for something uncertain, and gradually developing into an estimate with some degree of certainty.



something known  
and abundant  
allowances for  
something uncertain



with some degree of  
certainty

## Cost Planning, Estimating and Budgeting

Two approaches:

2. An evidence based approach starts with something known and certain, and gradually expanding and incorporating new elements as the design develops.



something known  
and certain



expanding and  
incorporating new  
elements as the  
design develops

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An estimate of the development cost will include:

- a) Land acquisition cost
- b) Client's own cost including organizational and administrative costs allocated to the project
- c) Occupants relocation cost
- d) Site investigation and preparation cost
- e) Construction costs
- f) Consultancy services fees
- g) Finance and legal charges
- h) Contingencies

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Cost estimates will be prepared throughout the project development. These are all predictions and should not be considered as 100% accurate.

Various stages of cost estimating:

1. Broad brush / Ballpark type of cost estimating
  - for prompt evaluation of commercial possibilities and economic viability of a project
  - accuracy varies (possibly in a range of  $\pm 25\%$  to  $50\%$ )
2. Preliminary cost estimate with some degree of certainty
  - based on information developed to some level of definition
  - accuracy varies (likely in a range of  $\pm 15\%$  to  $25\%$ )

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Various stages of cost estimating:

3. Cost estimate for budget purpose
  - for establishment of budget based on conceptual design and approximate quantities of some significant elements of work
  - accuracy will likely in a range of  $\pm 10\%$  to  $15\%$
  
4. Detailed cost estimate
  - based on detailed design with information developed to the level for tender bidding
  - accuracy will be in a range of  $\pm 5\%$  to  $10\%$

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## Quantity Surveying Division



For the cost estimate for the construction of an engineering project, the following will be some of the considerations:

- a) design of the project
- b) time of the construction (project programme)
- c) location of the works
- d) accessibility to the works
- e) method related charges
- f) plant & resources
- g) manpower availability
- h) trial works for ascertainment of the design feasibility
- i) temporary works
- j) safety and protection
- k) procurement arrangement



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Manpower status

Construction Industry Council

Workers Registration Data Analysis

Trade: Concretor (1/1/2016 – 31/12/2016)

Age	No. of workers	Ratio
Below 20	0	0.00%
20 – 29	218	6.06%
30 – 39	580	16.12%
40 – 49	755	20.98%
50 – 59	1088	30.23%
60 or above	958	26.62%
Total	3599	100.00%

(Source: [www.cic.hk/cic\\_data/files/Eng%206\\_Concretor.pdf](http://www.cic.hk/cic_data/files/Eng%206_Concretor.pdf))

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Manpower status

Construction Industry Council

Workers Registration Data Analysis

Trade: Bar Bender and Fixer (1/1/2016 – 31/12/2016)

Age	No. of workers	Ratio
Below 20	1	0.01%
20 – 29	1039	13.12%
30 – 39	1946	24.56%
40 – 49	1719	21.70%
50 – 59	1840	23.23%
60 or above	1377	17.38%
Total	7922	100.00%

(Source: [http://www.cic.hk/cic\\_data/files/Eng%202\\_Bar%20Bender%20and%20Fixer.pdf](http://www.cic.hk/cic_data/files/Eng%202_Bar%20Bender%20and%20Fixer.pdf))

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Manpower status

Construction Industry Council

Workers Registration Data Analysis

Trade: Carpenter (Formwork – Civil Construction)  
(1/1/2016 – 31/12/2016)

Age	No. of workers	Ratio
Below 20	0	0.00%
20 – 29	82	4.92%
30 – 39	192	11.51%
40 – 49	330	19.78%
50 – 59	524	31.41%
60 or above	540	32.37%
Total	1668	100.00%

(Source: [www.cic.hk/cic\\_data/files/Eng%205\\_Carpenter%20\(Formwork%20-%20Civil%20Construction\).pdf](http://www.cic.hk/cic_data/files/Eng%205_Carpenter%20(Formwork%20-%20Civil%20Construction).pdf))

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Manpower status

Construction Industry Council

Workers Registration Data Analysis

Trade: Rigger / Metal / Formwork Erector

(1/1/2016 – 31/12/2016)

Age	No. of workers	Ratio
Below 20	0	0.00%
20 – 29	70	3.87%
30 – 39	291	16.09%
40 – 49	495	27.36%
50 – 59	634	35.05%
60 or above	319	17.63%
Total	1809	100.00%

(Source: [http://www.cic.hk/cic\\_data/files/Eng%2025\\_Rigger%20Metal%20Formwork%20Erector.pdf](http://www.cic.hk/cic_data/files/Eng%2025_Rigger%20Metal%20Formwork%20Erector.pdf))

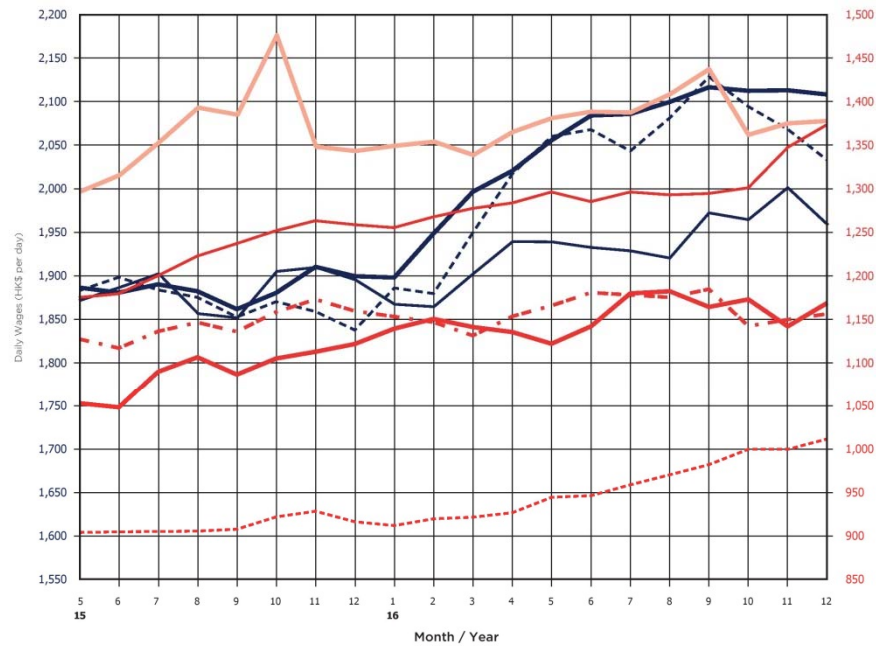
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HONG KONG  
REPORT | MARCH 2017

LABOUR COST  
TRENDS

AVERAGE DAILY WAGES OF WORKERS ENGAGED IN  
PUBLIC SECTOR CONSTRUCTION PROJECTS



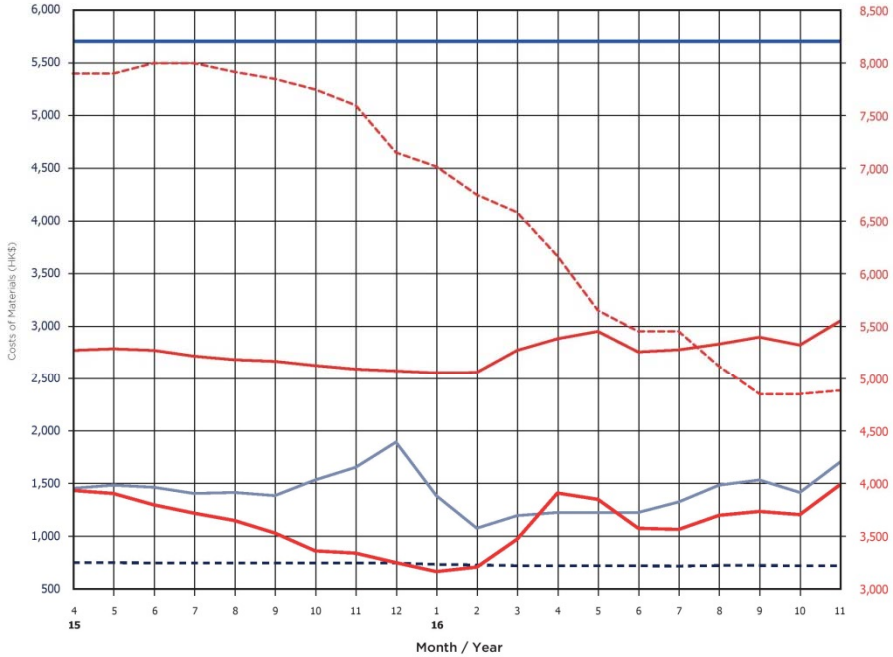
Selected Occupations	Average Daily Wages in HK\$ per day																			
	2015						2016													
	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Bar Bender and Fixer	1,886.3	1,880.5	1,890.1	1,882.1	1,861.5	1,880.2	1,910.2	1,899.4	1,897.8	1,948.4	1,996.5	2,020.6	2,055.7	2,084.2	2,085.9	2,099.8	2,116.7	2,112.5	2,113.1	2,108.4
Concretor	1,871.7	1,886.4	1,902.3	1,856.4	1,851.5	1,904.8	1,909.6	1,895.4	1,867.1	1,864.3	1,902.2	1,939.2	1,938.9	1,932.5	1,928.6	1,920.3	1,972.3	1,964.5	2,001.2	1,999.3
Carpenter (formwork)	1,882.9	1,898.2	1,883.6	1,875.1	1,852.5	1,870.1	1,858.7	1,837.5	1,885.9	1,879.5	1,949.6	2,016.9	2,060.1	2,067.9	2,043.3	2,081.3	2,128.7	2,094.4	2,068.2	2,031.0
Painter and Decorator	1,052.2	1,047.6	1,089.3	1,066.2	1,086.2	1,104.7	1,112.5	1,121.5	1,139.1	1,150.3	1,141.0	1,135.2	1,121.7	1,141.8	1,179.6	1,182.1	1,164.1	1,172.8	1,141.7	1,168.5
Plasterer	1,297.1	1,315.9	1,353.3	1,393.3	1,385.2	1,476.4	1,348.5	1,343.6	1,349.6	1,354.2	1,339.0	1,365.5	1,381.3	1,388.7	1,387.8	1,408.7	1,437.5	1,362.2	1,375.3	1,378.1
Metal Worker	1,127.0	1,116.7	1,136.0	1,146.3	1,135.7	1,158.3	1,172.7	1,159.4	1,153.0	1,146.5	1,131.2	1,153.3	1,165.6	1,180.5	1,177.9	1,175.1	1,184.5	1,142.1	1,149.5	1,156.0
Plumber	1,175.0	1,179.2	1,199.8	1,222.5	1,236.9	1,251.6	1,263.2	1,258.7	1,255.3	1,267.5	1,277.3	1,283.6	1,296.3	1,285.1	1,296.2	1,293.0	1,294.6	1,301.0	1,347.6	1,373.7
General Workers	903.4	904.1	904.4	904.9	907.1	921.2	927.8	915.7	911.3	919.1	920.9	926.1	943.8	945.7	958.2	969.7	981.5	999.3	999.0	1,011.0

(Source: Census and Statistics Department)

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## MATERIAL COST TRENDS AVERAGE WHOLESALE PRICES OF SELECTED BUILDING MATERIALS



Average Wholesale Prices of Selected Building Materials																				
Building Materials	2015																			
	4	5	6	7	8	9	10	11	12	1	2	3								
2016																				
	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11
Sand (\$/10 t)	1,450	1,480	1,460	1,400	1,410	1,380	1,530	1,650	1,890	1,380	1,070	1,190	1,220	1,220	1,220	1,320	1,480	1,530	1,410	1,700
Bitumen (\$/t)	7,900	7,900	8,000	8,000	7,917	7,850	7,750	7,600	7,150	7,017	6,750	6,583	6,167	5,650	5,450	5,117	4,850	4,850	4,883	
Portland Cement (\$/t)	742	742	740	739	739	739	739	739	738	726	720	714	713	712	712	710	715	715	713	713
Sawn Hardwood 50x75 (\$/m <sup>3</sup> )	5,707	5,707	5,707	5,707	5,707	5,707	5,707	5,707	5,707	5,707	5,707	5,707	5,707	5,707	5,707	5,707	5,707	5,707	5,707	5,707
Mild Steel Round Bars (\$/t)	5,270	5,285	5,270	5,215	5,180	5,165	5,125	5,090	5,073	5,054	5,059	5,270	5,380	5,450	5,255	5,275	5,330	5,395	5,320	5,590
High Tensile Steel Bars (\$/t)	3,930	3,900	3,792	3,713	3,643	3,524	3,355	3,333	3,242	3,157	3,200	3,466	3,905	3,844	3,570	3,558	3,692	3,730	3,700	3,985

(Source: Census and Statistics Department)

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## Quantity Surveying Division



For the cost estimate for the construction of an engineering project, the following will be some of the considerations:

- a) materials disposal method and arrangement (e.g. excavated soil)
- b) proprietary products and systems, availability of materials (e.g. cement and sand, steel)
- c) place of manufacture
- d) replacement or spare parts, follow up maintenance works
- e) use of off-site prefabrication or in-situ production
- f) various tests on materials, products, systems
- g) decontamination works
- h) temporary provisions for access to the work locations and subsequent removal
- i) the engineering team with the necessary expertise and capabilities
- j) the procurement of construction plant
- k) insurance provision
- l) temporary power and water supplies
- m) environmental protection measures
- n) safety and protection



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Cost management – Cost Control and Monitoring  
Reporting:

## 1. The Report

- timing of report (periodic and ad hoc)
- reporting items
  - budget vs updated estimates
  - budget vs committed expenditure
- scope of estimates
- exclusion
- deviations – track changes
- corrective measures

## 2. Confidentiality







## Contingencies

Contingency sums are global allowances to provide the unexpected and are intended to give the designer a degree of latitude in the overall spend for the project. (Andrew Ross & Peter Williams, 2013)

Contingency = Risks or Uncertainties ?

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## Contingencies

Donald Rumsfeld, the former US Secretary of Defense, famously said that ‘there are known-knowns, known-unknowns and unknown-unknowns’ which tends to suggest that:

- there are eventualities that we are not aware of which are therefore unpredictable in magnitude or extent
- awareness may not be sufficient to be able to ascribe a credible probability to a possible outcome
- if uncertainty can be recognized it may be sufficiently manageable to allow a project to continue without the benefit of certain knowledge (Friedman et al., 1999)

(Andrew Ross & Peter Williams, 2013)



## Contingencies

- wild guess
- allowance based on previous project experience
- allowance based on defined risks

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## INTERNATIONAL CONSTRUCTION MEASUREMENT STANDARDS

International standards and data for a global construction industry



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### ABOUT ICMS

The International Construction Measurement Standards Coalition (ICMSC) is a growing group of more than 40 professional and not-for-profit organisations from around the world, working together to develop and implement international standards for benchmarking, measuring and reporting construction project cost.

At present, the way construction projects are reported and costed varies significantly from one market to the next. These differences make it difficult to compare projects around the world, increasing investment risk and impeding transparency.

Many of the organisations that today set standards and guidelines on how construction projects are measured came together at the International Monetary Fund (IMF) in Washington D.C. in 2015 to launch the ICMS Coalition.

The Coalition seeks to develop and implement a common standard for construction measurement which will enhance transparency, investor confidence and public trust in the sector.





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### CONSULTATION

The consultation for the International Construction Measurement Standards has now closed.

#### What is ICMS?

- ICMS is a highly significant and ground-breaking standard for cost management of construction projects globally and we would like you to comment on the second draft standard when it is released for consultation.



#### Why do we want to hear from you?

It is imperative that the business management of construction is improved to optimise world resources. Why?

- Global construction is forecast to grow 85% to USD17.5 trillion by 2030. It will then account for 15% of world output.

The lack of a uniform approach can lead to confusion and the inability to compare property on a like-for-like basis. ICMS achieves this by standardising the high level presentation of costs on projects. Benefits:

- More effective global cost comparisons
- Better investment and funding decisions
- Improved cost prediction and management
- Consistent accounting



## Cost Management in Post Contract Award Stage

- a) design change management
  - authority hierarchy and threshold
  - approval procedure and timing
  - cost estimates
- b) design change instructions
  - follow contract provisions
- c) keep and maintain a register of design changes
- d) payment for design changes

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Quantification of design changes:

- follow contract provisions
- CESMM
- record documents
- BIM models ( ? ? ? )





## Cost Management on Claims

- follow contract provisions
- the 3Rs principles
- keep and maintain a register of claims



**Thanks**

**END**