Methodology for Construction Workers' Profile

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Methdology for Construction Workers' Profile

Construction Industry Development Board Malaysia

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Chapter 1

Introduction

1.1 BACKGROUND

Between 2012 and 2016, several studies were undertaken by CIDB to develop the methodology in establishing projection of demand for construction workers. The demand is based on standard constants of major construction workers employed in building works and civil engineering projects according to the categories of construction projects established by CIDB.

However, it was observed that the accuracy of the demand is compromised due to duplication of the number of workers such as multitasking activities performed by the construction workers and mobility of the construction workers for multiple projects in one time. Thus, this study focusses on developing profile of major construction workers so as to produce more reliable projection of demand for construction workers.

1.2 OBJECTIVES OF STUDY

The objectives of developing the Methodology for Construction Workers' Profile are as follows:

i) Determine and validate major construction workers for selected categories of building and civil engineering projects.
ii) Examine the duplication of construction workers and establish 'labour multiplier' should there is any duplication.
iii) Determine the factors contributed to the duplication of construction workers.

1.3 SCOPE OF STUDY

The scope of the study covers 13 categories (and sub-categories) which are as follows:

i) Kediaman (low rise)
ii) Kediaman (high rise)
iii) Komersial
iv) Pentadbiran
v) Perindustrian
vi) Kemudahan sosial (pendidikan)
vii) Kemudahan sosial (kesihatan)
viii) Utiliti (saluran paip)
ix) Pengangkutan (jalanraya)
x) Pengangkutan (jambatan)
xi) Saliran dan pembentungan (perparitan)
xii) Pecegahan bencana (kerja cerun)
xiii) Lain-lain (kerja tanah)

Chapter 2

Sampling Method

2.1 SAMPLING FRAME

Target population (respondents) for the study is mainly contractors who have project that is about to complete or has completed a project. Representatives from the contractor shall be of managerial and operational levels such as project director, project manager, project planner and site supervisor.

The study applied non-random sampling method to the contractor who volunteered as the respondent for the study specifically located in Peninsular Malaysia. Project progress reports are acquired as samples so as to extract the data such as categories of construction workers and their quantities. Should there is no report, a genuine estimation shall be perceived by the respondent.

2.2 SAMPLING SIZE

It was envisaged that minimum of five (5) samples are required for each categories of the construction project. However, should the minimum number of sample is not met, three (3) samples are considered sufficient provided that the result of the study is justified when the analysis gives a reasonable evaluation and interpretation to all of the acquired samples.

2.3 DATA COLLECTION METHOD

Data are collected directly from the respondents on voluntarily basis through three (3) medium of communications, i.e. e-mail, face-to-face and telephone. Data collection forms are given to the respondents together with the introductory letter by CIDB (refer Appendix A).

Data collection form is divided into three (3) sections which are as follows:

i) Background of respondent which covers position, years of experience and involvement in construction projects.

ii) Project particulars describes the basic information of the project under study including total number of construction workers.

iii) Construction worker's profile focusses on the main objectives of the study including assessment of duplication of construction workers in a matrix format. The matrix lists down the categories of construction workers and each worker is matched to one another while indicating the degree of duplication in percentum basis.

Chapter 3

Analysis Method

3.1 CONSTRUCTION WORKERS' PROFILE

There are three (3) steps in performing the analysis for construction workers' profile.

Step 1:

Record any duplication of construction workers

Any duplication of construction workers of project under study is recorded in a spreadsheet software. The degree of duplication is in percentum basis.

Examples in recording the duplication of construction workers are illustrated below. Table 1 shows that the number of bricklayer in the project is about 30% of the total quantity of plasterer. Similarly, it simply means that 50% of barbender are also a concretor.

Table 1 Duplication of construction workers for a project

Item	Construction worker (Duplicate)	Duplication (%)	Construction worker (Base)
1	Bricklayer	30	Plasterer
2	Concretor	50	Barbender

Step 2:

Record any duplication of construction workers for other similar projects

The analysis method repeats for other projects under same category of construction projects as per Step 1.

Step 3:

Establish 'labour multiplier'

The percentages of duplication of construction workers for similar projects are then converted into a standard percentage named as 'labour multiplier'. Projects that have minimum of two (2) duplication of construction workers of a similar category shall be analysed into one of the two (2) following methods:

i) Mode method. If minimum of two (2) percentage of duplication are of equal value. Example is illustrated in Table 2.

Table 2 Labour Multiplier using Mode method

Project	Construction worker (Duplicate)	Duplication (%)	Construction worker (Base)
1	Concretor	30	Barbender
2	Concretor	30	Barbender
Labour Multiplier	**Concretor**	**30**	**Barbender**

ii) Mean method. If minimum of two (2) percentage of duplication are of inequal value. Example is illustrated in Table 3.

Table 3 Labour Multiplier using Mean method

Project	Construction worker (Duplicate)	Duplication (%)	Construction worker (Base)
1	Concretor	30	Barbender
2	Concretor	50	Barbender
Labour Multiplier	**Concretor**	**40**	**Barbender**

3.2 LIST OF ASSUMPTIONS

Below are some of the assumptions made during the course of development of the Methodology for Construction Workers' Profile:

i) Construction technology
   The construction technology used for the construction project is based on conventional method and similar in nature for other projects in the same category.

ii) Construction management
   The main contractor manages the construction project entirely and not sub-assigns the project to other parties.

iii) Status of construction workers
   The construction workers have legal permits and documents as construction workers according to their skills.

iv) Source of labour
   The main contractor employs the labours from local surrounding citizen and foreigners with valid working permits.

3.3 LIMITATIONS OF STUDY

The study has a number of limitations. Among others are:

i) Samples of construction projects
   The samples used to generate the labour multiplier maybe small for certain construction projects.

ii) Data from same contractor
   The result maybe biased for a few construction projects as the samples are gathered from a same contractor.

iii) Accuracy of total number of workers

The accuracy of number of construction workers may be compromised when some samples are not based on the actual project progress reports but rather genuine estimation by the contractors.

iv) Construction technology other than conventional

The data is based on one specific construction technology and not to other technologies under the same category of construction projects.

Chapter 4

Findings

4.1 MAJOR CONSTRUCTION WORKERS

It was observed that major construction workers for 13 categories of construction projects are validated from the data collection process and are summarised in Table 4.

Table 4 Summary of major construction workers for 13 categories of construction projects

Project Category	Major construction workers	
	Original	**Revised**
1. Kediaman (low rise)	1. General worker 2. Concretor 3. Steel barbender 4. Carpenter (formwork) 5. Bricklayer 6. Plasterer 7. Painter	1. General worker 2. Concretor 3. Steel barbender 4. Carpenter (formwork) 5. Bricklayer 6. Plasterer 7. Painter
2. Kediaman (high rise)	1. General worker 2. Concretor 3. Steel barbender 4. Carpenter (formwork) 5. Bricklayer 6. Plasterer 7. Painter	1. General worker 2. Concretor 3. Steel barbender 4. Carpenter (formwork) 5. Bricklayer 6. Plasterer 7. Painter **8. Tiler** **9. Crane Operator**
3. Komersial	1. General worker 2. Concretor 3. Steel barbender 4. Carpenter (formwork) 5. Bricklayer 6. Plasterer 7. Painter	1. General worker 2. Concretor 3. Steel barbender 4. Carpenter (formwork) 5. Bricklayer 6. Plasterer 7. Painter **8. Tiler**

4. Pentadbiran	1. General worker 2. Concretor 3. Steel barbender 4. Carpenter (formwork) 5. Bricklayer 6. Plasterer 7. Painter	1. General worker 2. Concretor 3. Steel barbender 4. Carpenter (formwork) 5. Bricklayer 6. Plasterer 7. Painter
5. Perindustrian	1. General worker 2. Concretor 3. Steel barbender 4. Carpenter (formwork) 5. Bricklayer 6. Plasterer 7. Painter	1. General worker 2. Concretor 3. Steel barbender 4. Carpenter (formwork) 5. Bricklayer 6. Plasterer 7. Painter
6. Kemudahan Sosial (pendidikan)	1. General worker 2. Concretor 3. Steel barbender 4. Carpenter (formwork) 5. Bricklayer 6. Plasterer 7. Painter	1. General worker 2. Concretor 3. Steel barbender 4. Carpenter (formwork) 5. Bricklayer 6. Plasterer 7. Painter
7. Kemudahan Sosial (kesihatan)	1. General worker 2. Concretor 3. Steel barbender 4. Carpenter (formwork) 5. Bricklayer 6. Plasterer 7. Painter	1. General worker 2. Concretor 3. Steel barbender 4. Carpenter (formwork) 5. Bricklayer 6. Plasterer 7. Painter
8. Utiliti (saluran paip)	1. Plumber	1. Plumber **2. Pipelayer**
9. Pengangkutan (jalanraya)	1. General Worker 2. Backhoe loader operator 3. Roller operator	1. General Worker 2. Plant operator 3. Roller operator

10. Pengangkutan (jambatan)	1. General worker 2. Mobile crane operator	1. General worker 2. Crane operator **3. Concretor** **4. Barbender** **5. Pre-stressing worker**
11. Saliran dan pembentungan(perparitan)	1. General Worker 2. Plasterer 3. Concretor 4. Bricklayer 5. Carpenter	1. General Worker 2. Concretor 3. Steel barbender 4. Carpenter (formwork) **5. Drainlayer**
12. Pencegahan bencana (kerja cerun)	1. General worker 2. Mobile crane operator	1. General worker **2. Plant operator**
13. Lain-lain (kerja tanah)	1. General worker 2. Wheel loader operator	1. General worker **2. Plant operator** **3. Roller compactor**

4.2 LABOUR MULTIPLIER

It was noted that nine (9) categories of construction projects have duplication of construction workers while the remaining four (4) categories have no duplication of construction workers. Labour multipliers were then developed based on the analysis method and are listed in Table 5 (refer Appendix B for details).

It can be summarised that there are duplication of trades among the construction workers especially for structural works such as between barbender and concretor as well as architectural works such as bricklayer and plasterer.

Several factors contributed to the duplication of construction workers which lead towards multi-tasking roles by the specified construction workers. Amongst others are as follows:

i) Nature of works

Duplication happens when nature of works is within a same project element. For example, concretor, barbender and carpenter are part of structural element, thus makes it possible for the workers to do multi-tasking activities.

ii) Sequence of works

Duplication also happens between two (2) trades which are sequential. An example is plastering works can only proceed once the bricklaying works is completed.

iii) Cost saving

Contractors tend to go for duplication of workers when the profit margin of project costs are relatively low.

Table 5 Labour Multipliers for 9 categories of construction projects

Project Category	**Labour Multiplier**
Kediaman (low rise)	1. Bricklayer (0.3)Plasterer 2. Concretor (0.5)Barbender 3. Concretor (0.6)Carpenter
Kediaman (high rise)	1. Tiler (0.5)Plasterer
Komersial	1. Tiler (0.5)Plasterer
Pentadbiran	1. Bricklayer (0.4)Plasterer 2. Concretor (0.5)Barbender
Perindustrian	1. Bricklayer (0.3)Plasterer 2. Concretor (0.5)Barbender
Kemudahan Sosial (pendidikan)	1. Concretor (0.2)Barbender
Kemudahan Sosial (kesihatan)	1. Concretor (0.3)Barbender
Pengangkutan (jambatan)	1. Concretor (0.4)Barbender
Saliran & pembentungan (perparitan)	1. Concretor (0.5)Barbender

Note: Labour multiplier for concretor against barbender and carpenter is selected based on whichever is lower under project category of Kediaman (low rise).

4.3 MOBILITY OF CONSTRUCTION WORKERS

Mobility of construction workers refers to a possible movement some of the construction workers from one project to another project at one particular time either in the same vicinity or inter-city.

The feedbacks gathered through the data collection processs were almost unanimously claimed that there is no mobility issue among the construction workers except for a few rare cases such as progress of work and complexity of the work. Progress of work means the worker temporarily leaves the job after completion of his work in phases and shall continue the work once the next progress warrants his task to resume.

Chapter 5

Conclusion

5.1 CONCLUSION

From the study, it can be concluded that the construction workers' profile have been successfully established and developed based on the proposed sampling and analysis methods.

While the list of major construction workers for selected 13 categories of construction project have been validated throughout the study, significant findings are noted on the duplication of construction workers mainly for building projects. Labour multiplier (in percentum) is the outcome of the assessment on the duplication of construction workers for nine (9) categories of construction projects.

5.2 RECOMMENDATIONS

Below are some recommendations for future studies:

i) Continuous collection of data samples so as to improve the accuracy of the developed labour multiplier.

ii) Application of the study methodology to other remaining category of construction projects so as to develop the labour multiplier in entirety.

iii) Development of constants for all construction workers based on construction weightages so as to establish projection of demand for total workforce in construction sector.

iv) Study on mobility of construction workers after the project is completed for a certain duration so as to minimise any duplication of construction workers in projecting demand for construction workers.

v) Development of labour constant for Industrialised Building System (IBS) installer so as to further establish projection of demand for construction workers.

vi) Mandatory requirement for contractors to submit project progress report including quantity of construction workers upon completion of project so as to analyse the total supply of construction workers.

Appendices

A - Data Collection Form
B – Summary of Data Collection

Rujukan kami: LPIPM:KP/BBA/12/1/2(17)
Tarikh: 4 Januari 2019

KEPADA YANG BERKENAAN

Dato'/Tuan/Puan,

KAJIAN PROFIL PEKERJA DALAM INDUSTRI PEMBINAAN

Saya dengan segala hormatnya merujuk kepada perkara di atas.

2. Sebagai makluman tuan/ puan, Lembaga Pembangunan Industri Pembinaan (CIDB) telah melantik perunding MCM Value Sdn. Bhd. (MCMV) bagi melaksanakan kajian profil pekerja melalui pengumpulan maklumat penggunaan pekerja binaan dalam projek pembinaan yang sedang/ telah dilaksanakan oleh kontraktor. Hasil kajian akan digunakan untuk membangunkan kaedah unjuran bagi merancang keperluan pekerja binaan yang lebih efisyen dapat dilaksanakan.

3. CIDB memohon kerjasama tuan/ puan untuk mengemukakan maklumat terperinci mengenai projek pembinaan berkenaan melalui Borang Kaji Selidik yang disertakan bersama surat ini. Wakil dari perunding MCMV akan menghubungi pihak tuan/ puan bagi mendapatkan maklumat tersebut. Maklumat yang diterima adalah **SULIT** dan hanya akan digunakan untuk tujuan membangunkan profil pekerja di atas.

4. Sebanyak **5 mata CCD** akan diberikan ke atas Borang Kaji Selidik yang lengkap diisi. CIDB menyeru kerjasama sepenuhnya daripada tuan/ puan dalam menjayakan kajian ini demi pembangunan sektor pembinaan negara. Kerjasama tuan/ puan dalam perkara ini amat dihargai dan didahului dengan ucapan terima kasih.

Sekian.

"BINA SEMPURNA"

(Sr MOHD. ZAID ZAKARIA)
Pengurus Besar
Bahagian Bisnes & Antarabangsa
Sektor Dasar dan Korporat
Lembaga Pembangunan Industri Pembinaan
(CIDB) Malaysia
b.p Ketua Eksekutif

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DEVELOPMENT OF CONSTRUCTION WORKERS' PROFILE

FOR

CONSTRUCTION INDUSTRY DEVELOPMENT BOARD MALAYSIA

Survey Form

Name of Contractor : _____

Registered Address : _____

_____

_____

_____

Note: 5 CCD Points will be given for completeness of the survey feedback.

INTRODUCTION

Background:

i) CIDB intends to establish a projection model for demand of major construction workers in Malaysia.

ii) It is observed that the accuracy of the demand is compromised due to duplication of the number of workers such as:
   a. Multitasking activities performed by the construction workers.
   b. Mobility of the construction workers for multiple projects in one time.

iii) Thus, a study on profile of the construction workers is needed.

Objectives of Survey:

i) Determine major construction workers for building and civil engineering projects.

ii) Estimate the 'labour multiplier' should there is any multi-tasking trades.

iv) Determine the factors contributed to the duplication of demand for construction workers.

Instruction:

i) The survey is mainly for contractor who:
   a. Has projects in hand and the progress are approaching the practical completion.
   b. Has completed projects.

ii) This is a semi-structured survey. Interview is required.

iii) Discussion and guidance are provided should the respondent seeks for clarification.

SECTION A – BACKGROUND OF RESPONDENT

Q1. What is your position in the company?
(select only one)

Project Director	
Project Manager	
Project Planner	
Site Supervisor	
Resident Engineer	
Clerk of Work	
Others (please specify)	

Q2. How many years of experience do you have in construction?
(select only one)

Less than 5 years	
5 – 10 years	
10 – 15 years	
15 – 20 years	
More than 20 years	

Q3. Which category of projects do you involve in?
(you may select more than one)

Building		**Infrastructure**	
Residential (low rise)		Water pipeworks	
Residential (high rise)		Roadworks	
Commercial		Bridge	
Administration (offices)		Drainage & Irrigation	
Industrial		Slope stabilisation	
Education (school)		Earthworks	
Healthcare (hospital)			

SECTION B – PROJECT PARTICULARS

Q4. Identiy one (1) project from your selection in Q3 above.

Item	Description
Project Name	
Client	
Contractor	
Year of construction	
Project Cost	

Q5. How many construction workers are involved in the above project?

No	Trade	Qty (No.)
1	General Labour	
2	Plasterer	
3	Tiler	
4	Bricklayer	
5	Barbender	
6	Carpenter (Formwork)	
7	Concretor	
8	Painter	
9	Scaffolder	
10	Plumber (Building)	
11	Plumber (Reticulation)	
12	Drainlayer	
13	Wireman	
14	Welder	
15	Plant Operator	
16	Crane Operator	
17	Roller Compactor Operator	
18	Pre-Stressing Worker	
	Others (please specify)	
19		
20		
21		
22		
	Total	

SECTION C – CONSTRUCTION WORKER'S PROFILE

Q6. What trades are considered as major construction workers in the abovementioned project? Major trade is defined as one that is significant items and contributes to high cost in the project.
(you may select more than one)

1	General Labour	
2	Plasterer	
3	Tiler	
4	Bricklayer	
5	Barbender	
6	Carpenter (Formwork)	
7	Concretor	
8	Painter	
9	Scaffolder	
10	Plumber (Building)	
11	Plumber (Reticulation)	
12	Drainlayer	
13	Wireman	
14	Welder	
15	Plant Operator	
16	Crane Operator	
17	Roller Compactor Operator	
18	Pre-Stressing Worker	
	Others (please specify)	
19		
20		
21		
22		

Q7. Indicate the workers who can perform multi-tasking activities and the range of percentage.

Trade		Select the multi-tasking trade (top)																				
		A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**J**	**K**	**L**	**M**	**N**	**P**	**Q**	**R**	**S**	**T**	**U**	**V**	**W**	**X**
A	General Labour	----																					
B	Plasterer		----																				
C	Tiler			----																			
D	Bricklayer				----																		
E	Barbender					----																	
F	Carpenter (Formwork)						----																
G	Concretor							----															
H	Painter								----														
J	Scaffolder									----													
K	Plumber (Building)										----												
L	Plumber (Reticulation)											----											
M	Drainlayer												----										
N	Wireman													----									
P	Welder														----								
Q	Plant Operator															----							
R	Crane Operator																----						
S	Roller Compactor Operator																	----					
T																			----				
U																				----			
V																					----		
W																						----	
X																							----
		Indicate the range of percentage (below)																					

Note: Both top and below matrices shall be consistent. For example, should B and C are of multi-tasking trades, select (/) at the top matrix and indicate the percentage (%) at the below matrix.

Q8. What are the factors that lead to multi-tasking activities by the construction workers?

Q9. Is it a common practice that construction workers work in more than one (1) project at one time? Why is it so?

Q10. How do you make sure that the construction workers are efficiently managed and coordinated for the project?

THANK YOU FOR YOUR PARTICIPATION

METHODOLOGY FOR CONSTRUCTION WORKERS' PROFILE Appendix B

Summary of Data Collection

Sample	Duplication (multi-tasking trades)				Mobility
1. Kediaman (Low Rise)					
1	Tiler (0.3)Plasterer	Bricklayer (0.3)Plasterer	Concretor (0.7)Barbender	Concretor (0.7)Carpenter	No
2		Bricklayer (0.5)Plasterer	Concretor (0.5)Barbender		No
3		Bricklayer (0.3)Plasterer	Concretor (0.5)Barbender	Concretor (0.5)Carpenter	No
Multiplier		**Bricklayer (0.3)Plasterer**	**Concretor (0.5)Barbender**	**Concretor (0.6)Carpenter**	**No**
Method		mode	mode	mean	
2. Kediaman (High Rise)					
1	Tiler (0.5)Plasterer				Yes
2					No
3	Tiler (0.5)Plasterer	Bricklayer (0.5)Plasterer			No
Multiplier	**Tiler (0.5)Plasterer**				**No**
Method	mode				
3. Komersial					
1	Tiler (0.5)Plasterer				Yes
2		Bricklayer (0.5)Plasterer			No
3	Tiler (0.5)Plasterer		Concretor (0.5)Barbender		No
Multiplier	**Tiler (0.5)Plasterer**				**No**
Method	mode				
4. Pentadbiran					
1		Bricklayer (0.5)Plasterer			No
2	Tiler (0.5)Plasterer		Concretor (0.5)Barbender		No
3			Concretor (0.3)Barbender		No
4		Bricklayer (0.3)Plasterer	Concretor (0.5)Barbender		No
Multiplier		**Bricklayer (0.4)Plasterer**	**Concretor (0.5)Barbender**		**No**
Method		mean	mode		
5. Perindustrian					
1		Bricklayer (0.3)Plasterer	Concretor (0.5)Barbender		No
2		Bricklayer (0.3)Plasterer	Concretor (0.5)Barbender		No
Multiplier		**Bricklayer (0.3)Plasterer**	**Concretor (0.5)Barbender**		**No**
Method		mode	mode		
6. Kemudahan Sosial (pendidikan)					
1			Concretor (0.2)Barbender	Concretor (0.1)Carpenter	No
2		Concretor (0.5)Bricklayer	Concretor (0.3)Barbender		No
3			Concretor (0.2)Barbender		No
4			Concretor (0.2)Barbender		No
Multiplier			**Concretor (0.2)Barbender**		**No**
Method			mode		
7. Kemudahan Sosial (kesihatan)					
1				Concretor (0.5)Carpenter	No
2			Concretor (0.3)Barbender	Concretor (0.4)Carpenter	No
3			Concretor (0.3)Barbender		No
Multiplier			**Concretor (0.3)Barbender**	**Concretor (0.5)Carpenter**	**No**
Method			mode	mean	
8. Utiliti (saluran paip)					
1	Plumber (0.5)Pipelayer				No
2					No
3					No
Multiplier					**No**
9. Pengangkutan (jalanraya)					
1					No
2					No
3					No
4				Concretor (0.4)Carpenter	No
5					No
Multiplier					**No**
10. Pengangkutan (jambatan)					
1	Concretor (prestressing)				No
2			Concretor (0.4)Barbender		No
3			Concretor (0.3)Barbender		No
Multiplier			**Concretor (0.4)Barbender**		**No**
Method			mean		
11. Saliran & pembentungan (perparitan)					
1	Concretor (0.2)Drainlayer				No
2			Concretor (0.5)Barbender		No
3			Concretor (0.5)Barbender		No

Multiplier			Concretor (0.5)Barbender		No
Method			mode		
12. Pencegahan bencana (kerja cerun)					
1	Roller Optr (0.3)Plant Optr				Yes
2					No
3					No
Multiplier					**No**
13. Lain-lain (kerja tanah)					
1	Roller Optr (0.3)Plant Optr				Yes
2					No
3					No
Multiplier					**No**