



CONSTRUCTION INDUSTRY COUNCIL

建造業議會

Report on Manpower Research for the Construction Industry in Hong Kong (Workers)

First update in 2013

(Specially Updated Version - February 2014)

February 2014



Disclaimer

Whilst reasonable efforts have been made to ensure the accuracy of the information contained in this publication, the CIC nevertheless would encourage readers to seek appropriate independent advice from their professional advisers where possible and readers should not treat or rely on this publication as a substitute for such professional advice for taking any relevant actions. Prior approval and advice seeking from CIC are requested for using or applying any figures in this report.

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Preamble

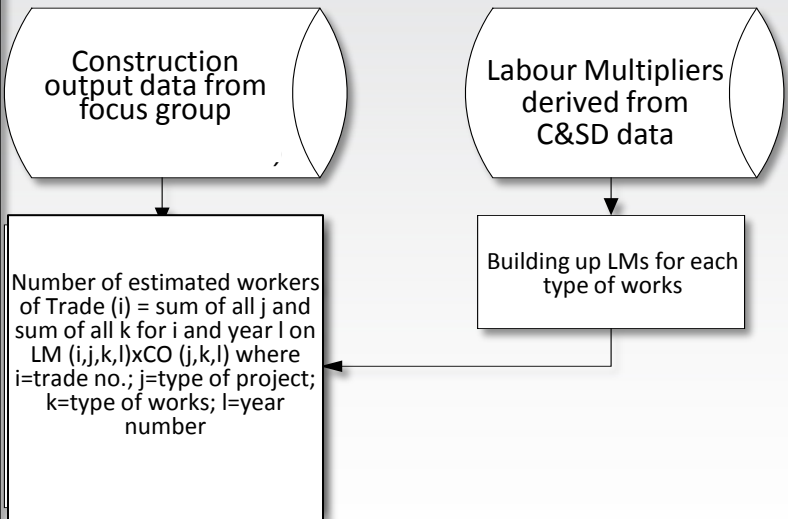
- The study was carefully conducted but inevitably based on a web of assumptions and incomplete basic data, such as lack of data of RMAA works and primary data of private projects.
- Therefore, the figures of the report are only ballpark figures and provide an indication of general trends of manpower situation. Further development of the forecast model is necessary to enhance its accuracy.
- The figures must not be taken at face value and must be considered with all assumptions taken, the inherent limitations and the need for enhancements.
- The projections in this report are based on the construction output data from the Focus Group on Projected Construction Expenditure (Focus Group) of CIC released in March 2013.

Objectives

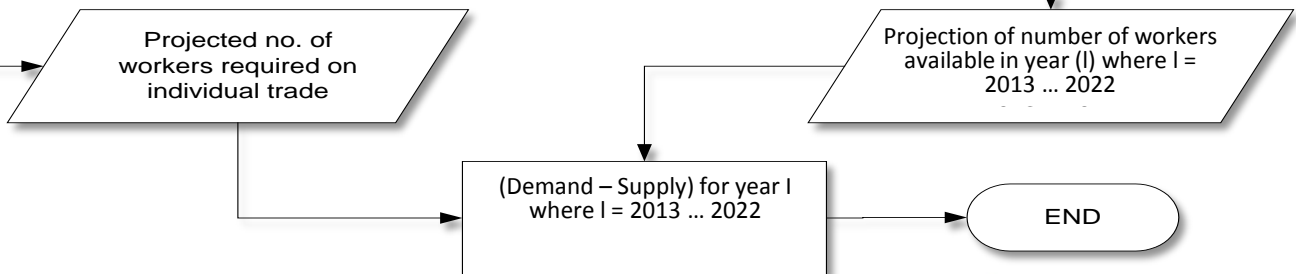
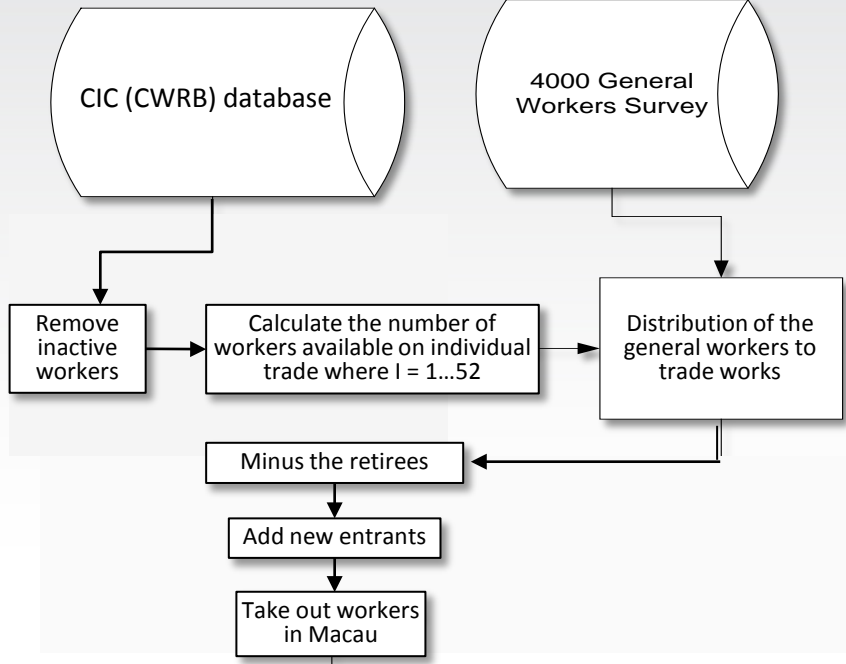
- This study is based on the existing Construction Industry Council Manpower Forecasting model with the first development from the year 2008.
- Update the manpower requirement using the following:-
 - existing CICMF model
 - construction output data from the Focus Group on Projected Construction Expenditure (Focus Group)
 - updated labour multipliers
- Show the overall manpower requirement trend
- Estimate the range of the population of the active workforce

CICMF Model

Demand



Supply



Trade Classification List of Workers in Model

| Trade No. | Trade Name (English) | 工種名稱 (中文) |
|-----------|--|-----------|
| 1 | Bar Bender & Fixer [or Steelbender] | 鋼筋屈紮工 |
| 2 | Concretor | 混凝土工 |
| 3 | Drainlayer | 地渠工 |
| 4 | Plumber | 水喉工 |
| 5 | Leveler | 平水工 |
| 6 | Scaffolder | 棚架工 |
| 7 | Carpenter | 木模板工 |
| 8 | Joiner | 細木工 |
| 9 | Plant & Equipment Operator (Load Shifting) [or Plant Operator (exc. driver, bulldozer driver, etc.)] | 機械設備操作工 |
| 10 | Truck Driver | 貨車駕駛員 |
| 11 | Rock-Breaking Driller [or Pneumatic Driller] | 鑽破工 |

Trade Classification List of Workers in Model

| Trade No. | Trade Name (English) | 工種名稱 (中文) |
|-----------|--|----------------------|
| 12 | General Welder | 普通焊接工 |
| 13 | Metal Worker | 金屬工 |
| 14 | Glazier | 玻璃工 |
| 15 | Painter & Decorator | 髹漆及裝飾工 |
| 16 | Plasterer Terrazzo & Granolithic Worker | 批盪工 |
| 17 | Bricklayer | 砌磚工 |
| 18 | Marble Worker | 雲石工 |
| 19 | Mason (incl. rubble mason, splitting mason and ashlar mason) | 砌石工 |
| 20 | Structural Steel Welder | 結構鋼材焊接工 |
| 21 | Structural Steel Erector | 結構鋼架工 |
| 22 | Rigger / Metal Formwork Erector | 索具工 (叻噪) / 金屬模板裝嵌工 |

Trade Classification List of Workers in Model

| Trade No. | Trade Name (English) | 工種名稱 (中文) |
|-----------|---|---------------|
| 23 | Asphalter (Road Construction) | 瀝青工 (道路建造) |
| 24 | Construction Plant Mechanic [or Fitter] | 建造機械技工 |
| 25 | Diver | 潛水員 |
| 26 | Electrical Fitter (incl. Electrician) | 電氣裝配工 |
| 27 | Mechanical Fitter | 機械打磨裝配工 |
| 28 | Refrigeration / AC / Ventilation Mechanic | 空調製冷設備技工 |
| 29 | Fire Service Mechanic | 消防設備技工 |
| 30 | Lift and Escalator Mechanic | 自動梯技工 / 升降機技工 |
| 31 | Building Services Maintenance Mechanic | 樓宇工程設備維修技工 |
| 32 | Cable Joints (Power) | 強電流電纜接駁技工 |
| 33 | Asphalter (Waterproof) | 瀝青工 (防水) |

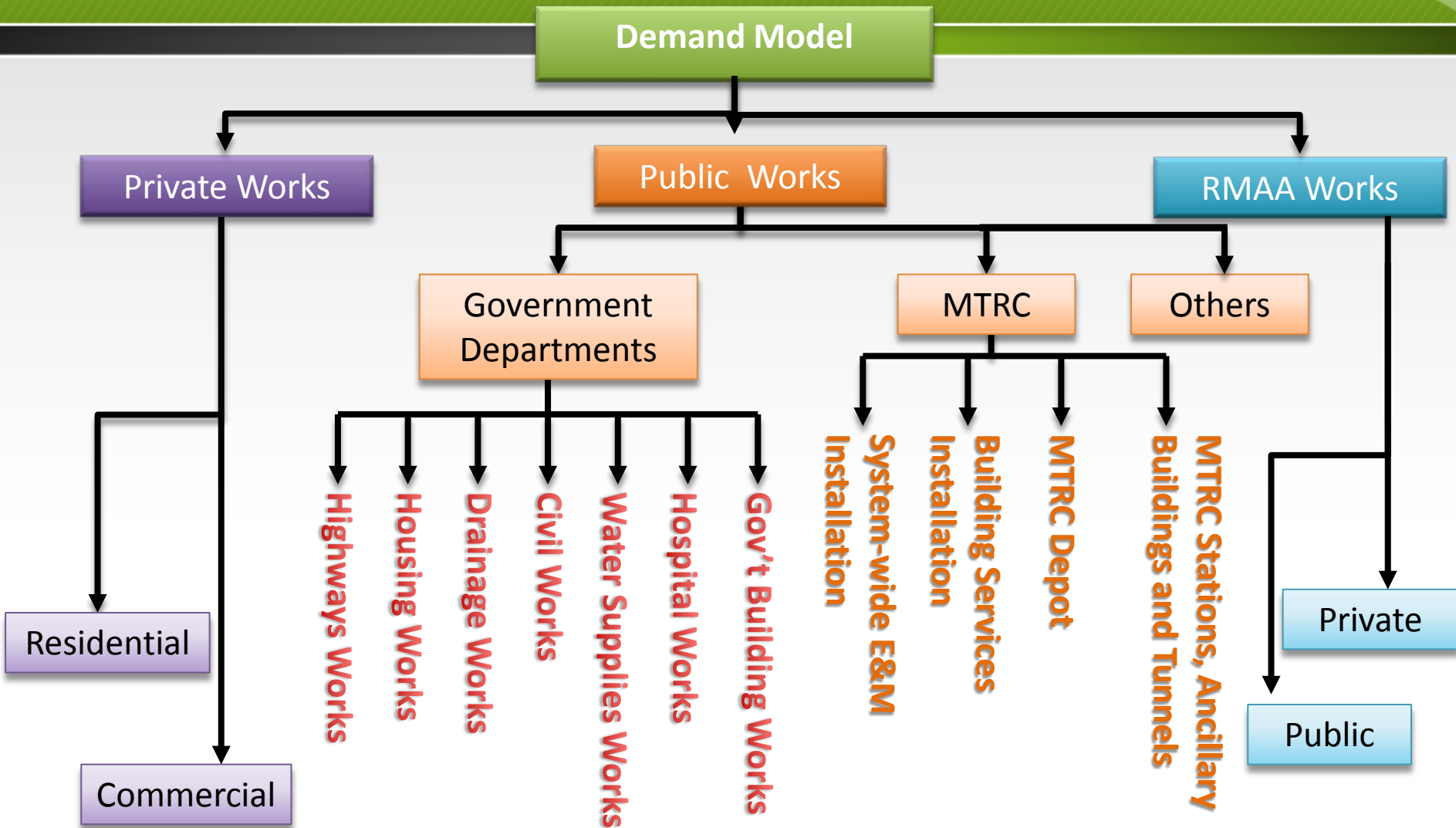
Trade Classification List of Workers in Model

| Trade No. | Trade Name (English) | 工種名稱 (中文) |
|-----------|----------------------|-----------|
| 34 | Tiler | 鋪瓦工 |
| 35 | Roofer | 屋面工 |
| 36 | Waterproofers | 防水工 |
| 37 | Material Lab Labour | 物料實驗室技工 |
| 38 | Gas Piper | 氣體裝置技工 |
| 39 | Drywall | 清水牆工 |
| 40 | False Ceiling Worker | 假天花工 |
| 41 | Landscape Worker | 園藝工 |
| 42 | Track worker | 鋪軌工 |
| 43 | Piling Worker | 打樁工 |
| 44 | Pipelayers | 敷喉管工 |

Trade Classification List of Workers in Model

| Trade No. | Trade Name (English) | 工種名稱 (中文) |
|-----------|------------------------|-----------|
| 45 | Shotfirer | 爆石工 |
| 46 | Tunnel Worker | 隧道工 |
| 47 | Marine Craft Crew | 海面建造機械操作工 |
| 48 | Diver's Linesman | 潛水架線工 |
| 49 | Miner | 礦工 |
| 50 | Shotcretor (Nozzleman) | 噴射混凝土工 |
| 51 | Stevedore | 搬運工人 |
| 52 | General Worker | 普通工人 |

The Construction Output covered by Focus Group in Demand Model



Assumptions and Limitations in Demand Model

Labour Multipliers (LMs)

- LMs of **public works** updated from 150 government projects & Civil Engineering Works Index and Building Works Tender Price Index
- New type of LMs for hospitals new works are added to the LMs data bank.

Assumptions and Limitations in Demand Model

Labour Multipliers (LMs)

- For the **private new works**, while the new data is still being collected, the following information has been adopted to adjust the original LMs:
 - 1) Original LMs with price level adjustment by the RLB Tender Price Index to 2012 Q3
 - 2) Data of C&SD (from 2005 Q1 to 2013 Q1)
 - a) No. of manual workers on private new works sites
 - b) Construction Output on the private new works
 - 3) New data from developers
- For the **private RMAA works**, a combination of LMs are used to generate a set of more accurate and reliable private LMs :
 - 1) public maintenance works;
 - 2) renovation works of Airport Authority; and
 - 3) RMAA projects of private stakeholders

Assumptions and Limitations in Demand Model

Labour Multipliers (LMs)

- Manpower data provided by MTRC are on-going contracts. Linear fraction of expenditure spent during the time span of contracts are used to calculate LMs.

Expenditure spend on Schedule

- Construction Expenditure released in March 2013 by the Focus Group of CIC will be spent on schedule.

Linear Transformation of the man-year

- Number of man-days is transformed to number of man-years.

Overall Manpower Requirements in CIC (CWRB) Covered Sites

| Financial Year | Total (Man-year) | |
|----------------|------------------|-------------|
| | Lower Bound | Upper Bound |
| 2013-2014 | 107,000 | 126,000 |
| 2014-2015 | 108,000 | 137,000 |
| 2015-2016 | 105,000 | 132,000 |
| 2016-2017 | 107,000 | 137,000 |
| 2017-2018 | 101,000 | 122,000 |
| 2018-2019 | 105,000 | 126,000 |
| 2019-2020 | 100,000 | 130,000 |
| 2020-2021 | 102,000 | 130,000 |
| 2021-2022 | 103,000 | 129,000 |
| 2022-2023 | 97,000 | 128,000 |

Note: CWRB covered sites means the sites of **New Works**, **Public RMAA** and **Part of Private RMAA** for which labour attendance data have to be reported to CWRB.

CICMF Supply Model

Base on CIC (CWRB) database for labour force of construction workers
(deduct inactive workers and distribute registered general workers possessing skills to individual trades)

Assume retirement rates from age 61-70 (sun-shine trades assumed to have higher retirement proportions in relatively younger ages compared with other trades)

Build-up database based on age profile
(verified with the age distribution with GHS from C&SD)

Project new entrants and workers exited to work in Macau

Project total number of construction workers available from year 2013 to 2022

Assumptions behind Supply Model

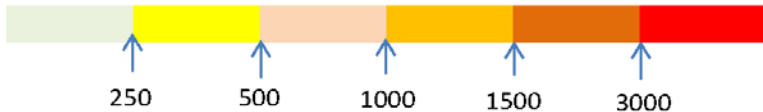
- Phone survey for registered general workers can properly approximate the real situation of registered general workers doing trades work on sites.
- The retirement process mainly starts after age 60 with increasing possibilities as the age increased to 70.
- The model result is verified by the CIC (CWRB)'s age profile and GHS age profile.
- New entrants mainly come from trainees of the Construction Industry Council (CIC) with wastage included.
- The number of employed workers exited to work in Macao has been considered taking into account the past trend.

Critical Trades

- Critical trades are those which have been forecasted with possible shortage within the period from year 2013 to 2022.
- Data are based on CIC (Construction Workers Registration Board (CWRB)) covered sites which means the sites of New Works, Public RMAA and Part of Private RMAA for which labour attendance data have to be reported to CIC (CWRB).

Trend of Trades with Demand > Supply (With No Training Output Considered)

| No. | Trade Classification | Year | | | | | | | | | |
|-----|---|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
| 1 | Bar Bender & Fixer [or Steelbender] | Red | Red | Red | Red | Red | Red | Red | Red | Red | Red |
| 3 | Drainlayer | Yellow | Light Orange | Light Orange | Light Orange | Light Orange | Light Orange | Light Orange | Light Orange | Light Orange | Light Orange |
| 5 | Leveler | Yellow | Light Orange | Light Orange | Light Orange | Light Orange | Light Orange | Light Orange | Light Orange | Light Orange | Light Orange |
| 7 | Carpenter | Red | Red | Red | Red | Red | Red | Red | Red | Red | Red |
| 11 | Rock-Breaking Driller [or Pneumatic Driller] | Light Green | Light Green | Light Green | Light Green | Light Green | Light Green | Light Green | Light Green | Light Green | Light Green |
| 20 | Structural Steel Welder | Yellow | Yellow | Yellow | Yellow | Yellow | Light Green | Light Green | Light Green | Light Green | Yellow |
| 21 | Structural Steel Erector | Light Green | Light Green | Light Green | Light Green | Light Green | Light Green | Light Green | Light Green | Light Green | Light Green |
| 22 | Rigger/Metal Formwork Erector | Yellow | Yellow | Orange | Yellow | Yellow | Yellow | Light Orange | Light Orange | Light Orange | Light Orange |
| 27 | Mechanical Fitter | Light Green | Light Green | Light Green | Light Green | Light Green | Light Green | Light Green | Light Green | Light Green | Light Green |
| 45 | Shotfirer | Light Green | Light Green | Light Green | Light Green | Light Green | Light Green | Light Green | Light Green | Light Green | Light Green |
| 46 | Tunnel Worker | Light Orange | Light Orange | Light Orange | Yellow | Yellow | Light Green | Light Green | Light Green | Light Green | Light Green |



Trend of Trades with Demand > Supply (With Training Output Considered)

| No. | Trade Classification | Year | | | | | | | | | |
|-----|--|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
| 1 | Bar Bender & Fixer [or Steelbender] | Light Orange | Yellow | Orange | Red | Orange | Orange | Orange | Orange | Orange | Orange |
| 3 | Drainlayer | Yellow | Light Orange | Light Orange | Light Orange | Light Orange | Light Orange | Light Orange | Light Orange | Light Orange | Light Orange |
| 5 | Leveler | White | Light Green | Yellow | Light Orange | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow |
| 7 | Carpenter | Orange | Red | Red | Red | Red | Red | Red | Red | Red | Red |
| 11 | Rock-Breaking Driller [or Pneumatic Driller] | Light Green | Light Green | Light Green | Light Green | Light Green | Light Green | Light Green | Light Green | Light Green | Light Green |
| 20 | Structural Steel Welder | Yellow | Yellow | Yellow | Yellow | Yellow | Light Green | Light Green | Light Green | Light Green | Yellow |
| 21 | Structural Steel Erector | Light Green | Light Green | Light Green | Light Green | Light Green | Light Green | Light Green | Light Green | Light Green | Light Green |
| 22 | Rigger/Metal Formwork Erector | Yellow | Yellow | Orange | Yellow | Yellow | Yellow | Light Orange | Light Orange | Light Orange | Light Orange |
| 27 | Mechanical Fitter | Light Green | Light Green | Light Green | Light Green | Light Green | Light Green | Light Green | Light Green | Light Green | Light Green |
| 45 | Shotfirer | Light Green | Light Green | Light Green | Light Green | Light Green | White | White | White | White | White |
| 46 | Tunnel Worker | Light Orange | Light Orange | Yellow | Yellow | Yellow | Light Green | White | White | White | White |



Result of CICMF Model

- Forecasted Manpower demand higher than supply for certain trades continuously exists and current training output does not fulfill the demand especially for some critical trades like bar benders & fixers and formwork carpenters.
- Aging may be one of the reasons for the possible manpower shortage situation.
- The limitations and assumptions of the model must be carefully considered when analysing the above figures:
 - Supply model only includes workers registered at CIC (CWRB).
 - Demand model only covers sites under companies with Business Registration but it cannot capture the number of workers under Hidden Construction Related Works (HCRWs). The estimation on the number of workers required by HCRWs are based on limited data and professional judgment.

(Note: HCRWs can be construction works performed by registered workers but the works are not captured in the construction output projected by the Focus Group.)

Attempts to project overall manpower requirement in the construction industry

| Financial year | Total (Man-year) | |
|----------------|------------------|-------------|
| | Lower Bound | Upper Bound |
| 2013 - 2014 | 199,000 | 236,000 |
| 2014 - 2015 | 208,000 | 257,000 |
| 2015 -2016 | 199,000 | 248,000 |
| 2016 -2017 | 207,000 | 260,000 |
| 2017 -2018 | 197,000 | 233,000 |
| 2018 - 2019 | 203,000 | 242,000 |
| 2019 - 2020 | 193,000 | 250,000 |
| 2020 - 2021 | 198,000 | 250,000 |
| 2021 - 2022 | 201,000 | 247,000 |
| 2022 - 2023 | 189,000 | 246,000 |

Note: Figures are estimated based on [limited data](#) and [professional judgment](#).

Estimated Overall Manpower Situation

| | |
|---|-----------|
| <p>(a) No. of registered workers <i>(Date Source: CIC (CWRB) database Oct 2013)</i></p> | ~ 320,000 |
| <p>(b) No. of registered workers who have left the construction industry <i>(Data Source: Estimated based on CIC (CWRB) phone survey conducted in mid 2013 and CIC (CWRB) record from Sep 2012 to Aug 2013)</i></p> | ~ 70,000 |
| <p>(c) Estimated no. of unemployed workers <i>(Data Source: C&SD Aug to Oct 2013 - unemployment rate for construction industry)</i></p> | ~ 10,000 |
| <p>(d) Discount of productivity for underemployed workers <i>(Data Source: C&SD Aug to Oct 2013 – underemployment rate for construction industry)</i> <i>(Assume underemployed workers contributes about 50% productivity of employed workers)</i></p> | ~ 9,000 |

Estimated Overall Manpower Situation

(e) Estimated no. of workers in Macau in the year 2013
(Based on statistic in the past)

~4,000

(f) Estimated no. of active workers under CIC (CWRB) registration
(Registered workers)

$(f) = (a) - (b) - (c) - (d) - (e)$
~225,000

Attention: Prior approval and advice seeking from CIC are requested for using or applying any figures in this report.

Additional manpower requirements in coming years (before considering training & better utilisation of potential workforce)

| Year end | 2014 | 2015 | 2016 | 2017 |
|--|-------------------|-------------------|---------|---------|
| Additional workers required * (approx.) | 15,000 to ~20,000 | 25,000 to ~30,000 | >30,000 | >30,000 |
| Additional skilled workers required * (approx.) | ~10,000 | 15,000 to ~20,000 | >20,000 | >20,000 |

*Figures are in absolute at the end of corresponding years and are non-cumulative.

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Further exploration on the additional skilled workers in coming years

Rough estimation on the additional skilled workers required (approx.) after considered the following assumptions and factors:

- (a) Training output of CIC per year is assumed to be constant in the coming four years. However, the following limitations exist:
- training capacities;
 - drop out of trainees;
 - difficulty in retaining new entrants;
 - productivity levels of graduated semi-skilled workers; and
 - loss of productivity for in-service skilled workers to nurture the semi-skilled graduates; and
- (b) Better utilisation of potential workforce including unemployed workers, underemployed workers and those who have left the industry (industry leavers).

| Year end | 2014 | 2015 | 2016 | 2017 |
|---|--------------------|---------------------------------|---------------------------------|--------------------|
| Additional skilled workers required* (approx.) | Below about 10,000 | Close to 10,000 to above 10,000 | Close to 10,000 to above 10,000 | Below about 10,000 |

*Figures are in absolute at the end of corresponding years and are non-cumulative.

Attention: Prior approval and advice seeking from CIC are requested for using or applying any figures in this report.

Concluding Remarks

- CICMF model shows the trend of manpower requirement goes upwards from 2012-2013 with the peak in 2016 and 2017 in the coming 4 years (based on slide 25).
- Based on a rough estimation and a set of assumptions in the specially updated version of report in February 2014, the peak of additional skilled workers required in the coming 4 years will be in 2015 and 2016 (based on slide 26).
- Depending on the progress of construction projects, training output and the size of potential workforce for utilisation, it is estimated an additional of close to 10,000 or more skilled workers are required.
- The construction output data adopted in this update has not yet fully reflected the new initiatives mentioned in the 2014 Policy Address.
- The manpower requirements are in man-year and should be carefully handled when used to compare directly with the actual number of workers.
- Supply model has gone through the redistribution process of registered general workers to skill works (accuracy depends on the information provided by respondents of the telephone survey).
- The model is based on a set of assumptions and limitations and there exists a number of unknowns in the industry affecting the accuracy of the forecast. It will be updated and enhanced constantly aiming to reflect the current situation of the industry.

Way Forward

- To enrich the private sector LMs project data
- To study any alternative approach in the removal of inactive workers
- To enrich the data of the unregistered workers and number of workers in minor RMAA works
- To seek input and feedback from the stakeholders for enhancement of the CICMF model study

Enquiries

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Thank you