# Indonesia's Critical Occupations List 2018

Technical Report

January 2020

COORDINATING MINISTRY FOR ECONOMIC AFFAIRS OF THE REPUBLIC OF INDONESIA

THE WORLD BANK
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# Acknowledgements

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# Executive Summary

**The government of Indonesia recognizes the importance of skills development to economic growth.** In September 2016, President Joko Widodo issued Presidential Instruction No. 9/2016, mandating the revitalization of Indonesia's vocational education system. This action acknowledged the urgency of a skills development reform. It also recognized that Indonesia's economy must adapt to structural changes if it is to reap the benefits of the country's demographic bonus, strategic position, and past economic growth. Under the presidential instruction, the Coordinating Ministry for Economic Affairs (CMEA), with support from the World Bank, instituted a skills monitoring system to better align education and skills programs with economic demand. The first step of the skills monitoring system was the production of the 2018 Indonesian Critical Occupations List (COL).

**The 2018 Critical Occupations List (COL) includes 35 occupations that are in shortage and strategic.** The 2018 COL draws upon international best practice from the United Kingdom, Australia, and Malaysia to develop a list of shortage occupations that can be used to inform labor market policies and programs. To be included on the list, an occupation must meet two criteria: (i) it must be in shortage, and (ii) it must be strategic for the Indonesian economy. Occupations on the COL represent jobs from sectors such as manufacturing, telecommunication and IT, accommodation and food services, construction, ICT, and other professional scientific services. This report details the methodology for creating the COL and suggestions for its application.

**The COL is developed by combining a "top-down" and a "bottom-up" approach.** In the "top-down" analysis, national-level data are scrutinized for trends that could indicate changes in the supply and demand of skills. For this report, SAKERNAS data from 2014 to 2017 was used. The "bottom-up" approach collects evidence from companies and business associations through employer surveys and consultations that involve both focus-group discussions and interviews. Qualitative information is also collected from the bottom-up approach (such as job titles, skills, and sector strategies to address skill gaps) to help contextualize analysis and provide evidence of persistent, widely-shared skills shortages.

**Evidence is analyzed through a dovetailing process and validated before generating the final COL.** The dovetailing process combines the "top-down" and "bottom-up" evidence, and determines whether an occupation can be considered to be in shortage. The results of the dovetailing process generate a preliminary COL, which is then shared with business associations through a validation process. During this stage, industry experts respond to the research team's interpretation of the COL evidence, providing additional input on whether an occupation is in shortage in their specific industry. The validation process also generates additional evidence for some occupations. A second round of dovetailing is conducted using the information received during validation to, when necessary, revise preliminary decisions. The final COL includes 35 occupations with specific job titles that are in shortage.

**The COL can be used to inform human capital development policies and strategies.** Internationally, COLs have been used to create targeted education and migration policies that address critical skills gaps. By serving as a platform for monitoring skills imbalances, the COL can help policymakers in Indonesia determine where investments should be made in training program, how incentives should be adjusted for apprenticeship programs, and which skills job-seekers should try to develop to increase their value in the labor market.

# Abbreviations

| | |
|---|---|
| **APINDO** | *Asosiasi Pengusaha Indonesia* (Employers' Association) |
| **AISC** | Australian Industry and Skills Committee |
| **ATVSI** | *Asosiasi Televisi Seluruh Indonesia* (TV Association) |
| **CfE** | Call for Evidence |
| **CMEA** | Coordinating Ministry for Economic Affairs |
| **COL** | Critical Occupations List |
| **EU** | European Union |
| **FGD** | Focus Group Discussion |
| **GAPMMI** | *Gabungan Pengusaha Makanan dan Minuman Indonesia* (Food/Beverages Association) |
| **GDP** | Gross Domestic Product |
| **GoI** | Government of Indonesia |
| **ICT** | Information and Communications Technology |
| **IdEA** | Indonesian E-Commerce Association |
| **ILO** | International Labour Organisation |
| **ISD** | Indonesia Services Dialogue |
| **KADIN** | *Kamar Dagang Indonesia* (Indonesian Chamber of Commerce) |
| **KBJI** | *Klasifikasi Baku Jenis Pekerjaan Indonesia* (Job Codebook) |
| **LMI** | Labor Market Information |
| **OECD** | Organisation for Economic Co-operation and Development |
| **OJK** | *Otoritas Jasa Keuangan* (Financial Services Authority) |
| **PHSI** | *Persatuan Hotel Seluruh Indonesia* (Hotel Association) |
| **SAKERNAS** | *Survei Tenaga Kerja Nasional* (National Labor Force Survey) |
| **SME** | Small and Medium Enterprise |
| **TVET** | Technical and Vocational Education and Training |



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# Intro

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## Labor Market Context

**The Indonesian labor force is expanding and grew by 1.7 million people in 2017.**[1] **Between 2016 and 2017, the labor force participation rate rose slightly from 66.3 to 66.7 percent (see Figure 1).** Yet this growth was felt unevenly. Approximately two-thirds of new entrants were men, 87 percent were between the ages of 35 and 39, and 70 percent had less than a primary education. Meanwhile, female labor force participation has stayed persistently low at 50.9 percent, compared to the male labor force participation rate of 82.5 percent (see Figure 1). While 11 percent of labor market entrants had a university degree or higher, this is proportional to the share of tertiary-educated people (university or higher, plus Diploma I, II and III) in the total labor force: 12.1 percent (see Figure 2). This suggests that most of Indonesia's labor market growth is driven by low-skilled laborers. Moreover, all new labor market entrants in 2016-2017 were in urban areas, half of which were in West Java alone, suggesting uneven economic growth. In fact, only Java, Bali, Sumatera, and Papua experienced an increase in the labor force. Meanwhile, Kalimantan, Sulawesi, Nusa Tenggara, and Maluku experienced a decline.

**1** As defined by the National Labor Force Survey (SAKERNAS), the labor force is composed of workers 15 years old and over who in the previous week were either working, temporarily absent from a current job, or who did not have work and were looking for work or in the process of establishing a new business.

Mar



**Parallel to the expansion in the labor force, employment grew by 2.6 million persons in 2017.** This figure is slightly lower than the number of new jobs created in 2016 (3.6 million additional workers) but higher than 2015 (191,173 additional workers). Among those who were newly employed in 2017, 61 percent were employed for less than 35 hours per week (6 percent were interested and willing to work more, i.e. partly unemployed; and 55 percent were satisfied with their current hours of work, i.e. part-time workers). The manufacturing, wholesale, and retail trade, and the community services sectors experienced the largest employment increase. The agriculture and mining and quarrying sectors experienced the largest decrease in employment.

**The Indonesian economy is experiencing structural transformation, with employment shifting away from the agriculture sector and towards more productive sectors such as manufacturing and services.** Between 2001 and 2017, the share of employment in the agriculture sector declined from 44 to 30 percent (see Figure 3). In agriculture, the output per worker was nearly one-quarter of that of workers in the manufacturing sector and less than half of that of workers in the services sector.2 Additionally, one-third of agricultural employment was in the form of unpaid family workers, leaving workers more vulnerable to economic shocks and in poor working conditions. Conversely, also between 2001 and 2017, employment in the trade, restaurants, and hotels sector increased from 19 to 23 percent. Employment in community, social, and personal services rose from 12 to 17 percent. This signals a shift in labor demand towards more productive sectors.

Fig. 1

Labor Force Participation Rate

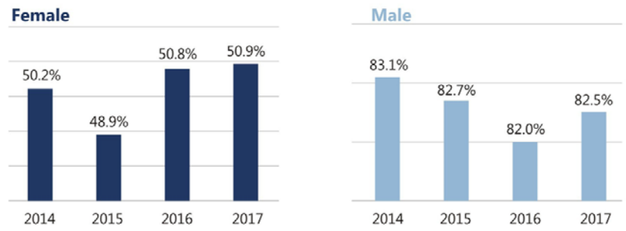
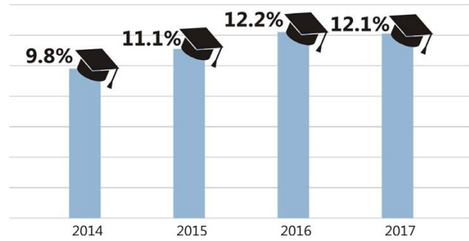




Fig. 2

Percent Share of the Labor Force with a Tertiary Education




**2** Source: Manning, C., and D. Pratomo (forthcoming). "Labor Market Developments in the Jokowi Years." 2018.

SOURCE: National Labor Force Survey (Survei Angkatan Kerja Nasional, SAKERNAS)

+ 2.6 Million

Parallel to the expansion in the labor force, employment grew by 2.6 million persons in 2017.



**Most workers in Indonesia are employed in semi-skilled occupations, however this share is declining.**[3] **In 2017, 62 percent of Indonesians worked in semi-skilled jobs, 21.5 percent in low-skilled jobs, and 16.5 in high-skilled jobs.** These figures are consistent with historical trends. Yet the proportion of semi-skilled workers has been declining over the past few years. Between 2016 and 2017, semi-skilled employment declined from 66.2 to 62 percent. Meanwhile, the share of low-skilled employment increased from 18.6 to 21.5 percent, and high-skilled employment increased from 15.2 to 16.5 percent (see Figure 4). This trend might be driven by the technology-driven changes to the nature of jobs. Internationally, some skill sets associated with semi- skilled jobs, especially those involving routine and manual tasks, are already being replaced by automation. Representatives from Indonesia's employers association stated that recent minimum wage hikes, which doubled between 2012 and 2018, has quickened the rate of automation in some sectors because labor costs are rising faster than the cost of machines.[4] Employment and skills trends may also be driven by skills mismatch. In recent years, employers have reported difficulty filling semi- and high-skilled jobs, which may suggest that these positions may be filled by people with inappropriate skills levels.

**In 2017 Indonesians worked in**

**62%** semi-skilled jobs

**21%** Low-skilled jobs

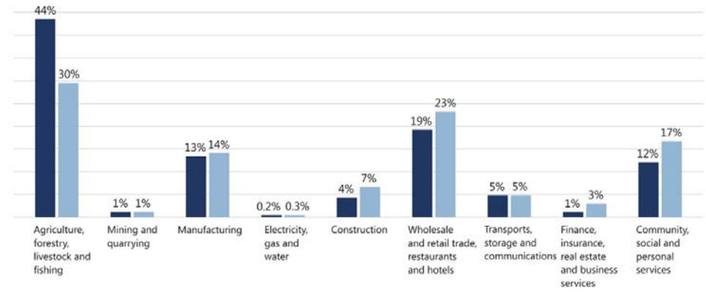
**16%** High-skilled jobs

**3** An occupation is identified as semi-skilled if it falls within one of the following categories: Clerical Support Workers; Service and Sales Workers; Skilled Agricultural, Forestry, Livestock and Fishery Workers; Craft and Related Trades Workers; and Plant and Machine Operators and Assemblers groups. It is considered high-skilled if it falls within one of the Managers, Professionals, Technicians, and Associate Professionals categories. It is identified as low-skilled if it falls within the Elementary Occupations group, which includes blue-collar workers, cleaning personnel, and other low-skilled occupations.

**4** Source: APINDO. "The Future of Employment: Indonesia's Context." Presentation, Indonesia Jobs Forum "The Future of Jobs and Jobs of the Future," Center for Strategic and International Studies, April 4, 2018.

Fig. 3

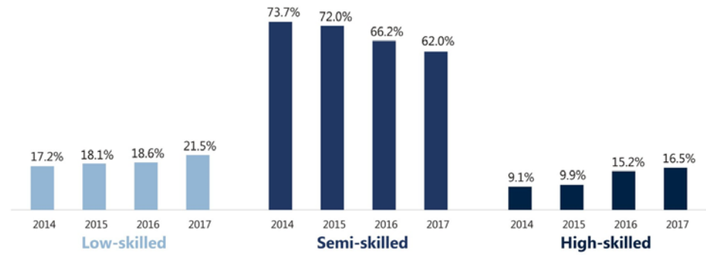
Employment by Economic Sector




SOURCE: National Labor Force Survey (SAKERNAS)

Fig. 4

Employment by Skills Categories




SOURCE: National Labor Force Survey (SAKERNAS)

# Skills Imbalances in Indonesia

**While Indonesian firms demand higher skills levels, a large part of the Indonesian workforce is not able to meet these needs.** Over the past two decades, the number of jobs that require secondary- or tertiary-levels of education has increased and the number of low- or unskilled jobs has decreased.[5] Indonesian firms are becoming more customer- and export-oriented, which requires soft skills such as leadership, communication, and relationship management.[6] These skills demands are not being met by Indonesian job-seekers, which has generated a skills mismatch where employees either have too many or too few skills for their jobs. Most employers report difficulty filling high-skilled positions, especially managerial roles. English and computer skills are lacking in the labor force, and high turnover rates and talent poaching create disincentives for firms to train employees.[7] Furthermore, Indonesian employers do not believe that the school system is producing quality graduates. The current volume of high-skilled workers is not sufficient to fill the increasing number of high skilled jobs. Between 2008 and 2015, more tertiary-educated people were working in the labor force than the total number of high-skilled jobs (such as managers, professionals, associate professional, and technicians). However, since 2016, this trend has been reversed so that the number of high-skilled jobs is currently higher than the number of highly-skilled workers. This may suggest that firms may be forced to hire less-educated workers to fill high-skilled positions, as a strategy to address the scarcity of skilled labor.

**5** Source: Lee, Jong-Wha, and Dainn Wie. Technological Change, Skill Demand, and Wage Inequality in Indonesia. Manila: ADB Economics Working Paper, 2013.

**6** Source: di Gropello, Emanuela, Aurelien Kruse, and Prateek Tandon. Skills for the Labor Market in Indonesia. Washington, DC: World Bank, 2011.

**7** Source: di Gropello, Emanuela, Aurelien Kruse, and Prateek Tandon. 2011.

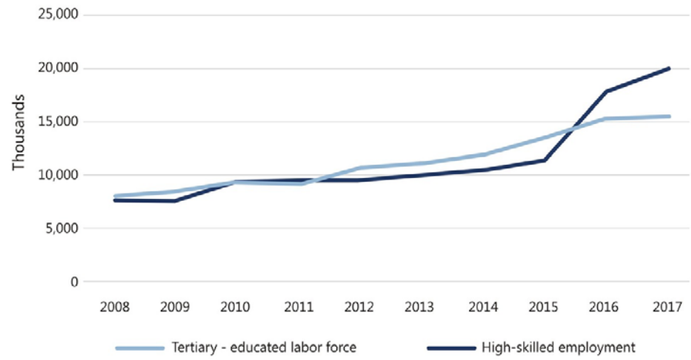


**Skills mismatch can take a variety of forms.** These may include skill gaps, skill shortages or surplus, over- and under-education, over- and under-qualification, and skill obsolescence.[8] The ILO's Indonesia Jobs Outlook 2017 report states that there is indicative evidence of a long-standing skills mismatch, although the type of skills mismatch has changed throughout the years. Between 2006 and 2016, over- education decreased, and under-education increased. Male and youth tended to be more overeducated than their female counterparts and older workers. Workers in urban areas, meanwhile, were more likely to be undereducated than workers in rural areas.

**Mismatches negatively impact output, productivity, competitiveness, and innovation.** Shortages exist when there is insufficient supply of appropriately qualified workers willing to work under existing market conditions, particularly at the prevailing wage rate.[9] They are primarily caused by delays in wage and labor supply adjustment and lack of labor market information. In the short-term, labor market shortages can lead to decreases in output and productivity. In the long-term, they can lead to a loss of competitiveness and innovation at the firm-level. As such, predicting shortages is crucial. Early shortage identification can allow Governments to protect and strengthen the national economy's productivity and competitiveness by designing migration management and education and training investment policies. Figure 6 provides details of the potential costs of skills imbalances for employers, employees, and for the whole economy.

Fig. 5

Number of Tertiary Education Workers and High-Skills Jobs




SOURCE: National Labor Force Survey (SAKERNAS)

Fig. 6

Potential Costs of Skills Imbalances


SOURCE: Malaysia's Critical Occupations List Report 2016/2017

**8** Source: ILO. Indonesia Jobs Outlook 2017. Jakarta: ILO, 2017.

**9** Source: Shah, Chandra and Gerald Burke. "Skills Shortages: Concepts, Measurement and Policy Responses." Australian Bulletin of Labor 31 (2005): 44-71

**Skills imbalances have several possible causes.** In Indonesia, drivers include: (i) inadequate labor market information; (ii) low quantity and quality of education; (iii) limited opportunities for on-the-job training; (iv) high labor mobility costs; and (v) structural change and rapid technological development. Table 1 describes how each of these factors may lead to skill imbalances in the Indonesian labor market.

Tab. 1 Potential Sources of Skills Imbalances in Indonesia

| | | |
|---|---|---|
| 1 | **Inadequate labor market information:** | Indonesian workers mainly find jobs through informal networks rather than through formal messaging boards, job announcements, or job matching services. This indicates that there is room to strengthen existing labor market information systems. |
| 2 | **Low quantity and quality of education:** | Only 65 percent of Indonesian workers have completed senior secondary school, indicating a relatively low level of education. In recent decades, enrollment in upper secondary education has increased substantially, suggesting future generations will be better educated. However, Indonesia still suffers from a lack of school quality. Scores from the OECD's Programme for International Student Assessment (PISA) show that more than half of Indonesian students do not possess adequate skills to compete in the labor market. |
| 3 | **Limited opportunities for on-the-job training:** | According to the World Bank's Labor Market Stakeholders' Perception Survey 2016, only one-third of medium-size firms provide training to workers. Additionally, of the large firms that are required to provide worker training by Indonesian labor regulations, one-third have failed to comply. |
| 4 | **High labor mobility costs:** | Recent evidence shows that higher housing prices and rising minimum wage have made it harder for workers to find jobs after negative economic shocks.10 |
| 5 | **Structural changes and rapid technological development:** | The Indonesian economy is transitioning from an agriculture-based economy towards a more manufacturing and service-led economy. This, coupled with the quick adoption of new technology, might lead to skills imbalances during market adjustment. |



"Only **65%** of Indonesian workers have completed senior secondary school, indicating a relatively low level of education"

# Addressing Skills Imbalances

**High-level leadership in Indonesia is focused on addressing the root causes of skills imbalances.** In April 2017, President Joko Widodo launched a government priority program called "The Economic Equity Policy," which consists of three pillars: land reform, equal access to opportunity, and improving human capital. Under the improving human capital pillar, President Widodo has focused on improving vocational school education, entrepreneurship, and the labor market. This includes close coordination across different government ministries and agencies, and across different coordinating ministries in the cabinet. These efforts aim to improve the competency of Indonesia's labor force, especially as the nature of jobs changes.

**To address these challenges, the Government of Indonesia (GoI), through the Coordinating Ministry for Economic Affairs (CMEA), is currently introducing a new *skills monitoring system*.** The *skills monitoring system* is the outcome of close collaboration between the GoI and the World Bank. Supported by the World Bank, it draws from a large body of international experiences, including that of the United Kingdom, Australia, and Malaysia. International experience suggests that monitoring skills accurately, frequently, and continuously is essential in allowing governments to plan and implement effective educational and workforce development policies. Skills monitoring can provide the evidence base to inform decisions on the allocation of public resources and other policy interventions.

**More specifically, skills monitoring helps align workforce development policies with demand-side needs.** Monitoring skills supply and demand can help identify gaps that the government can address through education, vocational training, or other interventions. The same monitoring system can also: (i) improve the quantity and quality of labor market information available to less well-off groups and reduce the inequality of opportunity; and (ii) enable businesses to address imminent and future shortages by applying company- specific interventions to retain or retrain existing employees.



## The Critical Occupations List

**The COL is a list of occupations that meet the "shortage" and "strategic" inclusion criteria.** For the purpose of the analysis, occupations are classified on the basis of the 2002 Klasifikasi Baku Jenis Pekerjaan Indonesia (KBJI). The KBJI classification is organized into 10 occupational groupings that differentiate occupations based on skill type:

Major Group 1
Legislative Officials, High Officials, and Managers

Major Group 2
Professionals

Major Group 3
Technical and Associate Professionals

Major Group 4
Clerical Support Workers

Major Group 5
Service and Sales Workers in Shops and Markets

Major Group 6
Skilled Agricultural, Forestry, Livestock, and Fisheries Workers

Major Group 7
Craft and Related Trades Workers

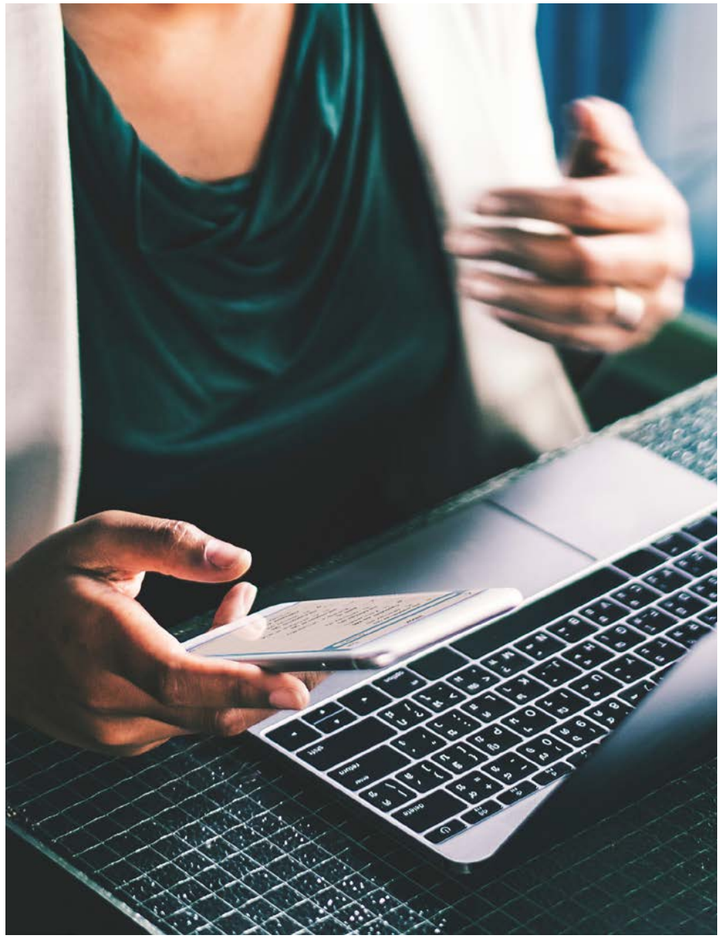
Major Group 8
Plant and Machine Operators and Assemblers

Major Group 9
Elementary Occupations that require only primary education

Major Group 0
Indonesia National Security and Defense

**In general, occupations in Major Groups 1 to 8 require at least a secondary education, while those in Major Group 9 require only a primary education.** Major Group 0 is not included in the COL because it encompasses Indonesian national security and defense occupations that are not the focus of skills development policies. The 2018 Indonesian review process considers all 312 occupations belonging to Major Groups 1-9 in the KBJI 2002. Four-digit KBJI codes are used for the COL analysis, and the final COL includes more granular information on specific job titles in shortage within the identified occupations.

**Occupations "in shortage" and "strategic" are identified through several complementary steps.** The top-down evidence uses national data to find economy-wide evidence that an occupation may be in shortage, while the bottom-up evidence plugs gaps in the top-down evidence and provides greater detail on the reasons and impact of the shortage. In addition, at the validation stage, knowledgeable stakeholders, including representative of the private sector and government agencies, provide input on the proposed shortage list to ensure that the included occupations are of strategic importance for future growth of the Indonesian economy. These two sources of evidence are combined to identify occupations that meet the criteria for inclusion on the COL.



Criteria 1

## Occupations Must Be in Shortage

**In shortage means that demand exceeds supply for a specific occupation or job title.** This criterion can be measured using quantitative and qualitative means. Quantitatively, the top-down approach sets thresholds based on national supply and demand indicators that determine if an occupation qualifies as "in shortage." Qualitatively, the bottom-up approach measures employer perceptions through a Call for Evidence survey (CfE) and in-person consultations. Both the CfE and the consultations ask firms to provide evidence of "shortage" and additional information, including job titles, job requirements, desired levels of experience, and employer responses to hiring difficulties

Criteria 2

## Occupations Must Be in Strategic

**Strategic means that an occupation is important to Indonesia's continued economic growth and diversification.** The use of a strategic criterion is meant to extend the COL beyond simply tallying occupations considered to be in shortage. Considering the strategic importance of occupations provides some guidance to the government and other entities that invest in skills development programs on how best to set priorities and allocate resources. Strategic importance is established via two channels: first the bottom-up process and then the validation stage. Through the bottom-up process, by design, the CfE asks employers to respond only when they feel that they face a shortage in a critical occupation. The CfE asks detailed follow-up questions for each occupation. This information is used to evaluate the case for the occupation nominated. The level of detail of information required also serves as a signal of the importance of the occupation to the employer. Gathering and submitting the required evidence requires effort that employers not interested in relief to their skills challenges are less likely to put forth. In consultations, employers are asked directly whether or not they think an occupation is strategically important to their company's success. At the validation stage, representatives of the private sector and government agencies are requested to provide feedback on a proposed shortage list, taking into consideration the needs of the Indonesian economy. This step is particularly important to ensure that the COL does not only include occupations that are critical to specific firms' growth and profitability, but also provides information on occupations that are important for the country's continued growth and diversification. Because the COL is designed to be used by a broad range of agencies and programs, the definition of strategic is also broad. This criterion is not intended to exclude a large number of occupations for which the shortage criterion is met. Rather, it aims to ensure that the COL takes into account Indonesia's economic and social needs, and prioritizes occupations that are aligned.

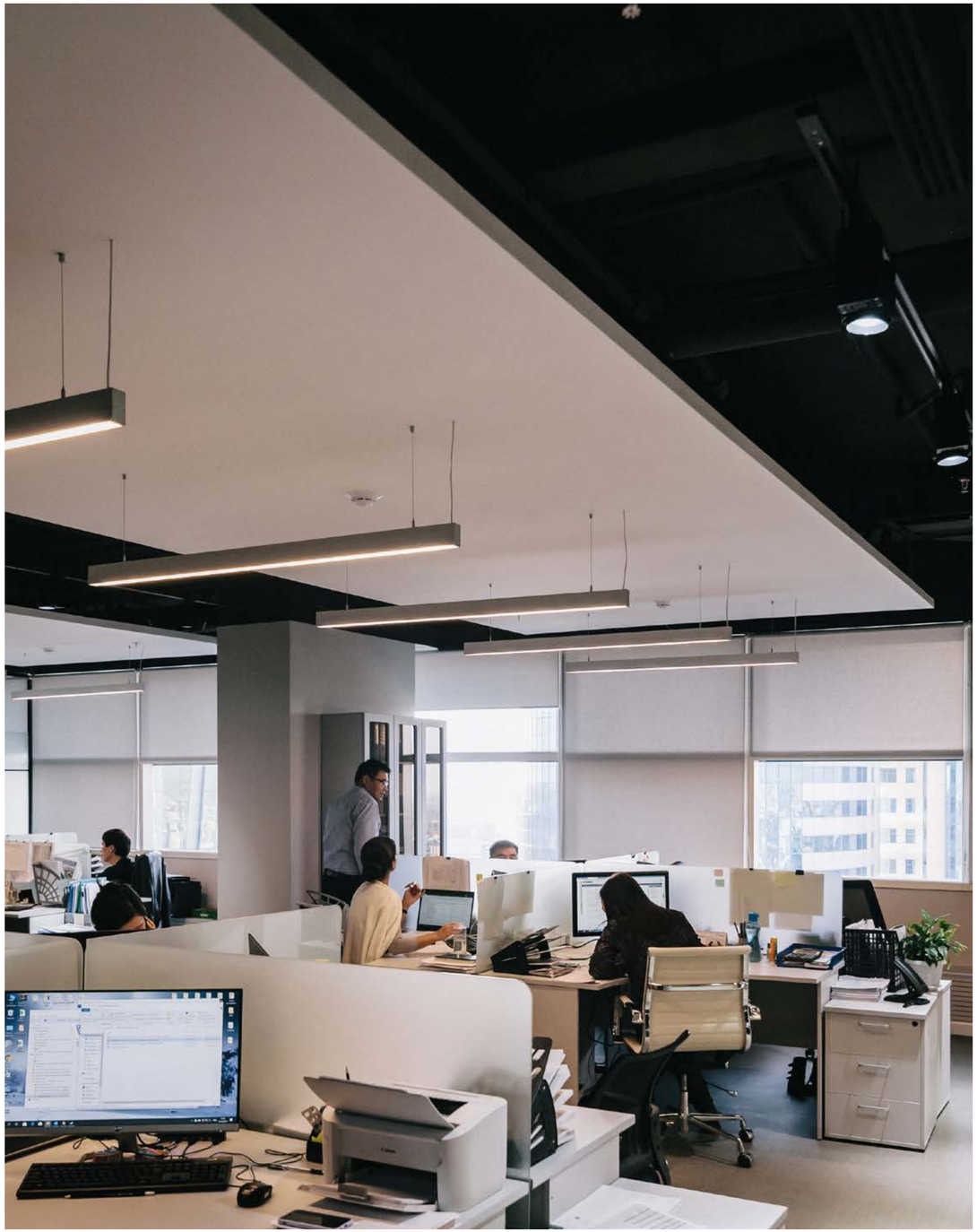
## COL Applications

**The COL is designed to inform human capital development policy.** As will be discussed in greater detail in Part III of this report, the COL is meant to help direct decision-making and resource allocation related to education, training, migration, and other areas of human capital development. By serving as a platform for monitoring skills imbalances, the COL can help policymakers in Indonesia determine where investments should be made in training programs, how incentives should be adjusted for apprenticeship programs, and which skills job-seekers should try to develop to increase their labor market value.

## Report Outline

**This methodological report presents the COL methodology, describes the steps taken to produce the COL, and shows the final results of 2018 Indonesia COL.** Part I describes the methodology used to create the 2018 COL. This includes a detailed description of the top-down process, bottom-up process, dovetailing, validation, and final results. Part II of the report presents the final 2018 COL with descriptions of each critical occupation. Part III highlights potential COL applications, both internationally and in Indonesia. Internationally, applications are divided between education- and migration-based initiatives. The report concludes with recommendations and next steps for future rounds of the COL work.





Chapter 1

# Methodology for the 2018 COL

Chapter 1.1

# Introduction

Ch.

1.1

**The Critical Occupations List (COL) is generated through rigorous quantitative analysis and stakeholder engagement.** Occupations included on the list must be in shortage and be of strategic importance to the economy. Methods for identifying such occupations rely on international best practice and employ both top-down and bottom-up approaches. The top-down approach analyzes national labor market indicators to determine which occupations are in shortage and strategic. The bottom-up approach collects survey data from Indonesian employers and supplemental information on specific job needs. Results from both approaches are then "dovetailed" to synthesize evidence, and ensure that both quantitative and qualitative metrics are considered. The final COL thus provides both an objective and contextualized view of which occupations are most in shortage and strategic.

**COL construction requires a high level of information, which is supplied through both top-down and bottom-up approaches.** This is required for several reasons. First, labor markets respond to shortages in a variety of ways. This makes it necessary to consider multiple indicators when determining if an occupation meets the shortage criterion. Second, evaluating an occupation's strategic importance requires sophisticated knowledge of the economic context in which the COL was drafted and will be applied in the future. Employing both top-down and bottom-up approaches helps meet this high threshold of required information.



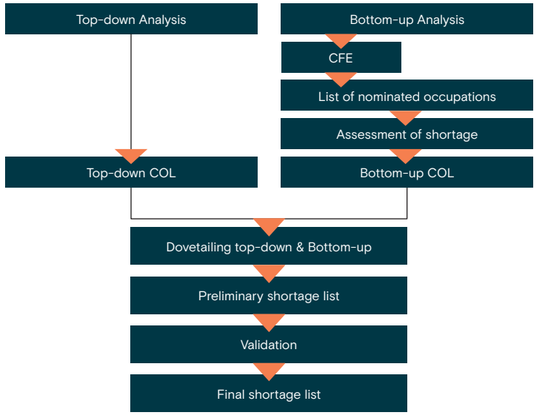
**By incorporating both quantitative data evidence and qualitative inputs from key stakeholders in a structured, transparent, and participatory way, the proposed methodology is particularly suitable to the Indonesian context.** When developing a methodology to identify shortages, it is important to consider that there is no single definition or empirical measure of a labor market shortage. As such, different methods can be used to determine skills shortages. The general consensus is that both quantitative and qualitative measures are necessary to identify a shortage.[10] These measures generally include employment and unemployment rates, vacancy and hard-to-fill vacancy rates, changes in wages, employer surveys, and in-depth discussions with employers, regulators, educational institutions, and other labor market stakeholders to understand context, the supply pipeline, and the demand outlook.

**To reconcile top-down and bottom-up evidence, the COL utilizes the Indonesian Standard Classification of Occupations (Klasifikasi Baku Jenis Pekerjaan Indonesia, KBJI) as the unit of analysis.** KBJI is the national tool organizing jobs into clearly defined job family groups according to the tasks and duties undertaken in the job. Following international practices, the COL utilizes KBJI at the 4-digit code level, which provides a sufficient level of disaggregation with enough sample size to generate robust statistics. Qualitative evidence from the bottom-up analysis provides further insights on specific job titles in shortage within identified occupations at the 4-digit code level.

**The proposed methodology represents a departure from the practice of manpower planning, which has been shown to have several weaknesses, especially in the context of growing and dynamic economies.** In recent decades, international best practice has departed from model-based manpower planning, which was widely used in the post-war period, particularly by governments that took a more active role in leading a productive economy. Experience from a broad range of countries and over time has shown that manpower planning relies on too many assumptions about present and future conditions, on which there is usually very limited information. Manpower planning has some predictive value in circumstances where little changes over time are observed, but it fails completely in circumstances where economies are more dynamic. Thus, manpower planning is an approach that is more suitable for highly managed, controlled, and planned economies. However, in a market-led economic system, the capacity of manpower planning has been shown to be severely limited.

Fig. 7

Process of COL Development




**10** Veneri, Carolyn M. 1999. "Can Occcupational Llabor Sshortages Bbe Iidentified Uusing Aavailable Ddata?" Monthly Labor Review 122 (1999): 15-21

Chapter 1.2

# Top-Down Analysis

**The top-down approach uses national labor market data to identify occupations for potential inclusion on the COL.** Skill shortages are difficult to identify because no single indicator by itself can demonstrate a shortage. Context is also important: for example, salaries can fluctuate substantially before reaching equilibrium in certain labor markets, while the level of vacancies can be high due to a high turnover in a particular occupation.11 For this reason, the COL top-down approach considers multiple labor market indicators. The method looks at both price indicators (earnings and premiums) and quantity indicators (employment levels, hours worked, etc.). In general, the objective of the top-down approach is to define a set of indicators that can provide evidence of labor market shortage, and to then set indicator-specific thresholds that define the level at which an indicator will likely signal shortage. If an occupation is above the given thresholds for at least half of the available indicators, then it is considered to be likely in shortage. The following section details the steps and procedures of the top-down approach.

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**11** MAC (United Kingdom Migration Advisory Committee). 2017. Assessing Labor Market Shortages: A Methodology Update. London: United Kingdom Migration Advisory Committee, 2017.



**The top-down approach involves six steps that select and refine shortage indicators.** Results from each step include the following (as summarized in Figure 9):

**1.**
**Data sources are selected that include information on occupations based on the KBJI 4-digit level classification.** Sources do not need to be only from survey data but can also come from administrative sources. In the case of Indonesia, SAKERNAS is the only dataset available to the research team that includes information on occupations classified according to 4-digit KBJI codes. A total of 312 occupations from SAKERNAS are considered.

**2.**
**These data sources are screened for usable information about occupations, which is the unit of analysis for the COL.** Screening includes evaluating the availability of a sufficient number of observations. In total, 167 occupations are determined to have sufficient information, meaning they have at least 30 observations in each year of the reference period.

**3.**
**Initial indicators are drawn from the dataset.** These indicators can reasonably be linked with occupational shortages through robust economic principles. In total, 16 indicators are identified.

**4.**
**These indicators are screened to ensure that each provides unique information about occupational shortages.** This involves looking at the correlation between indicators and evaluating which occupations are found to be in shortage under each indicator. This results in a set of 12 intermediate indicators.

**5.**
**The intermediate indicators are combined in a variety of specifications to evaluate the combinations that provide the best, easily-interpretable shortage information.** This requires thresholds to be defined for each indicator. Multiple thresholds are used to test less restrictive and more restrictive scenarios. This step also requires a rule to be defined for combining the different indicators to produce one shortage list for each combination of indicators.

**6.**
**The final stage uses the selected specification to evaluate occupations for shortage.** The result of this stage is the top-down shortage list.

Fig. 8

Top-Down Analysis in the COL Process

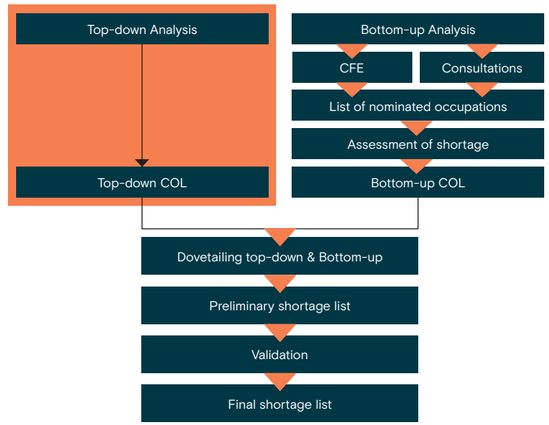


Fig. 9 Summary of the Top-Down Approach

| | | |
|---|---|---|
| Step 1 | **Select Dataset** | SAKERNAS is selected to represent the labor force based on the availability of 4 digit KBJI codes |
| Step 2 | **Keep representative Information** | Occupation with less than 30 observations are eliminated |
| Step 3 | **Identify initial indicators** | 16 indicators are identified from SAKERNAS |
| Step 4 | **Identify intermidiate indicators** | 4 indicators are eleiminated, and 12 become intermidiate indicators |
| Step 5 | **Identify most suitable specification and final indicators** | 14 specifications are tested to ensure robustness and 2 final specification is identified |
| Step 6 | **Generate top-down COL** | Using the chosen specification, the top-down COL is produced |

## Step 1 Select Dataset

**Potential data sources were screened.** Since occupations are the unit of analysis for the COL work, included data sources must have standardized occupational codes to ensure top-down and bottom-up methodologies produce comparable results. To ensure the analysis is sufficiently disaggregated, occupation classification codes at the 4-digit level are required for all years in the analysis.

**SAKERNAS was the only data source made available to the team that had sufficient information for the COL top-down analysis.** Available datasets vary by country. In Indonesia, the only available dataset that could be used to construct labor shortage indicators based on the 4-digit KBJI codes was the National Labor Force Survey (*Survei Tenaga Kerja Nasional*, SAKERNAS). This survey collects labor market information that is used to generate the main labor market indicators for Indonesia, including labor force participation, employment rate, unemployment rate, sector of employment, occupation, employment status, formality rate, labor income and wages, working hours, and so on.[12] To compare the occupation classification codes for the 2014-2017 SAKERNAS datasets, the team used the 2002 KBJI codes. [13]

**The reference population for the top-down analysis consists of all working age people, without restrictions on occupational skills levels.** Reference populations for shortage lists vary by country depending on the local context and the purpose of the analysis. In Malaysia and Mexico, the reference population included both high- and low-skilled workers, with working age people defined as individuals between 15 and 64 years of age per national conventions. In Indonesia, the working age population is defined as anyone over the age of 15, with no age ceiling, by the Central Bureau of Statistics (*Biro Pusat Statistik*, BPS). SAKERNAS provides job characteristics for the population above the age of 15, and this population is used in the COL construction. As for the skills level of the occupations included in the analysis, in the United Kingdom, Australia, and Malaysia, the reference population includes only workers in high-skilled occupations. However, based on discussions with government stakeholders, the Indonesian COL covers all occupations (excluding military and armed forces), similarly to Malaysia and Mexico.

**12** The frequency of this survey has changed periodically since its first implementation in 1976. However, since 2007, the sampling for the annual August round has been designed to represent the labor market at the district or city level. The only exception is the August 2016 SAKERNAS, in which the sample size was smaller. As such, the COL analysis uses the August rounds, as non-August rounds are typically not representative of district level data. This follows international trends: most other countries in which the top-down approach has been applied use annual data because several indicators—such as the change in wages or vacancies—may vary seasonally.

**13** In the 2016 and 2017 SAKERNAS surveys, occupation classifications were collected using the updated 2014 version of the KBJI, rather than KBJI 2002. In the data supplied by BPS, a mapping between KBJI 2014 and KBJI 2002 was used to reconstruct the 2016 and 2017 SAKERNAS with KBJI 2002 codes. However, in this mapping, there were instances where several KBJI 2002 occupations codes corresponded to a single KBJI 2014 occupation code. This means that the precise KBJI 2002 code could not be recovered. In these cases, multiple occupations (in terms of KBJI 2002) were collapsed according to the KBJI 2014 classification for all years of the SAKERNAS used in the COL analysis to avoid anomalous breaks over time. The occupations that were collapsed are shown in Annex A. Collapsed Occupational Codes.

## Step 2 Keep Representative Information

**Occupations must have more than 30 observations to be included in the COL analysis.** SAKERNAS is a representative survey of a subsample of the Indonesian population, and is stratified to consider both the location and employment of each respondent. As such, each SAKERNAS observation corresponds to an individual who represents a group of individuals with a similar labor market status. Given these dataset features and the importance of the occupation unit in COL analysis, it is necessary to ensure that there are sufficient observations per occupation to draw robust statistical results. While there is no set rule for the minimum number of observations that must be used for statistical analysis, Tanis and Hogg regard 30 as a boundary between small and large samples.[14] Based on this and precedence from Malaysia and the United Kingdom, 30 is used as the minimum number of observations per occupation. All occupations with fewer than 30 observations are eliminated from the analysis.[15] Of 312 available occupations, 145 are dropped for lack of at least 30 observations.

## Step 3 Identify Initial Indicators

**After data sources are selected and screened, initial indicators are compiled.** This list includes all indicators from the dataset, SAKERNAS, that have sufficient observations and might reasonably be able to predict occupational shortage. For example, median wage growth is included because a rise in occupational median wages might indicate rising relative demand for this occupation. Education levels, on the other hand, were chosen because a decrease in mean education might signal that an employer is willing to higher less-skilled workers to fill persistent vacancies. In total, 16 indicators are identified over two time horizons: 1-year and 3-year horizons. Table 2 lists the complete set of initial indicators and their corresponding economic rationale. For illustration purposes, the variables named in the table correspond to the SAKERNAS of August 2017.

## Step 4 Identify Intermediate Indicators

**Initial indicators are then evaluated to ensure that they provide unique information on occupational shortage.** This process requires selecting threshold values and evaluating indicators for duplicity. Threshold values provide levels of comparison to measure when an indicator's data signal occupational shortage. Once a threshold level is set, indicators are then compared against one another to ensure that each indicator provides unique information. If two indicators are highly correlated, then including both in the final analysis would produce duplicative results. Duplicative indicators are removed from consideration. At the end of the evaluation process, only indicators that provide unique, reliable information on occupation shortages are included in the intermediate list.

**14** Source: Tanis, Elliot and Robert V. Hogg. 2005. Probability and Statistical Inference. NJ: Pearson Prentice Hall.

**15** The team agreed to partner with BPS for the top-down analysis in future rounds of the COL and explore the possibility of using relative standard errors to guide the decision-making process of occupational exclusion from the top-down analysis due to limited representativeness of the data.

## Threshold Values[16]

**A threshold value is established for each indicator by examining the distribution of the indicator across all occupations.** Multiple threshold scenarios are examined for robustness. The threshold value is used to determine whether the indicator of interest suggests that there is evidence of shortage, and a different threshold value is selected for each unique indicator. To be considered in shortage, an occupation's data must reach the threshold for at least half of the available indicators.

**16** Threshold values are usually set in accordance to a benchmark period. The benchmark period is used to as the reference period to determine if and when an indicator can predict occupational shortage. This period is then compared with the current economic indicators. To minimize inclusion errors, potential benchmark periods are evaluated for the strength of their economic performance and employment growth. Stronger economic trends signal better benchmark data. The year 2017 is chosen as the benchmark year for the COL. SAKERNAS data show that Indonesia experienced strong employment and real earnings growth between 2015 and 2017. Another candidate for the benchmark year was 2010, which was the period of highest gross domestic product (GDP) per capita growth between 2008 and 2016, reaching 4.83 percent. The unemployment rate had decreased throughout 2007-16, with the exception of 2011 when it increased by 0.3 of a percentage point. In 2010, unemployment rate fell at one of the largest rates compared with other years between 2007 and 2016, averaging 0.7 of a percentage point. This rate is surpassed only in 2012, when unemployment dropped by 1.3 percent. Ultimately, the research team decided to use 2017 as the benchmark year because a 2010 benchmark would have inaccurately led to a large number of occupations being classified as in shortage.

Tab. 2 Indicators for Inclusion in the Top-down Approach in Indonesia

| Indicator | Variables used (from SAKERNAS Aug 2017) | Calculating the indicator | Shortage rationale |
|---|---|---|---|
| 1-year employment growth<br><br>3-year employment growth | Main occupation: V.D.24<br><br>Weights: weight | Employment per occupation is given by the number of weighted observations per occupation. Once the variable for employment per occupations is generated, the percentage change in employment is calculated with respect to 1 and 3 years prior to the year of analysis. | An increase in the number of employees indicates that more vacancies are being created (or there is a reduction in firing and voluntary departures). Rising employment suggests that the relative demand for that occupation is rising.<br><br>The 3-year change in employment has the same rationale, but captures the relationship between employment and shortages for occupations with a lagged response or that require more time to fill. |
| 1-year working hours growth<br><br>3-year working hours growth | Working hours in main occupation last week: V.D.26.b<br><br>Main occupation: V.D.24<br><br>Weights: weight | After generating the number of hours worked per week per individual, one can generate the median number of hours worked per week per occupation. The percentage change in median weekly hours worked per occupation is calculated with respect to 1 and 3 years prior to the year of analysis. | An increase in the median number of hours worked per week could signal that the existing labor force is working for longer hours due to rising demand for the labor force.<br><br>The 3-year change captures this effect for occupations that have a lagged response. |
| (Not used widely)<br><br>1-year education level decrease<br><br>3-year education level decrease | Highest level of education completed: V.A.1.a<br><br>Main occupation: V.D.24<br><br>Weights: weight | After generating the level of education per individual, the median level of education per occupation is calculated. Then one can calculate the percentage change in median level of education per occupation with respect to 1 and 3 years prior to the year of analysis. | A decrease in the education level could be linked to employer strategies to fill vacancies. Employers might accept workers with a lower level of education for a particular job if the vacancy has been very difficult to fill.<br><br>This indicator is expected to have a negative correlation with labor shortages. For this reason, the indicator is generated so that the relationship with labor shortages is positive, as with the other indicators, to facilitate interpretation.<br><br>The 3-year change captures the effect for occupations that have a lagged response. |



| Indicator | Variables used (from SAKERNAS Aug 2017) | Calculating the indicator | Shortage rationale |
|---|---|---|---|
| 1-year decrease in proportion of people with high school education or higher<br><br>3-year decrease in the proportion of skilled workers | Highest level of education completed: V.A.1.a<br><br>Main occupation: V.D.24<br><br>Weights: weight | Individuals that have completed high-school are typically considered 'skilled' in Indonesia.<br><br>Using this definition, it is possible to calculate the proportion of skilled workers in a given occupation. | As with the regular education variable, a decrease in the proportion of skilled workers in an occupation may indicate that employers are willing to accept less skilled workers to fill vacancies.<br><br>The 3-year change captures the effect for occupations that have a lagged response. |
| 1-year decrease in proportion of university-educated workers<br><br>3-year decrease in the proportion of university- educated workers | Highest level of education completed: V.A.1.a<br><br>Main occupation: V.D.24<br><br>Weights: weight | Using information on educational attainment, it is possible to calculate the proportion of workers in a given occupation that hold a university education (or Diploma IV) or higher.<br><br>Focusing solely on the distinction between 'skilled' and 'unskilled' workers may not capture variation in skills shortages at the higher end of the labor market. | As before, a decrease in the proportion of university- educated workers in an occupation may indicate that employers are willing to accept less skilled workers to fill vacancies.<br><br>The 3-year change captures the effect for occupations that have a lagged response. |
| 1-year median wage growth<br><br>3-year median wage growth | Net salary from main occupation: V.D.30<br><br>Frequency of payment: V.D.31<br><br>Main occupation: V.D.24<br><br>Weights: weight | Using the monthly median wage per occupation, one can calculate the growth rates for 1 and 3 years.<br><br>The nominal wage is used because we are interested in the change in wages of an occupation relative to other occupations. | A rise in median wages in an occupation relative to other occupations could be associated with an increase in the demand for labor in that occupation.<br><br>The 3-year change captures the effect for occupations that have a lagged response |

| Indicator | Variables used (from SAKERNAS Aug 2017) | Calculating the indicator | Shortage rationale |
|---|---|---|---|
| 1-year wage premium growth<br><br>3-year wage premium growth | Net salary from main occupation: V.D.30<br><br>Frequency of payment: V.D.31<br><br>Main occupation: V.D.24<br><br>Age: IV.6<br><br>Gender: IV.4<br>Highest level of education completed: V.A.1.a<br><br>Weights: weight | In this case one can calculate the premiums per occupation per year using an OLS regression where the dependent variable is the logarithm of the monthly wage per individual and the independent variables are dummies for each occupation, controlling for gender, age, age squared, and the level of education (dummy variables for each category of education). The coefficient of the dummy variables for each occupation represents the wage premium, which is then used to generate the 1- and 3-year changes. | The rationale is the same as for the change in median wages, but this indicator controls for age, gender, and education. |
| 1-year growth in rate in the proportion of formal employment<br><br>3-year growth in rate the proportion of formal employment | Main occupation: V.D.24<br><br>Status of employment V.D.27<br><br>Weights: weight | The 'official' definition of formality in Indonesia—on which the analysis relies—incorporates information on both occupation and status of employment.<br><br>All employees and employers assisted by permanent workers are classified as formal, but for the other employment statuses, formality depends on the specific occupation (see Annex B).<br><br>Using the definition of formal employment in Indonesia, one can identify the weighted number of formal workers per occupation. This can then be used to calculate the proportion of workers in an occupation that are classified as formal.<br><br>In turn it is possible to calculate the 1- and 3-year growth rates for the proportion of formal workers in an occupation. | An increase in the rate of formal employment in a particular occupation relative to other occupations could be a sign of an increase in wages (or demand) of formal workers. |



**Two potential threshold values are considered and tested.** The top-down approach for the 2018 COL in Indonesia considers two threshold scenarios based on international standards:

**1.** A less restrictive scenario that sets low threshold values for the shortage indicators, and thus results in a larger number of occupations that are considered to be in labor shortage for each indicator. The median plus 50 percent (referred to as p50+50%) is the main threshold considered for this scenario.

**2.** A more restrictive scenario that sets high threshold values for the shortage indicators, and thus results in a lower number of occupations that are considered to be in shortage for each indicator. The 75th percentile (referred to as p75) is the main threshold considered for this scenario

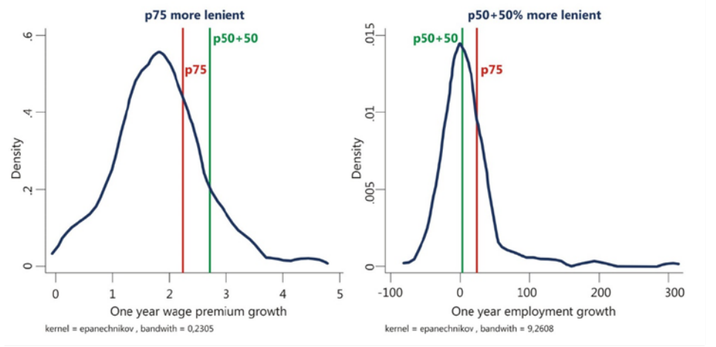
**However, the restrictiveness of the thresholds under the two scenarios is not the same for each indicator.** In most instances, the p50+50% measurement resulted in a less restrictive scenario than the p75 measurement (as is the case for 1-year employment growth, see Figure 10 right panel). Yet at times, p75 measures produced more lenient circumstances than p50+50 (as is the case for 1-year wage premium growth, see Figure 10 left panel). When this happened, p75 was considered the less restrictive scenario. Both the less and more restrictive scenarios are used for later analysis in the specifications stage.

## Evaluation for Duplicity

**Indicators are then evaluated against each other to avoid duplicity.** Some of the initial 16 indicators may be highly correlated and thus provide the same information on shortages. This is undesirable since each indicator is meant to provide evidence of shortage independently from other indicators. Therefore, the correlation between each indicator in the reference year, 2017, was evaluated. The matrix in Annex C reveals that there are statistically significant, positive correlations between education variables: average education levels, proportion of skilled workers, and the proportion of university-educated workers over both 1-year and 3-year time horizons. This implies that the different education indicators capture largely identical information. As such, only one education indicator is needed for the top-down analysis.

Fig. 10

### Least Restrictive Thresholds Vary by Occupation



**Duplicative indicators are removed, and intermediate indicators identified.** Among the education indicators, only the proportion of skilled workers per occupation (at both 1-year and 3-year intervals) is kept in the analysis. This indicator is by far the 'smoothest' distribution of the available education indicators. After removing the four duplicative indicators, 12 intermediate indicators remain. These intermediate indicators are:

1. 1-year employment growth
2. 3-year employment growth
3. 1-year working hours growth
4. 3-year working hours growth
5. 1-year decrease in the proportion of people with a high school education or higher
6. 3-year decrease in the proportion of people with a high school education or higher
7. 1-year median wage growth
8. 3-year median wage growth
9. 1-year wage premium growth
10. 3-year wage premium growth
11. 1-year growth in rate in the proportion of formal employment
12. 3-year growth in rate in the proportion of formal employment

## Step 5 Identify Most Suitable Specification and Final Indicators

**Intermediate indicators are combined to test overall efficacy.** To generate a final list of indicators, the intermediate indicators are combined in different groups to determine which set of indicators best predicts shortages. In other words, indicators are added to, or excluded from, different lists of specifications to measure total robustness.

**In addition to adding and excluding indicators, other specifications are also tested.** First, Specifications 3 and 4 look at the differences between low-, mid-, and high-skilled occupations. This is necessary because different skill levels may respond differently to changes in economic conditions and pooling all types of occupations may obscure these distinctions. Second, some KBJI-code occupations show anomalous changes in the number of observations over different years. To correct for possible biases, anomalous occupations are removed from the analysis in Specifications 2 and 4. Finally, Specifications 5, 6, and 7 measure different threshold values (more or less restrictive) for each indicator. The definition and comparison of each specification is shown in Annex D,[17] and the results are described in Table 3.

**Specification 2 is chosen as the preferred specification with 12 final indicators.** Specification 2 includes all 12 intermediate indicators from SAKERNAS, uses the less restrictive shortage threshold scenario, and does not include anomalous occupations (Table 3). While other specifications use a more restrictive scenario, Specification 2 is ultimately preferred because it provides results that are robust to several sensitivity tests and includes a sufficient number of results that can be further tested through bottom-up analysis. Annex D provides a more detailed explanation on the advantages of Specification 2 compared with each of the other specifications. Under Specification 2, the list of final indicators is identical to the list of intermediate indicators.

17 As explained below, Specification 2 is the preferred approach, so this is used as the yardstick against which the other specifications are compared.



Tab. 3 Specifications Tested for in the Top-Down Analysis

| Indicator | Specification | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| Employment growth – 1 year | x | x | x | x | x | x | x | x | x | x | x | | x | x |
| Employment growth – 3 years | x | x | x | x | x | x | x | x | x | x | x | | x | x |
| Working hours growth – 1 year | x | x | x | x | x | x | x | x | x | x | x | x | | x |
| Working hours growth – 3 years | x | x | x | x | x | x | x | x | x | x | x | x | | x |
| Decrease in proportion of people with high school education or higher – 1 year | x | x | x | x | x | x | x | | x | x | x | x | x | x |
| Decrease in proportion of people with high school education or higher – 3 years | x | x | x | x | x | x | x | | x | x | x | x | x | x |
| Wage premium growth – 1 year | x | x | x | x | x | x | x | x | | x | | x | x | x |
| Wage premium growth – 3 years | x | x | x | x | x | x | x | x | | x | | x | x | x |
| Median Wage growth (all workers)- 1 year | x | x | x | x | x | x | x | x | x | | | x | x | x |
| Median Wage growth (all workers)- 3 years | x | x | x | x | x | x | x | x | x | | | x | x | x |
| Formal employment growth - 1 year | x | x | x | x | x | x | x | x | x | x | x | x | x | |
| Formal employment growth - 3 year | x | x | x | x | x | x | x | x | x | x | x | x | x | |
| Threshold used | Less | Less | Less | Less | Most | p75 | p50+50% | Less | Less | Less | Less | Less | Less | Less |
| Anomalous occupations dropped | | x | | x | | | | | | | | | | |
| Occupation groups run separately | | | x | x | | | | | | | | | | |

## Step 6

## Generate Top-Down COL

**Once the preferred specification has been identified, occupations are evaluated using a traffic light approach.** Following the work of the U.K. Migration Advisory Committee (MAC) and the Malaysian COL, the research team considers an occupation to be in shortage if the occupation exceeds the threshold value for at least half of the available indicators. Visually, this translates into what the U.K. MAC refers to as a "traffic light" approach. As illustrated in Figure 11, if an occupation reaches the threshold of at least half of the available indicators (six out of 12 final indicators), then it is considered to be in shortage. If an occupation has insufficient evidence of shortage for more than half of the indicators, this occupation is considered not to be in shortage. In the case illustrated in Figure 11, the occupation has six indicators above the threshold and is therefore considered to be in shortage according to the top-down approach.

Fig. 11

### Traffic Light Approach to Assess Evidence of Shortage

| | |
|---|---|
| **KBJI title:** | Managers in construction |
| **KBJI code:** | 1223 |
| **Top-down data:** | This occupation passes six out of 12 indicators from top-down evidence |

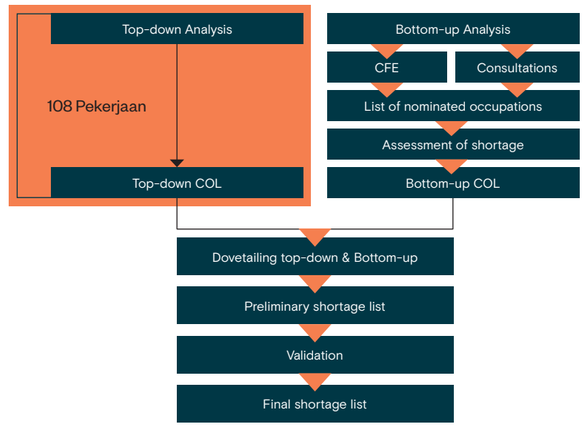
| | | | |
|---|---|---|---|
| 1. Employment growth - 1 year | yes | 7. Median wage growth - 1 year | no |
| 2. Employment growth - 3 years | yes | 8. Median wage growth - 3 year | no |
| 3. Median hours worked growth - 1 year | no | 9. Wage premium growth - 1 year | no |
| 4. Median hours worked growth - 3 year | yes | 10. Wage premium growth - 3 year | no |
| 5. Growth in formal employment – 1 year | no | 11. Reduction in skilled workers – 1 year | yes |
| 6. Growth in formal employment – 3 year | yes | 12. Reduction in skilled workers – 3 year | yes |



**In total, 41 occupations are identified for inclusion in the Top-Down COL (Figure 12).** Of the 167 occupations included in the analysis, the less restrictive scenario includes 41 (25 percent) occupations, versus just 12 (7 percent) in the more restrictive scenario. The less restrictive scenario thus presents a sufficient number of occupations that can be further explored during the bottom-up process and supports the selection of Specification 2. The shortage threshold value is set to p50+50% for all indicators except 1-year wage premium growth and 3-year wage premium growth, for which the shortage threshold value is set to p75 (which is less restrictive in these cases[18]). The list of the 41 occupations is provided in Annex E, along with the number of available indicators exceeding the shortage threshold for each occupation.

Fig. 12

### Output of the Top-Down Analysis




**18** Following the change in occupation classification starting in the 2016 version of SAKERNAS—with KBJI 2014 used to record occupations instead of KBJI 200215 occupations experienced anomalous jumps in the number of observations recorded between 2014 and 2017. For this reason, the preferred specification excludes these 15 anomalous occupations.

Chapter 1.3

# Ch. 1.3

# Bottom-up Analysis

**The bottom-up approach complements the top-down approach and offers contextual information.** The first objective of the bottom-up approach is to build an evidence base directly from stakeholders that, in conjunction with top-down information, allows for a systematic assessment of occupations for inclusion on the COL. The second objective is to build contextual knowledge about the occupations and sectors that are nominated. This allows the research team to better interpret indicators, communicate decisions, and plan monitoring efforts between COL rounds, to increase the breadth and depth of information available prior to the next COL.

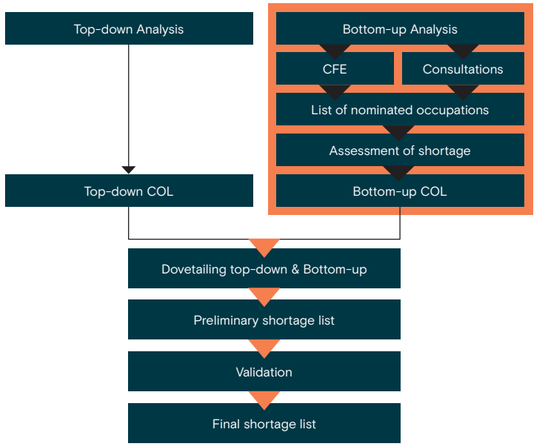


**The bottom-up approach draws upon data from two sources, the Call for Evidence (CfE) survey and stakeholder consultations.** These data are then combined to produce a final list of occupations nominated through the bottom-up process. The three steps in this approach include:

**1.** A CfE is sent to employers. Several methods are used for maximum distribution, and the research team regularly follows up on survey responses that do not provide adequate data. This year, 905 companies participated in the CfE survey and nominated 824 occupations that represent 108 distinct 4-digit KBJI occupation codes.
**2.** In parallel to the CfE, stakeholder consultations are held. These consultations solicit nominations for COL inclusion, and they collect supplementary information that is used to contextualize COL analysis. The results of the consultations are coded using KBJI 2002 occupation codes. In total, consultations with 34 companies nominated 51 occupations.
**3.** Data from both the CfE and consultations are combined and processed. In total, 120 unique occupations are nominated from both sources.

Fig. 13

Bottom-Up Analysis in the COL Process




## Step 1

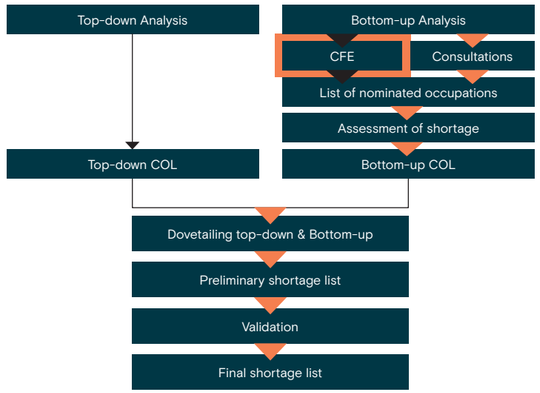
## Call for Evidence (CfE) Survey

**The Call for Evidence (CfE) survey captures employer perceptions of occupational shortage.** The CfE survey asks employers to nominate occupations for which they believe there is a shortage of qualified candidates. For each occupation that employers nominate, they answer a series of nine questions that are designed to determine hiring needs, recruitment practices, and the impact of the shortage. These questions are grouped into four categories: (i) number and experience level of vacancies; (ii) time to fill vacancies; (iii) employer strategies to fill vacancies; and (iv) desired candidate profile.

**The CfE survey is not designed to be a representative survey, and only employers experiencing shortages are expected to fill out the CfE.** It is designed so that employers can share their workforce needs and hiring experience. Employers who find it easy to fill their recruitment needs should not be compelled to respond to the CfE. It is plausible that certain economic sectors do not face recruitment challenges. As such, relatively low response rates or dominance in certain categories of employers should not be a concern, assuming that the questionnaire is widely distributed and there is robust data management and follow up. Nevertheless, strong skews should be monitored closely to ensure that they are not due to methodological or distribution errors.

Fig. 14

Call for Evidence in the COL Process




## The Indonesian CfE Experience

**The CfE is an online survey.** The CfE is built using the online platform Survey Gizmo, and was distributed between July 4 and August 31, 2018. Both Bahasa and English versions of the CfE were created. Respondents selected their preferred language at the beginning of the survey. Based on an initial test that showed that small and medium enterprises (SMEs) often abandon the survey at questions that ask for information about staff levels and profiles for the nominated occupation, a simplified version of the CfE was developed and used when SMEs made up a significant portion of the firms on a given mailing list. Information about the COL research process, steps to fill out the survey, and confidentiality matters were clearly explained in the CfE survey. Before the CfE survey was launched, a draft CfE survey was circulated among the CMEA and large business associations to gain input on the content, language, practicality, and layout of the survey.

**The CfE survey was delivered through three channels to ensure maximum distribution, beginning with a mass email campaign.** First, the CfE was distributed through a survey link to a comprehensive respondent list using Outlook email mail merge. The list of recipients was drawn from multiple sources. The BPS census provides a significant number of medium and large companies' contacts in all sectors. The team also relied on a list of companies provided by line ministries (CMEA, the Ministry of Industry, the Ministry of Cooperation and SME, and the Ministry of Communication and Information) and large associations (KADIN, APINDO, GAPMMI, idEA, and ISD). Details on the respondent list is provided in Table 4.

**Second, individual business associations and international chambers of commerce were contacted by e-mail and telephone.** The associations were asked to endorse the CfE to their constituent members. A customized email with the survey link was created for each association. These emails could then be easily forwarded to the association's list of members.

**Third, to ensure SMEs were included, the team worked with an Indonesian e-commerce platform company to relay the CfE survey to its merchants.** Most of these merchants were classified as SMEs in food and beverages. Emails sent to business associations and companies were attached with an endorsement letter from the CMEA. This letter proved to be helpful in building confidence and buy-in from the companies. A reminder email was sent to companies and associations every two weeks.

**In total, the CfE was distributed to 93,000 respondents.** A breakdown of recipients is detailed in Table 4.



Tab. 4

Sources of CfE Distribution Lists

| Sources | Firms |
|---|---|
| Economic Census 2016 - BPS | 35,996 |
| Medium and Big Industry Census - BPS | 1,441 |
| Industry - Ministry of Industry | 166 |
| Industry - CMEA | 486 |
| SMEs - Ministry of Cooperation and SME | 656 |
| Radio and TV stations – Ministry of Communication and Information | 2,001 |
| Enterprises (Manufacturing) Survey - World Bank | 62 |
| ICT companies, including financial technology companies | 173 |
| Hospitals - Website | 1,921 |
| Other firms not classified elsewhere - Website | 405 |
| Food merchant by an e-commerce platform | 50,000[19] |
| **Total** | **93,307** |

19 The survey link was distributed to an estimated 50,000 merchants, as informed by the e-commerce company using their communication platform.

**CfE respondents nominate 824 job titles.** In total, 905 companies participated in CfE survey, of which 197 companies reported that they did not experience labor shortages at the time of the survey. The remaining 708 companies reported shortages for 824 job titles. Respondents to the CfE represented all major sectors of the Indonesian economy. Table 5 lists response rates for each industrial sector participating in the CfE. The majority of respondents came from the following sectors: accommodation and food services activities, manufacturing industry, and the wholesale and retail trade. This is broadly consistent with the share of firms in each sector of the Indonesian economy.

Tab. 5

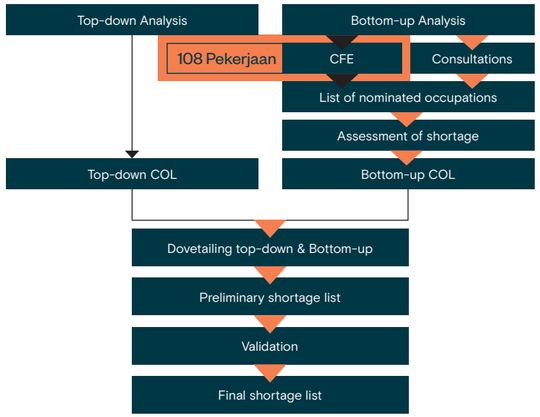
Number of CfE Responses by Sector

| | Percentage Share of Firms by Sector in the Economic Census | Percentage of CfE Respondents by Sector (excluding Agriculture) | Percentage of CfE Respondents that Nominated Occupations by Sector (excluding Agriculture) |
|---|---|---|---|
| B. Mining and Quarrying | 1 | 0.8 | 1.0 |
| C. Manufacturing | 17 | 19.5 | 17.6 |
| D. Electricity, Gas, Steam and Air Conditioning Supply | 0 | 0.4 | 0.3 |
| E. Water Supply; Sewerage, Waste Management and Remediation Activities | 0 | 1.3 | 0.9 |
| F. Construction | 1 | 1.4 | 1.2 |
| G. Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles | 46 | 9.5 | 8.4 |
| H. Transportation and Storage | 5 | 2.2 | 1.8 |
| I. Accommodation and Food Service Activities | 17 | 30.9 | 34.3 |
| J. Information and Communication | 2 | 7.5 | 8.9 |
| K. Financial and Insurance/ Takaful Activities | 1 | 4.7 | 4.8 |
| L. Real Estate | 1 | 0.4 | 0.3 |
| M,N. Business Services | 1 | 2.5 | 2.3 |
| P. Education | 2 | 2.1 | 2.1 |
| Q. Human Health and Social Work Activities | 1 | 1.9 | 1.9 |
| R,S,U. Other Services | 4 | 14.9 | 14.2 |
| Sum | 100 | 100 | 100 |

**Respondents to the CfE nominated 108 distinct occupations based on the KBJI 2002 codes.** It is necessary to code the occupations according to KBJI 2002 to align the data with other Indonesian data and documents, and to allow for data reconciliation with the top-down approach. The CfE asked employers to provide three pieces of information that allowed the research team to code occupations: (i) the employers best guess about the correct KBJI code; (ii) the job title that they use to describe the occupation within their company; and (iii) a short description of the primary tasks and responsibilities of the job. Item 3 was particularly important because it allowed coders to quickly assign the correct KBJI code based on the description of each occupation in the code book. If CfE responses were inconsistent or implausible, the team contacted companies directly for clarification. Translating occupations into KBJI codes was performed carefully using KBJI guidelines from BPS. Coding was cross-checked between two or three people to correct KBJI interpretation. In the end, 108 unique critical occupations were nominated from the CfE survey.

Fig. 15

Output of the Call for Evidence Survey



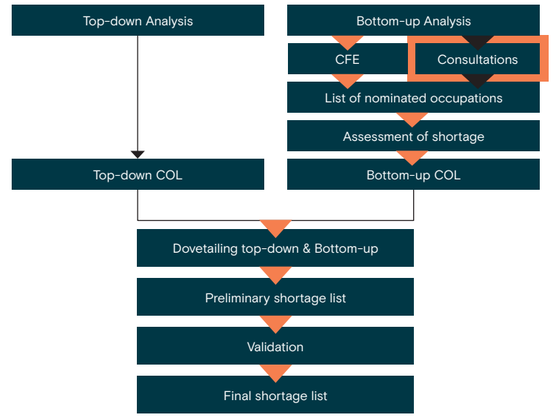

## Step 2 Consultations

**In tandem with the CfE, consultations are held to identify occupations for inclusion on the COL.** Unlike the CfE survey, consultations provide an opportunity to pose open-ended questions to employers about their skills needs and hiring challenges. It also serves to gather information from sectors that are underrepresented in the CfE survey. During the consultation phase, the team first used the COL responses to generate a list of occupations that employers consider to be hard to fill. Consultation participants are asked to reflect on the level of skills required for these occupations and evaluate whether these skills are in shortage and strategic. A particular emphasis is placed on evaluating the strategic importance of the occupation in both today's economic context and in future contexts where there could be more automation. Consultation discussions allow companies to share detailed information on the impact of occupational shortages and how industry strategizes to alleviate shortages. The consultations also help stakeholders identify whether shortages are limited to one specific job type, or are experienced across several different jobs in a single 4-digit KBJI occupation code.



Fig. 16

Consultations in the COL Process




**The consultations follow a specific structure to obtain similar and supplementary information to that of the CfE survey.** In addition to collecting nominations for the COL, the semi-structured stakeholder consultations served as a platform to improve the team's understanding of sectoral contexts and businesses' self-assessments on how they can improve talent availability. The consultations also revealed several government policies that indirectly affect firms' abilities to hire proper candidates. These include strict certification requirements that disqualify candidates with appropriate skills and experience, but who lack official certification.

**The consultations involve 90-minute semi-structured discussions with employers (see Annex G).** The consultation begins with an introduction of the COL, the government's mandate to map out skills gap in Indonesia, and the objectives of the consultation itself. Participants are then invited to nominate occupations that they would like to see included on the COL. The team asks participants to explain the main tasks of the nominated job title to ensure that the team has enough information to code the occupation according to KBJI standards.

**To ensure data consistency across meetings and facilitators, a set of questions is used to guide the discussion.** Most of the questions are identical to those on the CfE but, in some instances, facilitators add questions that are not prescribed but important to better understand the challenges faced by a specific sector. Standard questions include:

**1.** What are the reasons that this position is hard to fill?
**2.** What are the strategies your industry/company has used to meet your labor needs for this position?
**3.** What level or levels of experience are required for advertised positions in this occupation?
**4.** What is the minimum education qualification needed for this position?
**5.** Is there other relevant information that supports inclusion of this occupation on the COL?

**Consultations with 34 companies from 12 economic sectors were held.** Invitation letters to join the consultations were sent to companies listed on the Indonesian Financial Services Authority's (*Otoritas Jasa Keuangan*, OJK) top performing companies' data and other relevant sources.[20] For each consultation, the research team intended for a group of similar companies to attend a focus group discussion (FGD) together, yet some companies were unwilling to join the FGD if their competitors were present. In these cases, an opportunity to hold a private consultation was offered. Individual consultations were also held due to scheduling constraints. Table 6 provides informa-

**20** Data retrieved from the Center for Risk Management Studies: http://crmsindonesia.org/publications/ini-dia-50-perusahaan-terbaik-versi-ojk/

tion on the number of participants in each consultation session.

**The consultations nominated 51 unique critical occupations based on KBJI 2002 codes.** Occupations were coded using the KBJI classification system as in the case of the CfE survey. Throughout the process, participants expressed that they valued the COL procedure and were looking forward to accessing the results.

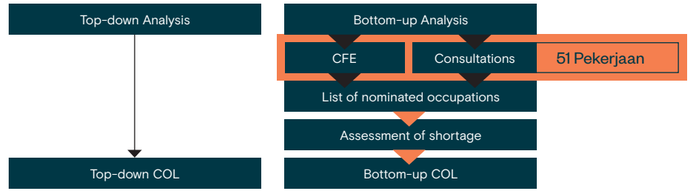
**Qualitative data were also collected through consultations.** Qualitative information included anecdotal evidence on recent hiring experiences, companies' strategies to overcome talent challenges, the firms' desired educational profiles. These data are useful in contextualizing results from both top-down and bottom-up analyses.

| Sector | Number of firms | |
|---|---|---|
| | FGD | Individual |
| A. Agriculture, Forestry and Fishing | 3 | 1 |
| B. Mining and Quarrying | 0 | 1 |
| C. Manufacturing | 3 | 1 |
| F. Construction | 2 | 0 |
| G. Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles | 3 | 1 |
| H. Transportation and Storage | 0 | 1 |
| I. Accommodation and Food Service Activities | 0 | 2 |
| J. Information and Communication | 5 | 1 |
| K. Financial and Insurance/Takaful Activities | 0 | 2 |
| M. Professional, Scientific and Technical Activities | 3 | 0 |
| N. Rental, Leasing and Its Related Activities, Employment, Travel Agent and other Business Support | 3 | 1 |
| Q. Human Health and Social Work Activities | 0 | 1 |
| **Total** | 22 | 12 |
| | **34** | |



Fig. 17

Output of the Consultations

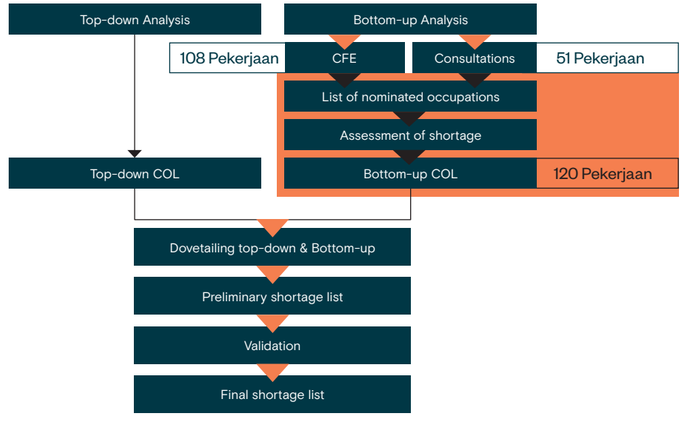



## Step 3 Combine and Process Data

**In total, 120 occupations are nominated through the bottom-up approach.** To produce a final list of occupations, results from the CfE survey and consultations are combined. The data are first cleaned and grouped by occupation. Then they are coded to the 4-digit KBJI level to ensure comparability with the top-down approach. The complete shortage list from the bottom-up approach includes 120 unique occupations.

Fig. 18

Output of the Bottom-Up Analysis



Chapter 1.4

# Dovetailing Top-Down & Bottom-Up Evidence

**Dovetailing is a data analysis process that consolidates top-down and bottom-up evidence.** It determines whether an occupation should be included on the COL by using a set of rules to guide decision-making. The primary drivers for inclusion are the availability of both bottom-up and top-down evidence pointing to shortage, and the volume and quality of bottom-up evidence received. The dovetailing process is applied for all 4-digit KBJI occupations for which evidence is available.

**Top-down and bottom-up results are compared against each other to assess the strength of evidence (Figure 19).** If an occupation has moderate or strong evidence for inclusion based on the top-down approach, it is compared against the bottom-up evidence to ensure data quality and reliability. If there is only weak quantitative evidence, a more careful review of bottom-up evidence is conducted to determine if there is a plausible case that this occupation is both in shortage and strategic. Such analysis includes assessing data for specific jobs, the reasons for shortage, the alignment of strategies to address the shortage, and additional information gathered through the consultations. If the team feels that the available information is insufficient to reach a decision, they seek additional information.

1.4



Fig. 19

Dovetailing Rules Matrix

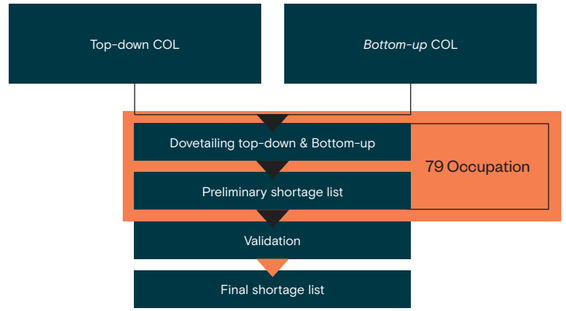
| Bottom-up \ Top-down | Pass | Does not pass (moderate) | Does not pass (Low) | Insufficient evidence |
|---|---|---|---|---|
| Categorization rules for assessing the strength of top-down and bottom-up evidence | | | | |
| High nomination (top25%) | 6 | 11 | 2 | 16 |
| Moderate nomination (top 35%) | 1 | 5 | 1 | 9 |
| Low nomination | 9 | 20 | 6 | 34 |
| Not nominated | 25 | 58 | 8 | 101 |

**During the dovetailing process, 145 occupations are actively reviewed.** Out of 312 KBJI occupations, 167 (denoted in red text in the figure above) clearly showed no evidence of shortage and are automatically excluded from the COL. The team therefore analyzed evidence for the remaining 145 occupations (denoted in green) for which there is a bottom-up nomination or that passed the top-down process. Occupations are classified based on the result of the top-down process and the number of bottom-up nominations as shown in Figure 19. This classification serves as a tool to help the team ensure that occupations with fewer nominations and inconclusive top-down evidence receive additional attention, and are prioritized for additional data collection during validation. The classification is not used as a set of decision rules. Some occupations for which there were a high number of nominations are excluded because the evidence received, while large in volume, did not make the case for the occupation being both in shortage and strategic. Conversely, some occupations for which there were relatively few nominations are included because of the high quality and convincing nature of the bottom-up evidence.

**As a result of the dovetailing process, 79 occupations move to the validation stage.** Of the 145 occupations analyzed, 66 occupations are determined to have insufficient evidence and therefore excluded from the COL. Forty-one occupations have sufficient evidence to warrant inclusion, and 38 occupations have some evidence for both inclusion and exclusion. The latter two categories, totaling 79 occupations, constitute the preliminary COL and move onto the validation process. This list includes occupations from all skill levels. Detailed dovetailing reports for each of the occupations analyzed during the dovetailing process are provided in a separate Annex.

Fig. 20

Dovetailing and Preliminary Shortage List in the COL Process



Chapter 1.5

# Validating the Results

**The preliminary COL of 79 occupations is shared with industry associations that are knowledgeable regarding the skills needs of their respective sector(s).** Similar to the consultations, validation is conducted by sector. When possible, validation meetings are conducted with a small group of participants. Individual meetings with validators are also conducted when necessary.

**Proper validation requires careful consideration of participants and facilitation.** The following conditions are considered during validation:

## 1 Participants

The number of participants is generally fewer than those in the original stakeholder consultations. This reflects both the broader and more specialized inputs expected from participants at this stage of the COL process. The most important considerations are credibility, objectivity, and representativeness. Potential participants possess: (i) a detailed, objective understanding of their sector and the constraints it faces; and (ii) the authority and public standing necessary to objectively validate the process through rigorous standards. The Indonesian COL team relied heavily on industry associations that were considered to be most knowledgeable about their sectors.

## 2 Duration

These consultations generally require more time than the original stakeholder consultations because of the detail of the discussions. In general, validation meetings within a group require up to two hours, while individual consultations require one hour. about their sectors.

## 3 Facilitation

Similar to the stakeholder consultations, at least two facilitators are present to collect data. Facilitators are required to lead the discussion on disputed occupations to a conclusion. Therefore, adequate knowledge about the sector and information gaps is essential.

## 4 Output

The validation consultations produce an organized set of notes about which occupations are most relevant to each sector. It also identifies which occupations participants believe should or should not be included on the COL and why. If an occupation is nominated for inclusion, supporting evidence is collected and organized.



**The goal of the validation process is to have knowledgeable individuals either affirm or suggest re- evaluation of the COL results.** If a stakeholder disagrees with an occupation's presence or absence from the preliminary list, the COL team requests the stakeholder to provide additional information. The team also seeks additional information from other sources. The goal of this process is twofold: (i) to maximize the amount of information on which decisions about marginal occupations are made; and (ii) receive feedback from knowledgeable stakeholders on occupations of strategic importance to the country's continued growth or diversification, and not only for firms' own growth or profitability. Occupations for which additional evidence is collected are re-evaluated during the final decision-making process of the COL.

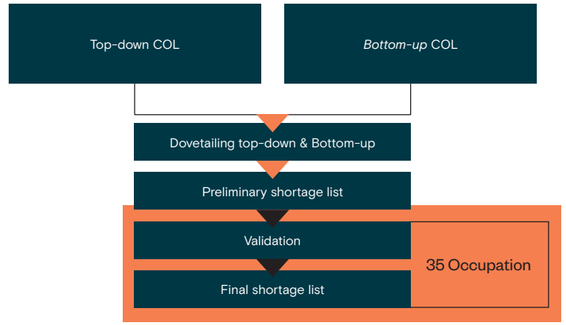
**A total of five validation meetings with seven individual business associations were conducted.** Participants included KADIN, APINDO, ATVSI, ISD, GAPMMI, IdeA, and PHSI. During the meetings, each stakeholder reviews and responds to occupations on the preliminary COL, and offers additional evidence when they disagree with the preliminary results. Because the larger associations represent multiple sectors (for example, APINDO and KADIN cover companies from almost all industrial sectors), their participation allows the research team to capture perspectives from various sectors.

**In total, 81 occupations were discussed in the validation process.** During the validation process, two occupations not discussed during the dovetailing process were flagged by associations: primary education teaching professionals and junior secondary education teaching professionals. These occupations were not included in the initial dovetailing because they were not nominated in the bottom-up process and did not pass the top-down test of shortage. Because they were nominated by validators, these occupations are discussed during a second dovetailing process after validation, but evidence did not support their inclusion on the final COL.[21]

**After validation, 35 occupations were included on the final COL.** In some cases, the views from validation provided strong rationales to include and exclude the nominated occupations. In other cases, occupations with incomplete or contradictory evidence were dropped because validators were unable to provide sufficient additional information. After validation, 35 occupations were included in the final COL with specific job titles in shortage within them. These occupations were discussed with representatives of the GoI and the private sector during a workshop that took place on November 19, 2018 at the Coordinating Ministry for Economic Affairs. The final COL was endorsed by all meeting participants.

Fig. 21

Validation in the COL Process




**21** Information from Ministry of Education and Culture suggests that primary and junior secondary teaching professionals are in oversupply even though these workers are not distributed evenly across Indonesia. This information provided a good rationale to exclude these two occupations from the final COL.

Chapter 1.5

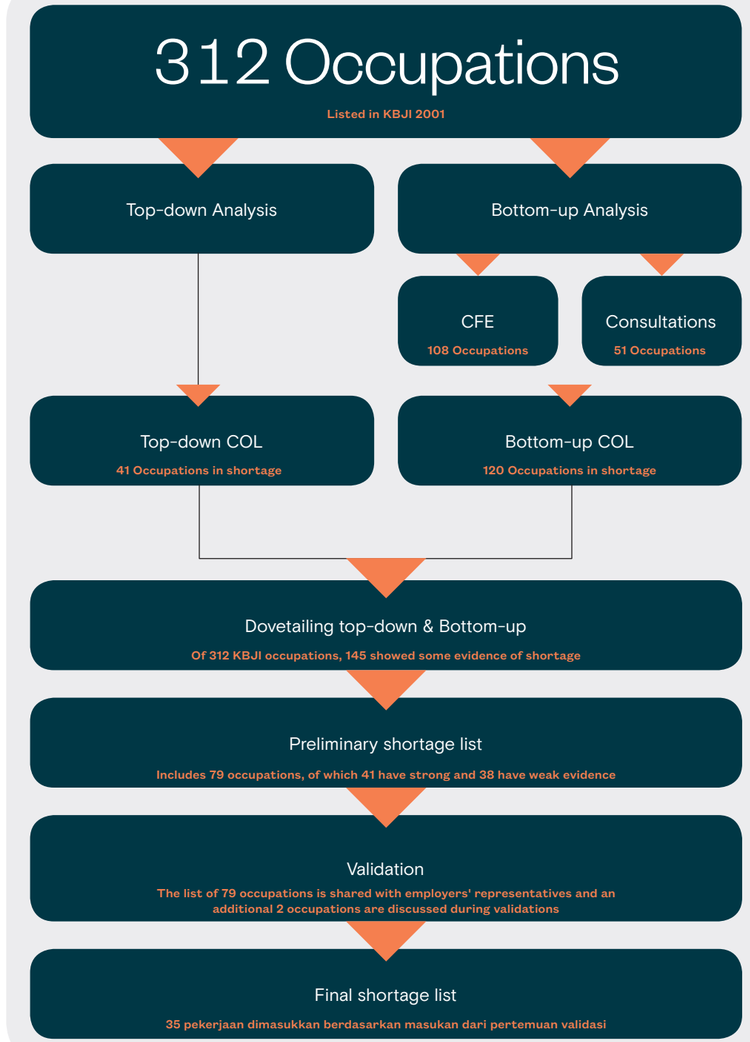
# Summary of the COL Process

01.1.6

**The methodology for producing the COL begins with all 4-digit level KBJI occupations (excluding the military and armed forces) and ends with a narrow list of occupations in shortage and strategic.** The first step in producing the COL is the top-down approach, which uses a series of quantitative indicators to determine if an occupation is in shortage. The second step is the bottom-up approach that uses employer nominations in a Call for Evidence (CfE) survey and stakeholder consultations. The third step is the dovetailing process, which brings the top-down and bottom-up evidence together, prioritizing occupations for inclusion on the COL by the strength of evidence. The dovetailing results are the preliminary COL. This preliminary COL is then validated with stakeholders, and the evidence base is increased for those occupations that have weak evidence for inclusion on, or exclusion from, the list. Finally, after additional evidence is collected in the validation phase, it is decided whether an occupation is strategic to Indonesia's economic development. The final evaluation produces the 2018 COL for Indonesia with specific job titles in shortage within the identified occupations.



Fig. 22 Summary of the COL Process and Outputs



Chapter 2

# Results —2018 Indonesian Critical Occupations List

The final 2018 COL contains 35 occupations out of 312 eligible KBJI 4-digit occupations with specific job titles in shortage within each occupation. This is nearly 11 percent of all 4-digit occupations. Table 7 lists the occupations on the 2018 Indonesia COL that are both in shortage and strategic across industrial sectors in Indonesia. The COL includes nine managers, 12 professionals, eight technicians or associate professionals, two skilled agricultural, forestry, livestock, or fishery workers, two craft and related trade workers, and two plant and machine operators and assemblers.

Tab. 7

Critical Occupation List

| Full List (35 Occupations) | | | | |
|---|---|---|---|---|
| # | Occupation | KBJI code | KBJI 4-digit Titles (Job Family) | Specific Job Titles in Shortage within the Occupation |
| 1 | Agriculture and Plantation Managers | 1221 | Production and Operations Department Managers in Agriculture, Hunting, Forestry and Fishing | Project Manager in Agriculture and Plantation |
| 2 | Biotechnology and Biochemistry Professionals in Manufacturing | 1222 | Production and Operations Department Managers in Manufacturing | Head of CMC; Biochemistry Supervisor; Microbiology Supervisor; Physiochemistry Supervisor; Quality Assurance Document Control Supervisor; Qualification, Validation, and Calibration Supervisor; Environmental Management Manager |
| 3 | Construction Project Leaders and Managers | 1223 | Managers in Construction | Construction Project Leader and Manager |
| 4 | Logistics Managers and Customs Managers | 1226 | Production and Operations Department Managers in Transport, Storage and Communications | Warehouse Manager; Gateway Manager; Customs Clearance Manager |
| 5 | Area Managers, Branch Managers and Regional Managers in Retail | 1227 | Production and Operations Department Managers Not Elsewhere Classified | Area Manager, Branch Manager and Regional Manager in Retail |
| 6 | Human Resources Managers | 1232 | Personnel and Industrial Relations Department Managers | Senior Human Resources Manager |
| 7 | Relationship Managers, Brand Managers and Public Relations Managers | 1233 | Sales and Marketing Department Managers | Relationship Manager; Brand Manager; Public Relations Manager |
| 8 | PPIC Managers and Merchandising Managers | 1235 | Supply and Distribution Department Managers | Production Planning and Inventory Control (PPIC) Manager; Merchandising Manager |
| 9 | Research and Development Managers | 1237 | Research and Development Department Managers | Research and Development Manager; QA & QC Manager; Sustainability Manager; Continuous Improvement Manager; Corporate Planning Manager |
| 10 | Actuaries and Underwriters | 2121 | Mathematicians, Actuaries and Statisticians | Actuaries; Underwriters |
| 11 | Professionals in Business Intelligence | 2131 | Computer Systems Designers and Analysts | Data Management Expert; Data Scientist; Dev Ops Engineer; Big Data Engineer; Network Engineer; System Analyst; Business Intelligence Analyst |
| 12 | Apps and System Developer | 2132 | Computer Programmers | Apps Developer; Backend Developer; Web Developer; Software Engineer; Programmer; Mobile App Developer |
| 13 | Cloud Solution Architect and UI/UX Designers | 2139 | Computing Professionals Not Elsewhere Classified | Cloud Solution Architect; UI/UX Designer |
| 14 | Civil Engineer | 2142 | Civil Engineers | Road Engineer; Drainage Engineer; Sanitary Engineer; Waste Experts |
| 15 | Chemical Engineer | 2146 | Chemical Engineers | Food Technologist; Food Engineering Technician; Chemical Engineer; Research and Development Engineer |
| 16 | Environmental Engineer, Production Engineer and Process Engineer | 2149 | Architects, Engineers and Related Professionals Not Elsewhere Classified | Environmental Engineering; Production Engineer; Process Engineer |
| 17 | Biochemical Researcher and Bio-scientist | 2211 | Biologists, Botanists, Zoologists and Related Professionals | Biochemical Researcher; Bio scientist |
| 18 | Specialist Doctor | 2221 | Medical Doctors | Anesthesiologist; Clinical Pathology Specialist; Pediatrician; Surgeon; Neurologist |
| 19 | Education Method Specialist | 2461 | Education Methods Specialists | Curriculum Planner |
| 20 | Senior Legal Officer and General Affairs Manager Assistant | 2519 | Legal Professionals Not Elsewhere Classified | Senior Legal Officer; General Affairs Manager Assistant |
| 21 | Professionals in Business Management | 2619 | Business Professionals Not Elsewhere Classified | Research and Development Specialist; Medical Scientific Liaison; Digital Marketing Specialist; License Officer; Business Development Specialist |

| | | | | |
|---|---|---|---|---|
| 22 | Surveyor | 3112 | Civil Engineering Technicians | Surveyor |
| 23 | Mechanical Engineering Technician | 3115 | Mechanical Engineering Technicians | Metal Graphical Engineering Technician; Production Technician; Seamer/Assembly Technician |
| 24 | Draughts Persons: Drafter | 3118 | Draughts persons | Drafter |
| 25 | Ship Technician | 3141 | Ship Technicians | Ship Technical Specialist |
| 26 | Safety, Health, and Quality Inspector | 3152 | Safety, Health and Quality Inspectors | Quality Controller; Quality Assurance; Occupational Health and Safety Specialist |
| 27 | Treasurer (in the Banking Industry) | 3411 | Securities and Finance Dealers and Brokers | Treasurer (in the Banking Industry) |
| 28 | Natural Raw Material Buyer | 3416 | Buyers | Natural Raw Materials Buyers |
| 29 | Graphic Designer, Layout Designer and Animator | 3951 | Decorators and Commercial Designers | Graphic Designer; Layout Designer; Animator |
| 30 | Skilled Farmers for Organic and Sustainable Farming | 6111 | Field Crop and Vegetable Growers | Skilled farmers for organic and sustainable farming (in rice and horticulture) |
| 31 | Skilled Farmers for Palm Oil and Chocolate Plantation | 6112 | Tree and Shrub Crop Growers | Skilled farmers for palm oil harvesting and sustainable chocolate plantation |
| 32 | Welder (for Underwater and Food Industry) | 7212 | Welders and Flame Cutters | Welder (for underwater welders, and food and beverage manufacturing) |
| 33 | Weaver and Batik Artisan | 7332 | Handicraft Workers in Wood, Textile, Leather and Related Materials | Weaver; Batik Artisan |
| 34 | Power Plant Operator | 8161 | Power-Production Plant Operators | Power Plant Operator |
| 35 | Heavy-Truck Driver | 8324 | Heavy-Truck Drivers | Heavy-Truck Driver |

**For each occupation in the COL, an occupation profile is provided.** The occupation profiles include more granular information for users of the COL and allow us to gain further insights on specific job titles in shortage within each of the 35 COL occupations. Profiles summarize key information drawn from different complementary data sources, including SAKERNAS, bottom-up data (CfE survey and consultations), and online job portals. A sample of the occupation profiles is shown below. A separate annex presents the methodology and the 35 profiles for each occupation in the 2018 COL.



# Occupation Profile

**Specific Job Titles in Shortage**

List of specific job titles in shortage within identified occupation/job family.

**What did employers tell us about these job titles?**

This section presents information on the job titles from the employers' perspective, including details on vacancies—i.e., required qualifications, skills, level of experience, and average time to fill the positions—why employers consider these job titles in shortage, strategies firms have implemented to address the shortage, and additional details about the job titles (e.g., workers' field of study, certifications needed, specific industry needs, etc.).

*Data source: Bottom-up data from Call for Evidence and Consultations*

*Information in this section cannot be generalizable to the whole Indonesian labor market. The data collection instruments were not designed to be representative surveys but to only gather information from employers who were experiencing shortages.*

**What does the market say about these job titles?**

This section presents average wages for each job title in shortage within the identified occupation

*Data source: Global Salary Calculator – Economic Research Institute (ERI)*

*Online data on wages usually are based on formal jobs at large firms. Thus, data in this section may be biased towards the upper part of the distribution and only represent the upper end of the Indonesian job market.*

**Job family according to the Indonesian official classification of occupations**

KBJI code and title:

KBJI Code – Occupation name

What workers in this occupation do, role and tasks include:

This section describes the main activities performed as part of the occupation. The description is obtained from Indonesian Standard Classification of Occupations (Klasifikasi Baku Jabatan Indonesia, KBJI) Handbook of Statistics Indonesia (Badan Pusat Statistik, BPS).

**What do national statistics say about this job family?**

This section presents national statistics on the Job Family (or 4-digit KBJI code) associated with the identified job titles in shortage, using National Labor Force Survey (SAKERNAS) data from August 2015 to 2017. When sample size allows, statistics include:

Wage distributions: A graph presents net monthly wage distributions of four groups of employees: all employees, inexperienced and experienced employees, and employees with the most common education level achieved within the job family. In some cases, workers' most common education level does not coincide with the one that firms highlighted in shortage during the bottom-up analysis. For these cases, sample size permitting, the graph also includes wage distributions of employees with the educational level in shortage according to the bottom-up approach. All wages are in 2017 values.

Workers' most common education achieved along with diplomas' and vocational high-school graduates' most common field of study.

Occupation outlook: average and percentiles 10 and 99 of years of experience, weekly working hours, and workers' age.

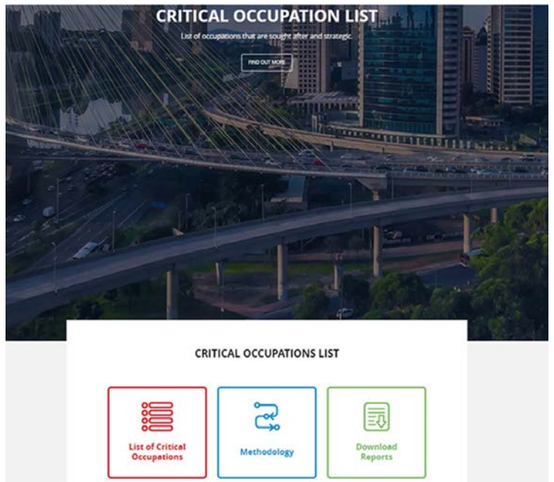
Most common sector of employment.

Provinces where most workers in the job family live.

*Data source: National Labor Force Survey (SAKERNAS) data from August 2015 to 2017 unless otherwise noted.*

*Statistics in this section require different levels of disaggregation. For robustness, statistics produced with less than 30 observations are either flagged or not present.*

**To make the results more easily accessible, increase utilization, and maximize the impact of the skills monitoring tool, a website was developed to host the COL.** The website aims to provide wide access to the COL, especially to stakeholders such as students, job-seekers, employers, and government agencies. The website presents the COL, as well as the occupation profiles and various technical documents associated with this work. A screenshot of the website is shown below.



Chapter 3

# Potential Applications & Recommended Next Steps

The Critical Occupations List presents evidence-based information to guide human capital development policy in Indonesia. By signaling occupation and skills imbalances, the list identifies areas of labor market inefficiency that effect Indonesia's economic development. Policymakers can use the COL to more efficiently allocate resources by targeting funds toward those programs that address acute occupational shortages. Section 1 of this part of the report explores shortage list applications in education and immigration policy in other countries, and the potential applications in Indonesia. Section 2 discusses recommendations for future rounds of COL work.

## Applications of shortage lists around the world and suggestions for Indonesia

**Policymakers use shortage lists to create targeted education and migration policies that improve human capital.** Lists identify areas in the labor market that lack needed skills. In many countries, such as Australia and Ireland, shortage lists are used when crafting education programs that address skills gaps. In other countries, such as New Zealand, shortage lists inform skilled migration policies. In some cases, both education and migration objectives are pursued concurrently. The U.K.'s Shortage Occupation List, for instance, is used to inform both skills training needs and immigration priorities. Table 8 illustrates additional examples of shortage list applications.

### Education and Training Applications

**Shortage lists help direct resource allocation toward high-impact job training, education, and development programs.** Internationally, shortage lists inform education and training policy in three separate ways: (i) they guide public and private investment in education and training; (ii) they provide guidance on in-demand jobs to job-seekers, the unemployed, and other populations receiving public assistance; and (iii) they are used to prioritize the development of training standards and programs. These three applications are described in more detail below.

**1.** Targeting training incentives and investments. In some countries, the government provides funding to trainees, employers, or education and training institutions that are engaged in developing in-demand skills. Shortage lists are used to identify eligible courses, sectors, and qualifications for subsidies. The goal is to increase the efficiency of government spending on skills development and increase the number of students or job-seekers with needed skills by allocating resources toward programs that address acute skills gaps.

The Smart and Skilled Program in New South Wales (NSW), Australia, is an example of this type of application. The Smart and Skilled Program makes use of the NSW Skills List to direct state support to TVET students toward those pursuing in-demand occupations. The NSW Skills List is a list of TVET courses that lead to in-demand occupations. It is compiled by the state and uses labor market data, as well as consultations with employers and their associations. Students seeking to study a priority TVET course may apply for financial support from Training Services NSW. Employers may also enroll employees and apply for fee reimbursement. The amount of money received varies from 90 percent to 55 percent depending on the level of study, a student's education history, and the level of financial need. In addition to providing an incentive to students and employers to train in areas of critical need, the program raises

Tab. 8 Applications of Shortage Lists around the World

| List | Use | Program | Purpose | List content | List methodology |
|---|---|---|---|---|---|
| NSW Skills List | Training incentives | Smart and Skilled, Australia | Identify training courses eligible for subsidies | Qualifications that lead to employment in critical occupations | Traditional labor market information; consultations |
| National Skills Bulletin | Training incentives | Springboard+, Ireland | Identify in- demand sectors and qualifications for subsidized training | Annual outlook for 130 major occupations | Traditional labor market information; survey of recruitment agencies |
| National Skills Needs List | Training incentives | Apprenticeships, Australia | Target incentives to apprentices and employers | TVET occupations that are in national skills shortage | Traditional and real- time labor market information; employer survey |
| Skills Shortage Lists | Training information | Training package development, Australia | Inform development of training packages | Skilled occupations with shortage or recruitment difficulty | Traditional labor market information; employer survey; consultations |
| Demand Occupations List | Career counselling | Career Connections, United States | Direct jobseekers to occupations when approving training funds | High growth occupations and matching credentials | Traditional and real-time labor market information |
| Labor Market Balance Report | Career counselling | Job Centers, Denmark | Identify occupations with employer- reported shortages and a pool of qualified jobseekers | Report balance of demand and supply for 900 occupations | Traditional labor market information; employer survey; piloting use of real-time labor market information |
| Skilled Occupation List | Migration | Temporary and permanent migration, Australia | Determine eligibility for migration | Occupations that would benefit from skilled migration to meet medium- and long-term economic needs | Traditional labor market information; stakeholder submissions; consultations |
| Shortage Occupation List | Migration | Skilled temporary migration, U.K. | Exempt from labor market test, expedite processing | Skilled occupations in shortage sensibly filled with non-EEA labor | Traditional labor market information; stakeholder submissions; consultations |
| Long- term Skill Shortage List | Migration | Skilled permanent migration, New Zealand | Conditional entry | Occupations with sustained, ongoing shortage of highly skilled workers globally and in New Zealand | Traditional labor market information; stakeholder submissions; consultations |
| Immediate Skill Shortage List | Migration | Skilled temporary migration, New Zealand | Exempt from labor market test | Occupations for which skilled workers are immediately required | Traditional labor market information; stakeholder submissions; consultations |
| Canterbury Skill Shortage list | Migration | Skilled temporary, regional migration, New Zealand | Conditional entry | Occupations in critical shortage in Canterbury after 2010 and 2011 earthquakes | Traditional labor market information; stakeholder submissions; consultations |
| Critical Occupations List | Migration | Skilled return migration, Malaysia | Points in points-based system | Skilled occupations in shortage that are strategic to Malaysia's economic needs | Traditional labor market information; employer survey; consultations |

SOURCE: Critical Skill Committee, 2017. "Critical Occupation List 2017/18: Technical Report". TalentCorp: Kuala Lumpur.

the level of training quality. In order to receive sponsored students, training providers must register, charge a pre-determined fee, and accept standards for program quality and customer satisfaction on top of the already robust Australian training standards. The government has focused on using this program to improve information flows from students and employers on training quality, as well as a means to compel providers to make information on program content and outcomes readily available to prospective students.

**2.** Providing guidance to job-seekers on occupations in shortage. Job centers may use shortage lists as advising materials for students and job-seekers. These lists help point job-seekers toward in-demand jobs.

Denmark provides an example of this type of shortage list use. The Danish Agency for Labor Market and Recruitment (STAR) produces a Labor Market Balance report on the labor market conditions for 900 occupations based on statistical evidence and surveys of employers. This information allows STAR to identify occupations where shortage exists. Unemployed individuals that register with municipal Job Centers fill out resumes that document previous work experience. This information allows STAR to calculate the number of unemployed people potentially qualified for each occupation. By combining this information with projections of shortage, STAR is able to provide guidance to Job Centers on occupations where there is both evidence of shortage and a pool of unemployed individuals capable of filling them. Career counselors at Job Centers can access this information to guide unemployed individuals toward these occupations.

**3.** Inform training standards and program development. Education and training providers, and regulators may use shortage lists to prioritize the development or revision of standards and curricula. In these cases, inclusion of the occupation on a shortage list might indicate that current education and training programs are out of date with industry needs, or that the emergence of new skills is not being well served by providers.

**Australia's Industry and Skills Committee (AISC) employs a shortage list to prioritize the revision of training standards.** AISC is a national multi-sector, multi-stakeholder body that advises the government on skills needs and policy. Each year, AISC publishes the National Schedule, which is a scheduled review and revision of training packages. Training packages are bundles of linked competencies for occupations that are used as standards against which training program curricula are developed. Setting this schedule is necessary because the amount of time and effort required to review and update training packages is substantial, and prioritization is therefore needed. To set the National Schedule, AISC relies on the Skill Shortage List, a list distinct from the NSW Skills List mentioned earlier, but based on the same national labor market statistics and surveys of employers, as well as sector-specific environment scans that provide more detailed information on the nature of skills gaps.

**As the examples above indicate, shortage lists have been used to inform both short-term and long- term interventions.** The use of employer-submitted information on their present hiring experiences means that shortage lists provide as current a picture of labor market conditions as possible without the use of real-time labor market information. This makes them useful for guiding short-term decisions regarding where resources and trainee time should be spent to best address skills gaps. The evidence collected through bottom-up data collection can also reveal persistent skills shortages related to supply bottlenecks, such as a lack of education and training programs that prepare students for critical occupations. Because shortage lists are regularly reviewed and updated in most countries, occupations for which there continues to be evidence of shortage over multiple rounds could face these types of supply issues. To the extent that shortage lists reveal these types of persistent shortages, they are also useful in informing longer-term decisions about education and training program development.



## Labor Migration Applications

**Shortage lists can be used to improve the efficacy and transparency of immigration policy.** List-based immigration policies eliminate the need for employers to prove labor shortages through a market test before being able to secure visas for employees, decreasing delays and allowing employers to fill vacancies more quickly. This also helps migrants find work faster and improves labor market conditions by decreasing skills gaps. Lists are also produced publicly, making list-based policies more transparent.

**Shortage lists are applied through seven broad categories.** In the short term, these categories focus on immediate labor market needs. In the long term, they examine admission eligibility. Many OECD countries now use shortage lists to inform migration policies, yet list-based migration represents a small proportion of overall immigration.[22] Their uses can be characterized by seven categories:

**1.** Employers are exempt from a labor market test. Many countries require employers to undergo a labor market test by marketing a vacancy domestically before hiring a worker abroad. If an occupation appears on a shortage list, however, employers may skip this step through a test exemption. This policy is generally employed to fill short-term needs. Examples include the United Kingdom's Shortage Occupation List, France's Shortage Occupations, Germany's Positive List, Ireland's High Skills Occupations List, New Zealand's Immediate Skills Shortage List, Spain's Catalogue of Hard-to-Fill Positions, and the United States' Schedule A.
**2.** Migrants are exempt from other requirements. If migrants work in an occupation appearing on the shortage list, they may be exempted from other admissions requirements. These include language, salary, or years of work experience standards. The EU Blue Card, for example, lowers the salary threshold for migrants working in list shortage occupations.
**3.** Occupation-based conditional entry. Some migrants may only enter a country if their occupation appears on the shortage list. This is generally used to fill long-term labor market needs. Examples include Australia's Short-term Skilled Occupation List and Medium and Long-term Strategic Skills List, New Zealand's Long-term Skills Shortage List, and Austria's Red White Red Card.[23]
**4.** Admissions points for certain occupations. In this system, points are awarded to potential migrants for having desirable characteristics. Experience in an occupation on the shortage list adds points and may compensate for other weaknesses in the migrant's application. Examples are Malaysia's Returning Expert Program and Australia's former Migration Occupations in Demand List.
**5.** Priority for certain occupations. Under this method, priority is given to migrants working in an occupation on the shortage list. Examples include the United Kingdom's Shortage Occupation List and Denmark's Positive List.
**6.** Expedited processing for certain occupations. This applies to those who work in occupations on the shortage list. Canada's Federal Skilled Workers Program formerly took this approach.
**7.** Use of a negative list. A negative list is the opposite of a shortage list and identifies areas of labor surplus. In these cases, migrants may not take a job on the negative list. Examples include Ireland's Ineligibles List and Portugal's Exclusion List.

**To be an effective policy tool, shortage lists must be regularly re-evaluated.** Without persistent monitoring, list-based policies might become outdated or lead to undesirable effects. As seen in Australia's former Migrant Occupations in Demand List (MODL), outdated lists can lead to a concentration of skilled workers in some areas, while leaving gaps in others.[24] List-based policies might also cause applicants to intentionally mislead admissions officers by falsely claiming they work in an occupation on the shortage list.[25] To avoid these pitfalls, sunset clauses, continual monitoring, and regular updating of shortage lists can be employed.

**22** Sources: Chaloff, Jonathan. 2014. "Evidence-based regulation of labor migration in OECD countries: setting quotas, selection criteria, and shortage lists." Migration Letters 11: 11-22; and OECD. 2014. International Migration Outlook 2014. Paris: OECD.

**23** In 2017, Australia's Department of Employment announced that two new lists—the Short-term Skilled Occupation List (STSOL) and the Medium and Long-term Strategic Skills List (MLTSSL)—would be introduced to guide decisions about temporary and permanent migration.

**24** Sources: Department of Education, Employment, and Workplace Relations and Department of Immigration and Citizenship (DEEWR and DIC). 2009a. *Select skills: Principles for a new Migration Occupations in Demand List*. Review of the Migration Occupations in Demand List Issue Paper No. 1. Australia Department of Education, Employment and Workplace Relations and Department of Immigration and Citizenship; and DEEWR and DIC. 2009b. *Future Skills Targeting high value skills through the General Skilled Migration Program*. Review of the Migration Occupations in Demand List Issue Paper No. 2. Australia Department of Education, Employment and Workplace Relations and Department of Immigration and Citizenship.

**25** Source: Birrel, Bob, Ernest Healy, and Bob Kinnaird. 2007. "Cooks Galore and Hairdressers Aplenty." People and Place 15: 30-44.

## Potential Applications in Indonesia

**The Government of Indonesia could consider using the COL to guide policies related to education, training, employment services, and business support.** Based on the lessons learned from international experience and discussions with government and non-government stakeholders, Table 9 presents potential policy applications for Indonesia's COL.

Tab. 9 Potential Applications of the Indonesian Critical Occupations List

| Policy Area | Specific applications |
|---|---|
| **Funding for training and apprenticeships** | An assessment of the skills development landscape in Indonesia has revealed that training provisions are spread across multiple ministries. The COL can help coordinate funding decisions.<br><br>The COL can inform ministries' decisions on allocating budgetary support to training providers, and ensure that trained and skilled personnel are fitting market needs.<br><br>Similarly, the COL can help firms better focus their talent sourcing strategies, as the list provides insights on the causes of occupation scarcity. This includes increasing apprenticeships when lack of experience is identified.<br><br>The COL may help inform funding priorities for upskilling and short-term training programs.<br><br>TVET and higher education funding priorities can draw upon the COL to target funds toward education programs related to occupations in shortage.<br><br>The COL may also build partnerships to increase system responsiveness. |
| **Employment services and reskilling** | The COL can act as a starting point for the government and private sector to develop an evidence-based link and match initiatives, whereby competencies developed through education and trainings are responding to labor market needs.<br><br>The COL, in addition to integrated information available on AyoKitaKerja, provides job-seekers with a more comprehensive guide to identifying skills that they can develop to increase their value in the labor market. |
| **Program and standards development** | Information from the COL can be used to update standards surrounding the curriculum, competency, and certification requirements to better respond to labor market needs.<br><br>The COL can support schools to address future skills needs and provide context in career guidance programs for students.<br><br>The COL can be used as a reference for the MoEC and sub-national governments, as well as for vocational schools and community-based learning centers (*Pusat Kegiatan Belajar Masyarakat*, PKBM) to better plan study programs, training programs, and vocational courses. |
| **Business support** | The COL fills information gaps on labor market needs and trends.<br><br>Information from the COL can be used in workforce planning projects for key sectors.<br><br>Empirical evidence of the reasons for shortage, such as a lack of experienced candidates, can be used as incentives for businesses to take on apprentices.<br><br>The COL is a reference for the private sector to support vocational training, as well as to take strategic actions for workforce fulfilment. |



# Recommendations and Next Steps

**The COL development process requires the involvement of diverse stakeholders across an economy.** Engaging these stakeholders and identifying proper data can be difficult and, in its first year, the Indonesian COL team identified several avenues in which COL development can be improved. These lessons learned are essential for refining and improving the COL process in the future. During a workshop held in September 2019, additional suggestions were also shared by relevant government and non-government stakeholders. Such lessons and recommendations can be summarized as follows:

**1** **Form a COL team to promote sustainability and increase GoI ownership.** In other countries, COLs are updated on a regular schedule, most often annually. Identifying a team that can support the COL is essential to continuing the COL project for several years and to keep momentum.

**The ideal team to carry forward the COL would be comprised of two groups: (i) an advisory group that sets the strategic direction for the COL and brokers access to companies, skills experts, and COL users; and (ii) a secretariat responsible for maintaining momentum between COL rounds and conducting the research needed to produce new rounds of the COL.** These two groups could be anchored by different organizations. For instance, a coordinating agency familiar with current labor market dynamics and how they relate to Indonesia's strategic policy direction could play the advisory role, while a line ministry focused on education, labor, or workforce development could devote staff to maintaining the COL between rounds and leading the research efforts each year. These groups do not necessarily need to be created as new, formal units within the bureaucracy dedicated only to the COL. In other countries, such as Malaysia, these duties have been given to existing groups as part of their overall annual work plans. It is also possible to pull staff from different agencies into an informal "working group" tasked with carrying forward the COL work.

**The advisory group serves two main functions.** The first is setting a strategic direction. The advisory group determines the sectoral scope of the COL and the skills levels that the COL focuses on. It also provides guidance to the research team during dovetailing and validation on which factors should be considered when assessing the strategic importance of occupations. The second function is coordination with COL users and informants. The advisory group publicizes the COL as a tool for informing policy, and serves as a liaison between users of the COL and the research team. The group should also be able to provide access to companies and their representatives for the purposes of data collection.

**The secretariat also serves two main functions.** The first function is to conduct the research needed to produce the COL. Implementation of the COL research methodology generally takes between six and nine months. The intensity of work varies during this period. It is lighter during the initial stages, such as designing the CfE questionnaire and releasing the CfE survey into the field. Work is more intense during consultations, dovetailing, and the validation of the initial COL. The second function is maintaining the COL outside of active research rounds. Activities include responding to questions about the COL, receiving feedback from users and from companies wishing to submit information, disseminating the COL in a tailored and user-friendly format to additional end-users, (e.g., employers, job-seekers, and students), and planning for future rounds.

**Secretariat staff should collectively possess both research and project management skills.** Conducting the COL requires researchers who are capable of leading quantitative and qualitative data collection and analysis. Because the COL methodology requires meeting with a wide set of stakeholders, managing a survey, and coordinating across a variety of government and non-government entities during validation, the team must also possess strong project management skills.

**Beyond increasing the chance of the COL being sustained, transferring responsibility to the government may have the added**

**benefit of increasing the COL's legitimacy with other stakeholders.** Other countries have found that the ability to influence government skills policy is a major reason why companies take the time to submit bottom-up information—a prospect that is more credible when the COL is housed within a government agency. Similarly, potential users of the COL may have more confidence in the validity of the work when it is produced by the government.

**2** **Archive COL methodological tools to ensure new research teams can effectively replicate the work**. In preparation for the next COL round and beyond, the 2018 research team might consider developing a short training seminar on their experiences organizing and conducting consultations, disseminating the CfE survey, cleaning the data, and creating and using the Google Sheets tool for tracking purposes. This will ensure that the knowledge and experience gained through this process is preserved for future research teams.

**3** **Strengthen links with information providers and users.** Because the 2018 COL is the first list produced for Indonesia, gathering feedback from stakeholders involved in the data collection process and COL end-users is key. Stakeholders involved in the bottom-up process can provide feedback on the robustness of the CfE, consultations, and validation, which can be distilled into recommendations for future COL production. End-users of the COL should also be contacted. These users can provide feedback on the COL's format and included information, ease of use, and thoughts on potential applications. In addition, these users can collaborate with the team in charge of the COL to strengthen synergies with existing initiatives implemented by other government and non-government agencies (Figure 23).

Fig. 23 Strengthening Cooperation in the COL Process

**Using the COL**

The COL can serve as tool to guide investment in the following policy areas:

- Funding for training and apprenticeships
- Employment intermediation services
- Program and standards development
- Business support


**Providing inputs to the development of the COL**

Cooperation can improve access to information on:

- Skills gaps experienced by employers
- Available quantitative data sources
- Link between occupations and training
- Standards and accreditation



**4** **Increase the number of available datasets and occupation information.** Currently, SAKERNAS is the only available data source for generating the COL. This differs from international best practice, where several datasets—including both public and private research—are used to generate a list. Drawing from multiple datasets eliminates bias and gives a more complete picture of the labor market. For example, the COL could benefit from indicators of market imbalances, focused on vacancies, and employer-based indicators. Two important data sources that could be used to complement (or even replace) the SAKERNAS are Occupation Employment and Vacancy Surveys, which provide a reliable quantities measure of the growing occupations, and vacancy data from job postings from public and private job boards, which require text analysis based on machine learning algorithms. Indonesia could consider partnering with local universities to collect additional, reliable data for consideration. Similarly, future COLs could benefit from more robust data on occupations and at a more disaggregated level. Data gathering could include more detailed descriptions of job titles, job functions, vacancies, wages and required experience. In particular, data at the job title level would be more useful to address employers' needs and produce accurate occupation profiles. Occupations in the KBJI codes could also be regularly re-evaluated to eliminate obsolete occupations from consideration.

**5** **Continue to improve the process of verifying the accuracy of occupation coding.** As submissions are received through the CfE, it is essential that nominated occupations are correctly coded according to the KBJI system (or another system if it becomes available in the future). During the 2018 COL process, the research team used the KBJI codebook to classify occupations. In cases where the occupation was unclear, an additional team member was consulted, or the code was reviewed during the dovetailing process. Moving forward, the team could strengthen training in occupation coding so that two trained members of the team code each occupation separately and then compare for accuracy. Alternatively, a government agency with experience in coding occupations could be consulted.

**6** **Occupations on the COL can be linked with educational requirements.** Because many skillsets are developed in the education system, collecting occupation-based data on educational requirements can aid in the analysis of skills gaps. For instance, if most occupations on the COL require a university education or higher, this might signal that universities are not graduating enough students in this sector. This could help form more targeted education policies or incentives that ensure new graduates are able to fill critical vacancies in the labor market.

**7** **Mobilize firms to increase participation.** Regular outreach and contact with firms can increase CfE and consultation participation. The 2018 COL should be widely distributed to showcase the work of the *skills monitoring system* and importance of employer participation. Researchers should also periodically contact firms that participated in the 2018 COL to maintain relationships and encourage future participation and buy-in. In future COL rounds, obtaining association endorsement may also help boost response rates, and the consultations may be held over a longer period of time to allow space for more firms to be involved.

**8** **Streamline CfE dissemination and data collection.** In this round of the CfE, industry leaders shared the CfE link in a way that led to a limited number of responses being overwritten by multiple users. In the future, developing clear protocols for third-parties assisting in the dissemination of the CfE will ensure that all responses are correctly received. Similarly, streamlining the language of the CfE could make it more user-friendly and eliminate the need to create a separate survey for SMEs.

**9** **Employ real-time labor market information (LMI).** LMI data are mined from online job postings and collects information on job vacancies, job titles, and skills associated with each occupation. Most importantly, it provides time-specific, granularized information. Inclusion of LMI data in the top-down approach can take the form of a new indicator measuring the quantity of job vacancies. In the bottom- up approach, contextualized information on titles and skills can be used in final analysis and to create occupation profiles. Once COLs are constructed, their data can be featured on job-matching platforms that can help direct job-seekers or students to consider occupation shortages. Such applications may also be used to attract skilled foreign labor to Indonesia.

**10** **Consider regional COLs.** Different provinces and regions in Indonesia experience labor market changes differently, and each has a different labor force size, participation rate, structural composition, and education level. For example, in 2016, 53 percent of the labor force in East Nusa Tenggara worked in agriculture, compared with just 19 percent in West Java.[26] Creating regional COLs might better inform local policies. Other countries, such as Australia and the United Kingdom, have used localized COLs to capture shortages felt at a local level but that are undetectable at a national level. Moreover, the SAKERNAS survey already captures provincial-level data, making it easier to conduct top-down analysis. Engaging stakeholders from a local level to perform bottom-up analysis may be challenging, and future rounds of COLs might consider better, more specific outreach to targeted areas.

**26** Source: Author's calculations based on August 2016 SAKERNAS data.



# References

**APINDO.** 2018. "The Future of Employment: Indonesia's Context." Presentation, Indonesia Jobs Forum "The Future of Jobs and Jobs of the Future," Center for Strategic and International Studies, April 4.

**Birrel, Bob, Ernest Healy, and Bob Kinnaird.** 2007. "Cooks Galore and Hairdressers Aplenty." *People and Place* 15: 30-44.

**Cali, M.,** T. Hidayat, C. H. Hollweg. 2018. "Determinants of Labor Mobility Costs in Indonesia." Preliminary and incomplete draft. July.

**Chaloff, Jonathan.** 2014. "Evidence-based regulation of labor migration in OECD countries: setting quotas, selection criteria, and shortage lists." *Migration Letters* 11: 11-22.

**Critical Skills Monitoring Committee.** 2018. *Critical Occupation List 2017/18: Technical Report*. Kuala Lumpur: TalentCorp.

**di Gropello, Emanuela, Aurelien Kruse, and Prateek Tandon.** 2011. *Skills for the Labor Market in Indonesia*. Washington, DC: World Bank.

**DEEWR and DIC.** 2009a. *Select skills: Principles for a new Migration Occupations in Demand List*. Review of the Migration Occupations in Demand List Issue Paper No. 1. Australia Department of Education, Employment and Workplace Relations and Department of Immigration and Citizenship.

**DEEWR and DIC.** 2009b. *Future Skills Targeting high value skills through the General Skilled Migration Program.* Review of the Migration Occupations in Demand List Issue Paper No. 2. Australia Department of Education, Employment and Workplace Relations and Department of Immigration and Citizenship.

**Frey, Carl Benedikt, and Michael A.** Osborne. 2017. "The Future of Employment: How Susceptible Are Jobs to Computerisation?" *Technological Forecasting and Social Change* 114: 254-80.

**ILO.** 2017. *Indonesia Jobs Outlook 2017.* Jakarta: ILO.

**Lee, Jong-Wha, and Dainn Wie.** 2013. *Technological Change, Skill Demand, and Wage Inequality in Indonesia.* Manila: ADB Economics Working Paper.

**MAC (United Kingdom Migration Advisory Committee).** 2017. *Assessing Labor Market Shortages: A Methodology Update*. London: United Kingdom Migration Advisory Committee.

**Manning, C.,** and D. Pratomo (forthcoming). 2018. "Labor Market Developments in the Jokowi Years." OECD. 2014. *International Migration Outlook 2014*. Paris: OECD.

**Shah, Chandra and Gerald Burke.** 2005. "Skills Shortages: Concepts, Measurement and Policy Responses." *Australian Bulletin of Labor* 31: 44-71.

**Tanis, Elliot and Robert V.** Hogg. 2005. *Probability and Statistical Inference.* Upper Saddle River, NJ: Pearson Prentice Hall. Veneri, Carolyn M. 1999. "Can Occupational Labor Shortages Be Identified Using Available Data?" *Monthly Labor Review* 122: 15-21.

# ANNEX A.
# Collapsed Occupational Codes

| KBJI 2014 | | KBJI 2002 | | Collapsed Occupation name and code | |
|---|---|---|---|---|---|
| 1114 | Senior Officials of Special-Interest Organizations | 1141 | Senior officials of political-party organizations | 1141 | Senior Officials of Special-Interest Organizations |
| | | 1143 | Senior officials of humanitarian and other special-interest organizations | | |
| | | 1142 | Senior officials of employers', workers' and other economic-interest organizations | | |
| 1323 | Managers in Construction | 1223 | Production and operations department managers in construction | 1223 | Managers in Construction |
| | | 1313 | General managers in construction | | |
| 1324, 1330 | Production and Operations Department Managers in Transport, Storage (1324) Managers in Communications (1330) | 1226 | Production and operations department managers in transport, storage and communications | 1226 | Production and Operations Department Managers in Transport, Storage and Communications |
| | | 1316 | General managers in transport, storage and communications | | |
| | | 1236 | Computing services department managers | | |
| 1219 | Production and Operations Department Managers not elsewhere classified | 1227 | Production and operations department managers in business services | 1227 | Production and Operations Department Managers not elsewhere classified |
| | | 1318 | General managers in personal care, cleaning and related services | | |
| | | 1317 | General managers of business services | | |
| | | 1239 | Other department managers not elsewhere classified | | |
| | | 1231 | Finance and administration department managers | | |
| | | 1229 | Production and operations department managers not elsewhere classified | | |
| | | 1228 | Production and operations department managers in personal care, cleaning and related services | | |
| 6121 | Dairy, Livestock, Poultry, Apiarists, Seri culturists, and Mixed-Animal Producers | 6121 | Dairy and livestock producers | 6121 | Dairy, Livestock, Poultry, Apiarists, Seri culturists, and Mixed-Animal Producers |
| | | 1311 | General managers in agriculture, hunting, forestry/ and fishing | | |
| | | 6123 | Apiarists and Seri culturists | | |
| | | 6122 | Poultry producers | | |
| | | 6124 | Mixed-animal producers | | |

| KBJI 2014 | | KBJI 2002 | | Collapsed Occupation name and code | |
|---|---|---|---|---|---|
| 2120 | Mathematicians, Actuaries and Statisticians | 2121 | Mathematicians and related professionals | 2121 | Mathematicians, Actuaries and Statisticians |
| | | 2122 | Statisticians | | |
| | | 2214 | Animal husbandry researchers | | |
| | | 2213 | Agronomists and related professionals | | |
| 2131 | Biologist, Botanist, Zoologist, and related professionals | 2211 | Biologist, Botanist, Zoologist | 2211 | Biologist, Botanist, Zoologist, and related professionals |
| | | 2212 | Pharmacologists, pathologists and related professionals | | |
| 2351 | Education Methods Specialists | 2461 | Education methods specialists | 2461 | Education Methods Specialists |
| | | 2462 | School inspectors | | |
| 2611 | Lawyers/Attorneys | 2511 | Lawyers | 2511 | Lawyers/Attorney |
| | | 2513 | Attorney | | |
| 2652, 2653 | Musicians, Singers and Composers (2652) Dancers and Choreographers (2653) | 2925 | Composers, musicians and singers (except street singers) | 2925 | Musicians, Singers and Composers, Dancers and Choreographer s |
| | | 3953 | Street, night-club and related musicians, singers and dancers | | |
| | | 2926 | Choreographers and dancers | | |
| 2659 | Creative and Performing Artists not elsewhere classified | 2927 | Puppeteers, gamelan players, and related artists | 2927 | Creative and Performing Artists not elsewhere classified |
| | | 3954 | Clowns, magicians, acrobats and related associate professionals | | |
| 2636 | Religious Professionals | 2931 | Ulama and related professionals in Islam religion | 2931 | Religious Professionals |
| | | 2939 | Other religious professionals not elsewhere classified | | |
| | | 2935 | Pastor and related personnel in Hinduism religion | | |
| | | 2934 | Monks and related professionals in Buddhism religion | | |
| | | 2933 | Christian-Catholic priest and related professionals | | |
| | | 2932 | Christian-Protestant priest and related professionals | | |
| 3112 | Civil Engineering Technicians | 3112 | Civil engineering technicians | 3112 | Civil Engineering Technicians |
| | | 3151 | Building and fire inspectors | | |
| 3139, 8171 | Process Control Technicians (3139), Paper machine operator (8171) | 3123 | Industrial robot controllers | 3123 | Process Control Technicians not classified elsewhere |
| | | 8172 | Industrial-robot operators | | |
| | | 8171 | Automated-assembly-line operators | | |
| | | 8143 | Papermaking-plant operators | | |
| | | 8142 | Paper-pulp plant operators | | |

| KBJI 2014 | | KBJI 2002 | | Collapsed Occupation name and code | |
|---|---|---|---|---|---|
| 3431, 3114, 3521, 3522 | Photographer (3431) Electronic technicians (3114) Broadcasting technicians (3521) Telecommunication technicians (3522) | 3131 | Photographers and image and sound recording equipment operators | 3131 | Telecommunication and Broadcasting Technicians and others |
| | | 3139 | Optical and electronic equipment operators not elsewhere classified | | |
| | | 3133 | Medical equipment operators | | |
| | | 3132 | Broadcasting and telecommunications equipment operators | | |
| | | 3114 | Electronics and telecommunications engineering technicians | | |
| 3413 | Religious Associate Professionals | 3242 | Faith healers | 3242 | Religious Associate Professionals |
| | | 3960 | Religious associate professionals | | |
| 2352 | Special Education Teacher | 3310 | Special education teaching associate professionals | 3310 | Special Education Teacher |
| | | 2450 | Special education teaching professionals | | |
| 4221 | Travel Agency Clerks and Travel Consultant | 3414 | Travel consultants and organizers | 3414 | Travel Agency Clerks and Travel Consultant |
| | | 4221 | Travel agency and related clerks | | |
| 0115, 0215, 0315 | POLRI officer (0115) POLRI sergeant (0215) Enlisted Rank POLRI (0315) | 3930 | Police inspectors and detectives | 140 | Armed Forces |
| | | 5162 | Police officers | | |
| | | 140 | Police members | | |
| 4131 | Typists and Word Processing Operators | 4111 | Stenographers and typists | 4111 | Typists and Word Processing Operators |
| | | 4112 | Word-processor and related operators | | |
| 4132 | Data Entry Clerks | 4113 | Computer and data entry operators | 4113 | Data Entry Clerks |
| | | 4114 | Calculating-machine and bookkeeping machine operators | | |
| 5161 | Astrologers, Fortune-Tellers, and Related Workers | 5151 | Astrologers and related workers | 5151 | Astrologers, Fortune-Tellers, and Related Workers |
| | | 5152 | Fortune-tellers, palmists and related workers | | |
| 6210 | Forestry Workers | 6141 | Forestry workers and loggers | 6141 | Forestry Workers |
| | | 6142 | Charcoal burners and related workers | | |
| 6222 | Fishery and Underwater Workers | 6152 | Inland and coastal waters fishery workers | 6152 | Fishery and Underwater Workers |
| | | 7216 | Underwater workers | | |
| 7223 | Metal-Products Machine Tool Operators | 8211 | Machine-tool operators | 8211 | Metal-Products Machine Tool Operators |
| | | 7223 | Machine-tool setters and setter-operators | | |

| KBJI 2014 | | KBJI 2002 | | Collapsed Occupation name and code | |
|---|---|---|---|---|---|
| 7413, 7421 | Electronic equipment fitter (7413) Electronic equipment mechanics (7421) | 7242 | Electronics fitters | 7242 | Electrical and Electronic Equipment Mechanics and Fitters |
| | | 7245 | Electrical line installers, repairers and cable jointers | | |
| | | 7244 | Telegraph and telephone installers and servicers | | |
| | | 7243 | Electronics mechanics and servicers | | |
| 7316 | Textile, Leather and Related Pattern-Makers And Cutters | 7323 | Glass engravers and etchers | 7323 | Textile, Leather and Related Pattern-Makers and Cutters |
| | | 7324 | Glass, ceramics and related decorative painters | | |
| 7318 | Handicraft Workers in Wood, Textile, Leather and Related Materials | 7332 | Handicraft workers in textile, leather and related materials | 7332 | Handicraft Workers in Wood, Textile, Leather and Related Materials |
| | | 7438 | Batik makers | | |
| | | 7432 | Weavers, knitters and related workers | | |
| | | 7431 | Fiber preparers | | |
| 7321 | Pre-Printing Workers | 7341 | Compositors, typesetters and related workers | 7341 | Pre-Printing Workers |
| | | 7343 | Printing engravers and etchers | | |
| | | 7342 | Stereotypers and electrotypers | | |
| 8132 | Photographic and Related Workers | 7344 | Photographic and related workers | 7344 | Photographic and Related Workers |
| | | 8224 | Photographic-products machine operators | | |
| 7323 | Bookbinders and Related Workers | 7345 | Bookbinders and related workers | 7345 | Bookbinders and Related Workers |
| | | 8252 | Bookbinding-machine operators | | |
| 7322 | Printing and Related Trades Workers | 7346 | Silk-screen, block and textile printers | 7346 | Printing and Related Trades Workers |
| | | 8251 | Printing-machine operators | | |
| 7523 | Woodworking Machine Setters and Setter-Operators | 7423 | Woodworking machine setters and setter-operators | 7423 | Woodworking Machine Setters and Setter-Operators |
| | | 8240 | Wood-products machine operators | | |
| 7531 | Tailors, Dressmakers and Hatters | 7433 | Tailors, dressmakers and hatters | 7433 | Tailors, Dressmakers and Hatters |
| | | 7434 | Furriers and related workers | | |
| 8121 | Metal-Processing-Plant Operators | 8121 | Ore and metal furnace operators | 8121 | Metal-Processing-Plant Operators |
| | | 8126 | Metal drawers and extruders | | |
| | | 8125 | Metal heater operators | | |
| | | 8124 | Metal caster operators | | |
| | | 8123 | Metal-heat-treating-plant operators | | |
| | | 8122 | Metal rolling-mill operators | | |
| 8181 | Glass and Ceramics Kiln and Related Machine Operators | 8131 | Glass and ceramics kiln and related machine operators | 8131 | Glass and Ceramics Kiln and Related Machine Operators |
| | | 8139 | Glass, ceramics and related plant operators not elsewhere classified | | |

| KBJI 2014 | | KBJI 2002 | | Collapsed Occupation name and code | |
|---|---|---|---|---|---|
| 8131 | Chemical-Processing-Plant Operators | 8151 | Crushing-, grinding- and chemical-mixing-machinery operators | 8151 | Chemical-Processing-Plant Operators |
| | | 8229 | Chemical-products machine operators not elsewhere classified | | |
| | | 8222 | Ammunition- and explosive-products machine operators | | |
| | | 8221 | Pharmaceutical- and toiletry-products machine operators | | |
| | | 8159 | Chemical-processing-plant operators not elsewhere classified | | |
| | | 8155 | Petroleum- and natural-gas-refining-plant operators | | |
| | | 8154 | Chemical-still and reactor operators (except petroleum and natural gas) | | |
| | | 8153 | Chemical-filtering- and separating-equipment operators | | |
| | | 8152 | Chemical-heat-treating-plant operators | | |
| 8160 | Food and Related Products Machine Operators | 8271 | Meat- and fish-processing-machine operators | 8271 | Food and Related Products Machine Operators |
| | | 8279 | Tobacco production machine operators | | |
| | | 8278 | Brewers, wine and other beverage machine operators | | |
| | | 8277 | Tea-, coffee-, and cocoa-processing-machine operators | | |
| | | 8276 | Sugar production machine operators | | |
| | | 8275 | Fruit-, vegetable- and nut-processing-machine operators | | |
| | | 8274 | Baked-goods, cereal and chocolate-products machine operators | | |
| | | 8273 | Grain- and spice-milling-machine operators | | |
| | | 8272 | Dairy-products machine operators | | |
| 8212 | Electronic-Equipment Assemblers | 8282 | Electrical-equipment assemblers | 8282 | Electronic-Equipment Assemblers |
| | | 8283 | Electronic-equipment assemblers | | |
| 8219 | Other Machine Operators and Assemblers | 8284 | Metal-, rubber- and plastic-products assemblers | 8284 | Other Machine Operators and Assemblers |
| | | 8290 | Other machine operators and assemblers | | |
| | | 8286 | Paperboard, textile and related products assemblers | | |
| | | 8285 | Wood and related products assemblers | | |

| KBJI 2014 | | KBJI 2002 | | Collapsed Occupation name and code | |
|---|---|---|---|---|---|
| 9329, 9612 | Manufacturing Laborers not classified wlsewhere (9329)<br>Garbage collectors (9612) | 9321 | Assembling laborers | 9321 | Manufacturing Laborers not classified elsewhere |
| | | 9322 | Hand packers and other manufacturing laborers | | |
| | | 9161 | Garbage collectors | | |

# ANNEX B.
# Official Definition of Formality from BPS

| Occupation | Status of Employment: Own account | Employer assisted by temporary worker | Employer assisted by permanent worker | Employee | Casual worker in agriculture | Casual worker not in agriculture | Unpaid family worker |
|---|---|---|---|---|---|---|---|
| Professional, Technical & Related Workers | Formal | Formal | Formal | Formal | Formal | Formal | Informal |
| Administrative & Managerial workers | Formal | Formal | Formal | Formal | Formal | Formal | Informal |
| Clerical & Related Workers | Formal | Formal | Formal | Formal | Formal | Formal | Informal |
| Sales Workers | Informal | Formal | Formal | Formal | Informal | Informal | Informal |
| Services Workers | Informal | Formal | Formal | Formal | Informal | Informal | Informal |
| Agriculture & Forestry Workers, Fisherman & Hunters | Informal | Informal | Formal | Formal | Informal | Informal | Informal |
| Production, Transport equipment operators & laborers | Informal | Formal | Formal | Formal | Informal | Informal | Informal |
| Others | Informal | Informal | Formal | Formal | Informal | Informal | Informal |

# ANNEX C.
# Correlation Matrix for All Indicators in Top-Down Analysis

| | Employment growth - | | Working hours growth | | Education level decrease | | Decrease in proportion of people with high school or above education | | Decrease in proportion of people with university education or above | | Wage premium growth | | Median wage growth | | Formal employment growth | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 year | 3 years | 1 year | 3 years | 1 year | 3 years | 1 year | 3 years | 1 year | 3 years | 1 year | 3 years | 1 year | 3 years | 1 year | 3 years |
| Employment growth - 1 year | 1 | | | | | | | | | | | | | | | |
| Employment growth - 3 years | 0.180* | 1 | | | | | | | | | | | | | | |
| Working hours growth - 1 year | 0.0367 | -0.0193 | 1 | | | | | | | | | | | | | |
| Working hours growth - 3 years | 0.195* | 0.0816 | 0.358*** | 1 | | | | | | | | | | | | |
| Education level decrease - 1 year | -0.0441 | 0.0192 | -0.331*** | -0.475*** | 1 | | | | | | | | | | | |
| Education level decrease - 3 years | -0.121 | 0.0441 | -0.138 | -0.309*** | 0.328*** | 1 | | | | | | | | | | |
| Decrease in proportion of people with high school or above education - 1 year | 0.00126 | 0.0593 | 0.00545 | -0.00458 | 0.287*** | -0.0952 | 1 | | | | | | | | | |
| Decrease in proportion of people with high school or above education - 3 years | -0.139 | 0.153* | -0.139 | -0.624*** | 0.408*** | 0.547*** | 0.0372 | 1 | | | | | | | | |

| | Employment growth - | | Working hours growth | | Education level decrease | | Decrease in proportion of people with high school or above education | | Decrease in proportion of people with university education or above | | Wage premium growth | | Median wage growth | | Formal employment growth | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 year | 3 years | 1 year | 3 years | 1 year | 3 years | 1 year | 3 years | 1 year | 3 years | 1 year | 3 years | 1 year | 3 years | 1 year | 3 years |
| Decrease in proportion of people with university education or above - 1 year | -0.119 | 0.0724 | -0.0952 | -0.381*** | 0.455*** | 0.195* | 0.304*** | 0.345*** | 1 | | | | | | | |
| Decrease in proportion of people with university education or above - 3 years | -0.117 | 0.0738 | -0.12 | -0.345*** | 0.259*** | 0.256** | 0.0638 | 0.480*** | 0.259** | 1 | | | | | | |
| Wage premium growth – 1 year | 0.0338 | -0.0732 | 0.018 | -0.084 | 0.0961 | -0.101 | -0.162 | -0.12 | 0.0234 | -0.0442 | 1 | | | | | |
| Wage premium growth – 3 years | 0.0429 | -0.285** | 0.0479 | 0.0404 | 0.115 | -0.194* | 0.018 | -0.390*** | 0.122 | -0.121 | 0.0635 | 1 | | | | |
| Median wage growth – 1 year | -0.242** | -0.0816 | -0.0549 | -0.123 | -0.0602 | -0.0784 | -0.324*** | -0.155 | -0.086 | 0.023 | 0.549*** | 0.0859 | 1 | | | |
| Median wage growth – 3 years | -0.0121 | -0.208* | -0.105 | -0.0493 | 0.181* | -0.209* | -0.0602 | -0.497*** | 0.0155 | -0.144 | -0.0755 | 0.756*** | 0.220* | 1 | | |
| Formal employment growth - 1 year | -0.339*** | -0.0419 | 0.0479 | 0.0464 | -0.143 | 0.160* | -0.0934 | 0.0282 | -0.119 | -0.153 | -0.00619 | -0.019 | 0.0886 | -0.0863 | 1 | |
| Formal employment growth - 3 years | -0.206** | -0.205** | 0.0439 | 0.0886 | 0.0701 | -0.164* | 0.206** | -0.305*** | -0.00443 | -0.099 | 0.0569 | 0.116 | 0.173 | 0.172 | 0.347*** | 1 |

# ANNEX D.
# Specifications Tested for the Top-Down Analysis

| Spec. | Difference from Preferred Specification | Dropped | Added | Differ | Total | Recommendation |
|---|---|---|---|---|---|---|
| 1 | Anomalous occupations are included in the analysis | 5 | 41 | 46 | 46 | • Due to the way that later SAKERNAS surveys were collected – with KBJI 2014 used to record occupations and then converted back to KBJI 2002 – the anomalous occupations display large jumps in their representation in the workforce over time<br>• It is therefore recommended to drop anomalous from the preferred specification |
| 2 | N/A | N/A | N/A | N/A | 41 | • Preferred specification based on the analysis of the indicators |
| 3 | Anomalous occupations are included in the analysis and separate COLs are created for each occupational group and then pooled | 8 | 11 | 19 | 44 | • As in Specification 1, the anomalous occupations display large jumps in their representation in the workforce over time, so should be dropped<br>• Creating separate COLs, which are then combined, has little effect on the total number of occupations classified as in shortage (comparing Specifications 1 and 3)<br>• Were it not for the anomalous occupations, Specification 3 would be viable |
| 4 | Separate COLs are created for each occupational group and then pooled | 8 | 7 | 15 | 40 | • The resulting number of shortage occupations is similar to the preferred specification<br>• More than three-quarters of the occupations (33 occupations) appear under both Specifications 2 and 4, demonstrating a certain level of robustness in the results<br>• For certain broad occupational groupings – namely 'technicians and assistants of professionals' – Specifications 2 and 4 pick out exactly the same occupations<br>• Specification 4 is a viable alternative to Specification 2<br>• However, Specification 2 is preferred as – by keeping all occupation groups together – it imposes less structure when creating the COL |

| Spec. | Difference from Preferred Specification | Dropped | Added | Differ | Total | Recommendation |
|---|---|---|---|---|---|---|
| 5 | Most restrictive threshold used for each indicator (and anomalous occupations are included) | 29 | 12 | 41 | 12 | • The resulting COL is very short, at just 12 occupations<br>• This makes it difficult to scrutinize the results using the bottom-up analysis<br>• This specification is too restrictive and is therefore unsuitable |
| 6 | p75 threshold used for each indicator (and anomalous occupations are included) | 26 | 1 | 27 | 16 | • The resulting COL is short, at just 16 occupations<br>• This makes it difficult to scrutinize the results using the bottom-up analysis<br>• This specification is too restrictive and is therefore unsuitable |
| 7 | p50+50% threshold used for each indicator (and anomalous occupations are included) | 8 | 3 | 11 | 36 | • The only differs from Specification 2 on 11 occupations<br>• However, being slightly more restrictive,this specification is not preferred |
| 8 | Indicators for 1- and 3-year decrease in the proportion of skilled workers dropped (and anomalous occupations are included) | 8 | 12 | 20 | 45 | • As per the correlation matrix in Annex C, each of these indicators carry additional independent information, which is not captured by the other indicators available<br>• Removing these indicators always lengthens the COL, compared with Specification 2<br>• However, excluding potentially important independent information on shortages cannot be justified without good reason, so none of these specifications are preferred |
| 9 | Indicators for 1- and 3-year wage premium growth are dropped (and anomalous occupations are included) | 2 | 20 | 22 | 59 | |
| 10 | Indicators for 1- and 3-year median wage growth are dropped (and anomalous occupations are included) | 5 | 19 | 24 | 55 | |
| 11 | Indicators for 1- and 3-year wage premium growth and median wage growth are dropped (and anomalous occupations are included) | 5 | 27 | 32 | 63 | |
| 12 | Indicators for 1- and 3-year employment growth are dropped (and anomalous occupations are included) | 6 | 11 | 17 | 46 | |
| 13 | Indicators for 1- and 3-year working hours growth are dropped (and anomalous occupations are included) | 3 | 31 | 34 | 69 | |
| 14 | Indicators for 1- and 3-year growth in the proportion of formal workers are dropped (and anomalous occupations are included) | 10 | 15 | 25 | 46 | |

# ANNEX E.
# Top-Down Critical Occupations List (Preferred Specification)

| Occupation Code | Name | # of available indicators | # of exceeding threshold |
|---|---|---|---|
| 1120 | Senior government officials | 12 | 6 |
| 1210 | Directors and chief executives | 8 | 6 |
| 1222 | Production and operations department managers in manufacturing | 8 | 5 |
| 1223 | Managers in Construction | 12 | 6 |
| 1224 | Production and operations department managers in wholesale and retail trade | 8 | 4 |
| 1315 | General managers of restaurants and hotels | 8 | 5 |
| 2221 | Medical doctors | 12 | 6 |
| 2421 | Senior secondary education teaching professionals | 12 | 6 |
| 2469 | Other teaching professionals not elsewhere classified | 12 | 8 |
| 2619 | Business professionals not elsewhere classified | 12 | 6 |
| 2922 | Journalists | 12 | 8 |
| 3112 | Civil Engineering Technicians | 8 | 4 |
| 3115 | Mechanical engineering technicians | 12 | 7 |
| 3121 | Computer assistants | 8 | 5 |
| 3122 | Computer equipment operators | 8 | 5 |
| 3241 | Traditional medicine practitioners | 8 | 4 |
| 3511 | Trade brokers | 8 | 4 |
| 4111 | Typists and Word Processing Operators | 12 | 7 |
| 4141 | Library and filing clerks | 12 | 8 |
| 4213 | Pawnbrokers and money-lenders | 8 | 4 |
| 5112 | Land transportation conductors including train steward and stewardess | 8 | 5 |
| 5121 | Housekeepers and related workers | 12 | 6 |
| 5131 | Child-care workers | 12 | 7 |
| 5132 | Institution-based personal care workers | 12 | 7 |
| 5149 | Other personal services workers not elsewhere classified | 12 | 6 |
| 5161 | Fire-fighters | 12 | 7 |

| Occupation Code | Name | # of available indicators | # of exceeding threshold |
|---|---|---|---|
| 7111 | Miners and quarry workers | 12 | 6 |
| 7113 | Stone splitters, cutters and carvers | 8 | 5 |
| 7136 | Plumbers and pipe fitters | 8 | 6 |
| 7141 | Painters and related workers | 8 | 4 |
| 7241 | Electrical mechanics and fitters | 8 | 4 |
| 7416 | Tobacco preparers and tobacco products makers | 12 | 6 |
| 7422 | Cabinet makers and related workers | 12 | 7 |
| 7424 | Basketry weavers, brush makers and related workers | 12 | 6 |
| 8212 | Cement and other mineral products machine operators | 8 | 4 |
| 8261 | Fibre-preparing-, spinning- and winding-machine operators | 12 | 6 |
| 8262 | Weaving- and knitting-machine operators | 12 | 6 |
| 9120 | Shoe cleaning and other street services elementary occupations | 8 | 5 |
| 9142 | Vehicle, window and related cleaners | 12 | 6 |
| 9151 | Messengers, package and luggage porters and deliverers | 12 | 7 |
| 9212 | Forestry laborers | 12 | 7 |

# ANNEX F.
# Call for Evidence (CfE) Questionnaire

## CRITICAL OCCUPATIONS CALL FOR EVIDENCE SURVEY 2018

### INTRODUCTION

### Critical Occupations Call for Evidence Survey 2018

The Coordinating Ministry for Economic Affairs is gathering information on critical occupations. This information will be used to help the Government monitor key labor indicators and to contribute to policies for productivity improvement.

The Critical Occupations List (COL) is a list of occupations for which there is strong evidence that there is significant labor market shortage that may be alleviated through government action. The COL seeks to identify and draw stakeholder attention to this set of occupations that are critical to the continued growth and development of the Indonesian economy but that are currently difficult to fill. The COL can help policymakers determine investments and programs in policy areas including education, training, apprenticeships, and immigration.

The COL relies on information from businesses about their recruitment experiences. Your input through this Call for Evidence (CfE) survey is extremely important in identifying occupations considered critical to your industry and enabling the Government in partnership with industry to develop programs that address critical talent shortages that pose challenges to your industry's growth prospects. It is vital that the COL is updated, stays robust and accurately represents industry needs. Accordingly, it is updated every year.

The CfE Survey will ask you to identify occupations in your business that meet the criteria for inclusion in the COL. The survey will also ask you to provide information on recent recruitment experience and any other relevant evidence to support the inclusion of the critical occupations that you identify. The strength of evidence provided will be a key consideration in the evaluation of occupations for inclusion.

The individual responses received for this Critical Occupations Call for Evidence Survey will be kept **STRICTLY CONFIDENTIAL** and will not be divulged to any person or party outside the Ministry.

| CONTACT INFORMATION | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Name: | | | | | | | | | | | | | |
| Designation: | | | | | | | | | | | | | |
| Business or Organization Name: | | | | | | | | | | | | | |
| Business or Organization Address: | | | | | | | | | | | | | |
| Office telephone: | | | | - | | | | | | | | | |
| Mobile telephone: | | | | - | | | | | | | | | |
| Email address: | | | | | | | | | | | | | |
| (Refer to Section 2, Table A) Which **KBLI industry sector** best describes the industry that your business or organization is operating in? (e.g. A) | CODE: | | | | | | | | | | | | |
| (Refer to Section 2, Table B) Which **sub-sector, under the KBLI industry sector that you have indicated above,** best describes your business or organization? (e.g. A1) | CODE: | | | | | | | | | | | | |

## SECTION 1: CRITICAL OCCUPATIONS LIST

This exercise uses two specific criteria to evaluate occupations and job titles for inclusion on the Critical Occupations List:

1. **Is the occupation in shortage in the labor market?** In shortage means that for a given occupation or job the demand for workers exceeds the supply of appropriately qualified applicants despite extensive efforts on the part of employers to find suitable workers.
2. **Is the occupation of strategic importance to the Indonesian economy?** Strategic means that occupations support sectors or perform job functions that Indonesia needs to develop in line with its investment and economic aspirations. For this submission, please consider any occupation that is of critical importance to your operations or the health of your industry strategic.

---

In the following section, you will be asked to nominate job positions within your business or organization that you deem critical, based on the three criteria above. Please answer the questions to the best of your ability. All questions are mandatory except otherwise stated. Please respond for your Indonesia-based operations only.

Does your company have any vacancies that are hard to fill?

- Yes [Go to next question]
- No [Exit survey]

Read the column titles carefully and fill in the details of critical job positions in the table provided below. An example has been provided in row 'EG' for reference, with additional notes at the bottom of each page.

| ID (For Office Use) | Column 1 | Column 2 | Column 3 | Column 4 | | Column 5 | Column 6 |
|---|---|---|---|---|---|---|---|
| | Occupation according to KBJI code | Job title | KBJI Code | How many full-time employees are currently employed for this position (working at least 35 hours a week)? | How many part-time employees are currently employed for this position (working less than 35 hours a week)? | How many of those currently employed are non-Indonesians? | How many vacancies did you advertise for this position in the past 12 months? |
| **ID1** | | | | | | | |
| **ID2** | | | | | | | |
| **ID3** | | | | | | | |
| **ID4** | | | | | | | |
| **ID5** | | | | | | | |
| **ID6** | | | | | | | |

| ID (For Office Use) | Column 7 | Column 8 | Column 9 | Column 10 | Column 11 | Column 12 | Column 13 |
|---|---|---|---|---|---|---|---|
| | What different levels of experience are required for the advertised positions? | | | What is the average time taken to fill vacancies for this position (in months)? | What are the top-3 reasons that this position is hard-to-fill? (Refer to Section III, Table C for answers) | | |
| | < 2 years | 2—4 years | > 4 years | | Top 1 | Top 2 (Optional) | Top 3 (Optional) |
| ID1 | | | | | | | |
| ID2 | | | | | | | |
| ID3 | | | | | | | |
| ID4 | | | | | | | |
| ID5 | | | | | | | |
| ID6 | | | | | | | |
| ID7 | | | | | | | |
| ID8 | | | | | | | |
| ID9 | | | | | | | |
| ID10 | | | | | | | |

| ID (For Office Use) | Column 14 | Column 18 | Column 19 | Column 20 |
|---|---|---|---|---|
| | What is the minimum level of qualification needed for this position? (Refer to Section III, Table D for answers) | What are the top-3 strategies your business or organization has used to meet your labor needs for this position? (Refer to Section III, Table E for answers) | | |
| | | Top 1 | Top 2 (Optional) | Top 3 (Optional) |
| ID1 | | | | |
| ID2 | | | | |
| ID3 | | | | |
| ID4 | | | | |
| ID5 | | | | |
| ID6 | | | | |
| ID7 | | | | |
| ID8 | | | | |
| ID9 | | | | |
| ID10 | | | | |

| ID (For Office Use) | Column 24 | Column 26 |
|---|---|---|
| | Do you think this position is more or less hard-to-fill than it was one year ago? (Refer to Section III, Table F for answers) | Do you have any other comments in relation to this position? (Optional) |
| ID1 | | |
| ID2 | | |
| ID3 | | |
| ID4 | | |
| ID5 | | |
| ID6 | | |
| ID7 | | |
| ID8 | | |
| ID9 | | |
| ID10 | | |

## SECTION 2: ANSWERING CODES FOR USE IN SECTION 1

# TABLE A

| ANSWER | ANSWER CODE |
|---|---|
| Agriculture, Forestry and Fishing | A |
| Mining and Quarrying | B |
| Manufacturing | C |
| Electricity, Gas, Steam and Air Conditioning Supply | D |
| Water Supply; Sewerage, Waste Management and Remediation Activities | E |
| Construction | F |
| Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles | G |
| Transportation and Storage | H |
| Accommodation and Food Service Activities | I |
| Information and Communication | J |
| Financial and Insurance/Takaful Activities | K |
| Real Estate Activities | L |
| Professional, Scientific and Technical Activities | M |
| Rental, Leasing and Its Related Activities, Employment, Travel Agent and other Business Support | N |
| Public Administration and Defense; Compulsory Social Security | O |
| Education | P |
| Human Health and Social Work Activities | Q |
| Arts, Entertainment and Recreation | R |
| Other Service Activities | S |
| Household Activities as Employers; Activities that Produce Goods and Services by Households to Meet Their Own Needs | T |
| Activities of International Agencies and Other Extra International Agencies | U |

# TABLE B

| ANSWER | | ANSWER CODE |
|---|---|---|
| **A. Agriculture, Forestry and Fishing** | 01. Crops and animal production, hunting and related service activities | 01 |
| | 02. Forestry and logging | 02 |
| | 03. Fishing and aquaculture | 03 |
| **B. Mining and Quarrying** | 05. Mining of coal and lignite | 05 |
| | 06. Extraction of crude petroleum and natural gas | 06 |
| | 07. Mining of metal ores | 07 |
| | 08. Other mining and quarrying | 08 |
| | 09. Mining support service activities | 09 |
| **C. Manufacturing** | 10. Manufacture of food products | 10 |
| | 11. Manufacture of beverages | 11 |
| | 12. Manufacture of tobacco products | 12 |
| | 13. Manufacture of textiles | 13 |
| | 14. Manufacture of wearing apparel | 14 |
| | 15. Manufacture of leather and related products | 15 |
| | 16. Manufacture of wood and products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials | 16 |
| | 17. Manufacture of paper and paper products | 17 |
| | 18. Printing and reproduction of recorded media | 18 |
| | 19. Manufacture of coke and refined petroleum products | 19 |
| | 20. Manufacture of chemicals and chemical products | 20 |
| | 21. Manufacture of basic pharmaceutical products and pharmaceutical preparations | 21 |
| | 22. Manufacture of rubber and plastics products | 22 |
| | 23. Manufacture of other non-metallic mineral products | 23 |
| | 24. Manufacture of basic metals | 24 |
| | 25. Manufacture of fabricated metal products, except machinery and equipment | 25 |
| | 26. Manufacture of computer, electronic and optical products | 26 |
| | 27. Manufacture of electrical equipment | 27 |
| | 28. Manufacture of machinery and equipment n.e.c. | 28 |
| | 29. Manufacture of motor vehicles, trailers and semitrailers | 29 |
| | 30. Manufacture of other transport equipment | 30 |
| | 31. Manufacture of furniture | 31 |
| | 32. Other manufacturing | 32 |
| | 33. Repair and installation of machinery and equipment | 33 |
| **D. Electricity, Gas, Steam and Air Conditioning Supply** | 35. Electricity, gas, steam and air conditioning supply | 35 |
| **E. Water Supply; Sewerage, Waste Management and Remediation Activities** | 36. Water collection, treatment and supply | 36 |
| | 37. Sewerage | 37 |
| | 38. Waste collection, treatment and disposal activities; materials recovery | 38 |
| | 39. Remediation activities and other waste management services | 39 |

| ANSWER | | ANSWER CODE |
|---|---|---|
| **F. Construction** | 41. Construction of buildings | 41 |
| | 42. Civil engineering | 42 |
| | 43. Specialized construction activities | 43 |
| **G. Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles** | 45. Wholesale and retail trade and repair of motor vehicles and motorcycles | 45 |
| | 46. Wholesale trade, except of motor vehicles and motorcycles | 46 |
| | 47. Retail trade, except of motor vehicles and motorcycles | 47 |
| **H. Transportation and Storage** | 49. Land transport and transport via pipelines | 49 |
| | 50. Water transport | 50 |
| | 51. Air transport | 51 |
| | 52. Warehousing and support activities for transportation | 52 |
| | 53. Postal and courier activities | 53 |
| **I. Accommodation and Food Service Activities** | 55. Accommodation | 55 |
| | 56. Food and beverage service activities | 56 |
| **J. Information and Communication** | 58. Publishing activities | 58 |
| | 59. Motion picture, video and television program production, sound recording and music publishing activities | 59 |
| | 60. Programming and broadcasting activities | 60 |
| | 61. Telecommunications | 61 |
| | 62. Computer programming, consultancy and related activities | 62 |
| | 63. Information service activities | 63 |
| **K. Financial and Insurance/Takaful Activities** | 64. Financial service activities, except insurance/takaful and pension funding | 64 |
| | 65. Insurance/takaful, reinsurance/retakaful and pension funding, except compulsory social security | 65 |
| | 66. Activities auxiliary to financial service and insurance/ takaful activities | 66 |
| **L. Real Estate Activities** | 68. Real estate activities | 68 |
| **M. Professional, Scientific and Technical Activities** | 68. Legal and accounting activities | 68 |
| | 69. Activities of head offices; management consultancy activities | 69 |
| | 70. Architectural and engineering activities; technical testing and analysis | 70 |
| | 71. Scientific research and development | 71 |
| | 72. Advertising and market research | 72 |
| | 73. Other professional, scientific and technical activities | 73 |
| | 74. Veterinary activities | 74 |
| **N. Rental, Leasing and Its Related Activities, Employment, Travel Agent and other Business Support** | 77. Rental and leasing activities | 77 |
| | 78. Employment activities | 78 |
| | 79. Travel agency, tour operator, reservation service and related activities | 79 |
| | 80. Security and investigation activities | 80 |
| | 81. Services to buildings and landscape activities | 81 |
| | 82. Office administrative, office support and other business support activities | 82 |
| **O. Public Administration and Defense; Compulsory Social Security** | 84. Public administration and defense; compulsory social security | 84 |
| **P. Education** | 85. Education | 85 |
| **Q. Human Health and Social Work Activities** | 84. Human health activities | 84 |
| | 85. Residential care activities | 85 |
| | 86. Social work activities without accommodation | 86 |
| **R. Arts, Entertainment and Recreation** | 90. Creative, arts and entertainment activities | 90 |
| | 91. Libraries, archives, museums and other cultural activities | 91 |
| | 92. Gambling and betting activities | 92 |
| | 93. Sports activities and amusement and recreation activities | 93 |
| **S. Other Service Activities** | 90. Activities of membership organizations | 90 |
| | 91. Repair of computers and personal and household goods | 91 |
| | 92. Other personal service activities | 92 |
| **T. Household Activities as Employers; Activities that Produce Goods and Services by Households to Meet Their Own Needs** | 97. Household Activities as Employers of Domestic Personnel | 97 |
| | 98. Activities that Produce Goods and Services by Households to Meet Their Own Needs | 98 |
| **U. Activities of International Agencies and Other Extra International Agencies** | 99. Activities of International Agencies and Other Extra International Agencies | 99 |

# TABLE C

| ANSWER | ANSWER CODE |
|---|---|
| No or too few applicants generally | K1 |
| Applicants lack the required credential or certification | K2 |
| Applicants lack relevant job experience | K3 |
| Applicants lack the required technical or occupational skills | K4 |
| Applicants lack other required skills (e.g., time management, ability to get along with others, teamwork, creativity, problem solving, reading, writing, speaking, math and logic, etc.) | K5 |
| Applicants' expected compensation are beyond the market rate | K6 |
| We cannot afford to pay the market rate for the applicants | K7 |
| Other | Please write answer directly in Columns 11, 12, and 13 in Section 1 |

## TABLE D

| ANSWER | ANSWER CODE |
|---|---|
| Junior high school (SMP) or below | L1 |
| Senior high school (SMA) | L2 |
| vocational high school (SMK) | L3 |
| Diploma I/II | L4 |
| Diploma III | L5 |
| Diploma IV/Bachelors | L6 |
| Masters | L7 |
| PhD/Doctoral degree | L8 |
| Other | Please write answer directly in Column 14 in Section 1 |

## TABLE E

| ANSWER | ANSWER CODE |
|---|---|
| Raising wages | N1 |
| Hiring less well qualified applicants | N2 |
| Expanding local recruitment efforts (e.g., wider distribution of job opening, increased presence at career fairs, increased use of recruitment firms, etc.) | N3 |
| Expanding international recruitment efforts | N4 |
| Increasing worker training | N5 |
| Establishing or expanding partnerships with education or training providers focused on recruitment of graduates | N6 |
| Increasing worker hours or overtime | N7 |
| Convincing workers to delay retirement | N8 |
| Converting part-time workers to full time status | N9 |
| Hiring temporary or contracts workers | N10 |
| Outsourcing this job function | N11 |
| Resorting to automation of tasks performed by person in this occupation | N12 |
| None | N13 |
| Others | Please write answer directly in Columns 18, 19, and 20 in Section 1 |

## TABLE F

| ANSWER | ANSWER CODE |
|---|---|
| More hard-to-fill | P1 |
| Neither more nor less hard-to-fill | P2 |
| Less hard-to-fill | P3 |
| Unsure | P4 |

# ANNEX G.
# Consultation Session Agenda

| | | |
|---|---|---|
| **DURATION:** | 90 minutes | |
| **OBJECTIVE:** | To gain information on what are the occupations that is hard to fill and why so in company | |
| **AGENDA:** | **20 minutes:** | Introduction – The team to brief the audience on the objective of why this consultation is held and what is Critical Occupations List, including consensus on the rules of discussion. |
| | **60 minutes:** | To ask the audience specifically on occupation that is hard to fill.<br>• **10 minutes:** To list down all the occupations companies find it very hard to fill.<br>• **50 minutes:** To go through each specific occupation nominated for 5-10 minutes by asking the same list of consultation questions:<br>  • What are the reasons that this position is hard-to-fill?<br>  • What education qualification are required for advertised positions in this occupation, including certification or license?<br>  • What level or levels of experience are required for advertised positions in this occupation?<br>  • What are the strategies your industry/company have used to meet your labor needs for this position?<br>  • Is there other relevant information that supports inclusion of this occupation on the COL? |
| | **10 minutes:** | To ask the audience on the general trends of the industry and if there is anything company would like to add in general, agree/disagree with the nominated occupations. Also provides time for a discussion of participant questions and for sharing next steps. |

# ANNEX H.
# Priority Sectors for Consultation

| **Sector (*Klasifikasi Baku Lapangan Usaha Indonesia*, KBLI)** |
|---|
| • Manufacturing |
| • Agriculture, Forestry, and Fishery |
| • Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles |
| • Information and Communication |
| • Financial and Insurance/TakafulActivities |
| • Construction |
| • Accommodation and Food Service Activities |
| • Rental activity, human resource services, travel agencies, and other business supporting activity |
| • Transportation and Storage |
| • Mining and Quarrying |
| • Professional, Scientific and Technical Activities |
| • Human Health and Social Work Activities |

# ANNEX I.
# Consultation Data Collection Template

| Contact Detail | Nominated Job (hard to fill) | How many persons are needed? | Main Responsibilities/ Job Description | Level of experience (in years) | Minimum level of education? Need of specific certificates, competencies, etc. | How long does it take to fill the job position? Do you need to re-advertise? | Why is the job difficult to fill? | What are specific strategies employed? |
|---|---|---|---|---|---|---|---|---|
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