

# Indonesia's Occupational Employment Outlook

**2020** Technical Report

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# Contents

|   |    |
|---|----|
| Acknowledgments   | 6  |
| Abbreviations   | 7  |
| Users' Guide  | 8  |
| 1. Introduction   | 10 |
| 2. Methodology  | 16 |
| 3. Firms and Employment Panorama  | 24 |
| 4. Short-Term Occupational Dynamics   | 30 |
| 5. Drivers of Short-Term Occupational Prospects   | 48 |
| 6. Summary and Recommended Next Steps   | 58 |
| Appendix A. Best practices around the World   | 63 |
| Appendix B. Reliability of indicators: RSE  | 67 |
| Appendix C. Firms and Employment Panorama   | 67 |
| Appendix D. Occupations with Signs of Skills Shortages                                  | 76 |
| Appendix E. Overlap between Bright and Critical Occupations List (COL) 2018 Occupations | 77 |
| Appendix F. Additional Statistics for Bright Occupations                                | 77 |
| Appendix G. Clusters for 42 Bright Occupations  | 79 |
| Appendix H. OEVS Questionnaire  | 80 |
| Endnotes  | 93 |
| References  | 96 |

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# Abbreviations

|              |   |
|--------------|---|
| <b>BLS</b>   | Bureau of Labor Statistics  |
| <b>BPS</b>   | Statistics Indonesia (Badan Pusat Statistik)  |
| <b>CAPI</b>  | computer-assisted personal interview  |
| <b>CMEA</b>  | Coordinating Ministry of Economic Affairs   |
| <b>COL</b>   | Critical Occupations List   |
| <b>ICT</b>   | information and communication technology  |
| <b>ISCO</b>  | International Standard Classification of Occupations  |
| <b>IT</b>    | information technology  |
| <b>JOLTS</b> | Jobs Openings and Labor Turnover Survey   |
| <b>JVS</b>   | Job Vacancy Survey  |
| <b>KBJI</b>  | Indonesian Standard Classification of Occupations<br>(Klasifikasi Baku Jenis Pekerjaan Indonesia) |
| <b>LMIS</b>  | labor market information system   |
| <b>LMO</b>   | labor market observatory  |
| <b>NACE</b>  | Nomenclature of Economic Activities   |
| <b>NAICS</b> | North American Industry Classification System   |
| <b>ODS</b>   | Occupational Demand Survey  |
| <b>OECD</b>  | Organisation for Economic Co-operation and Development  |
| <b>OES</b>   | Occupational Employment Statistics  |
| <b>OEVS</b>  | Occupational Employment and Vacancy Survey  |
| <b>OJK</b>   | Financial Services Authority (Otoritas Jasa Keuangan)   |
| <b>OLE</b>   | Observatorio Laboral para la Educación  |
| <b>ORS</b>   | Occupational Requirements Survey  |
| <b>OWS</b>   | Occupational Wage Survey  |
| <b>PISA</b>  | Programme for International Student Assessment  |
| <b>RSE</b>   | relative standard error   |
| <b>SES</b>   | Structure of Earnings Survey  |
| <b>SNIES</b> | Sistema Nacional de Información de Educación Superior   |
| <b>SOC</b>   | Standard Occupational Classification  |
| <b>SSOC</b>  | Singapore Standard Occupational Classification  |
| <b>TVET</b>  | technical and vocational education and training   |
| <b>UBOS</b>  | Ugandan Bureau of Statistics  |

Indonesia's Occupational Employment Outlook 2020 analyzes the results of a pilot survey designed to retrieve detailed information on Indonesia's short-term occupational dynamics with the objective of informing workforce development policy and the population in general about the future demand for skills. The pilot Occupational Employment and Vacancy Survey (OEVS) was designed based on lessons from best practices in high-income countries as a proof of concept before institutionalizing a full-scale survey in the country.

The analysis is presented in two companion reports: the Technical Report, which is presented here, and the Short-Term Occupational Prospects Report. Depending on the need, the reports can be used jointly or separately. The reports include cross-references for users who would benefit from the information in both of them. The OEVS will be used mainly to feed an online labor market information platform to be developed by the government of Indonesia, with multiple search functions and in combination with other data sources currently being developed. These reports provide the methodological description and a preview of results that could later form the platform.

The Technical Report is directed to policy makers and researchers. It describes the contribution of the data to evidence-based workforce development policy, best practices used in design of the OEVS instrument, and technical features of the survey. It describes the data and the overall results in a highly aggregated manner to summarize the main findings, including a short quality assessment drawn from the comparison of selected variables with other official data sources. Finally, it illustrates the underlying channels that could generate the observed patterns, explored through a combination of theory and qualitative analysis.

The Short-Term Occupational Prospects Report is directed to a wider

audience of policy makers and practitioners involved in career guidance and job search counseling. It is intended to help these practitioners to inform end users such as students and job seekers about which jobs have more auspicious prospects in the short term. It is designed as a statistical bulletin and it presents the complete list of occupations with the indicators that led to the conclusion about their short-term prospects. The indicators are presented in absolute numbers and in rankings for each occupation to allow practitioners to grasp quickly the short-term dynamics of an occupation. The report includes a short technical description on how to make sense of the wealth of information provided.

To take into account the potential direct consumption of information by end users, results are presented in an easily digestible manner. Figure 1.2 in the Short-Term Occupational Prospects Report lists the 42 occupations identified as bright—occupations with good short-term prospects based on all computed indicators—and the 90 occupations identified as dim—occupations with poor short-term prospects. Individuals can consult these reports to inform their educational investments and to discuss with their counselors the fields of study and education courses associated with a given occupation. More generally, the results presented in the Short-Term Occupational Prospects Report and, more specifically, in table 4.1 and appendix D aim to facilitate the counseling task of practitioners and to inform the design of the online labor market information platform. Box 1 provides suggestions for how to consult the two reports, depending on the user's interests and needs.

It is very important to recognize that the data collection for the OEVS was completed just before the COVID-19 outbreak. The crisis triggered by the pandemic is creating a break in trends, which may affect the validity of the assumptions and estimates.



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## Policy makers

- Policy makers interested in evidence-based workforce development policy should consult both reports.
- Policy makers interested in understanding the design of the OEVS and its uses for policy making in other countries should consult sections 1 (introduction) and 2 (methodology) and appendixes A and H in the Technical Report.
- Policy makers interested in understanding the methodology for classifying occupations as bright or dim should consult section 4 (short-term occupational dynamics) and appendix C in the Technical Report and sections 1 (main messages), 3 (indicators) and 4 (Short-Term Occupational Prospects) in the Short-Term Occupational Prospects Report.
- Policy makers interested in knowing which occupations have better short-term prospects should consult section 1 (main messages) and appendix C in the Short-Term Occupational Prospects Report.

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## Practitioners

- Practitioners should consult section 1 (main messages) and 4 (indicators) in the Short-Term Occupational Prospects Report, which provide background information, and table 4.1, which summarizes the profile of each occupation sorted by KBJI. Such information will help them to answer questions about whether an occupation has good or poor prospects and what are the potential risks of investing in it, based on observed short-term dynamics.
- Practitioners interested in knowing the rankings in terms of job creation should consult appendix C in the Short-Term Occupational Prospects Report.
- The Ministry of Manpower and Ministry of Education and Culture should disseminate these reports among practitioners and provide further training, if necessary.

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## Students and parents

- Students should consult figure 1.1 and table 4.1 in the Short-Term Occupational Prospects Report or companion infographics.
- All students should talk to a career counselor to gather information on the fields of study associated with the occupations that have bright career prospects.

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## Job seekers and workers

- Job seekers and workers interested in investing further in education should consult figure 1.1 and table 4.1 in the Short-Term Occupational Prospects Report or companion infographics.
- All job seekers and workers should consult with a job counselor to gather information on the training opportunities associated with the occupations that have bright career prospects.

# 1. Introduction

**Economic growth is not just a number that matters to politicians and economists. Embedded in economic growth is a structural transformation that changes the way we work, the way we live.** It changes the skills that firms demand and changes the human capital investments of students and workers. Knowing the occupations and skills of today—let alone those of the future—is fundamental for continuing to grow and for reducing poverty and income inequality, most of which stems from labor market disparities.

**The twin global forces of the onset of the Fourth Industrial Revolution and COVID-19 pandemic will most likely exacerbate these changes and the need to understand skills and occupational demand.** As Indonesia phases out of this crisis, it will enter into a “new normal” characterized by a new way of producing and consuming goods and services. Global value chains and production processes will need to adjust to the lingering mitigation measures and to new measures needed to prepare us to deal with potential new pandemics. Moreover, low-skilled workers and youth will likely have more need to upskill and reskill to catch up with the upcoming changes.



**Developing the skills and capabilities of the Indonesian workforce are key drivers of economic growth, individual wellbeing and societal cohesion.** These could be achieved through education, long-life learning at the job, at school or at home, online or in a classroom, through formal training or ad-hoc. It is becoming widely agreed that the Fourth Industrial Revolution (4IR) and the COVID-19 crisis are carrying in the possibility of mass job displacement, undermining skills shortages, and a race between human and artificial intelligence that moves at different pace all over the world. The success of the next decade will hence hinge on successful leadership of governments and the private sector to maintain the pace of skill accumulation to satisfy the demand of the changing world of work.<sup>1</sup>

**Short-term occupational employment predictions are critical to monitor, in a reliable manner, the implications of the structural transformation on the labor market.** Short-term predictions of the occupational demand are important for policy makers and the general public investing in education and a critical element of the labor market information system (LMIS). They inform the design of policies and programs, allowing the skills system to adjust to the ongoing changes in the employment structure. They inform educational and training investment of students, workers, and employers, to maximize the returns of those investments. Over time, as the information system consolidates, they could contribute to producing long-term forecasting of implications of demographic changes in employment.

**This report, the Indonesia's Occupational Employment Outlook (IOEO) 2020, explains why an occupational demand study is needed, the methodology used to collect data, and it includes a broad analysis of occupational demand.** It provides short-term predictions of the changes in occupational employment demand stemming from the structural transformation. The predictions result from the analysis of ten indicators that capture both dynamic and static dimensions of occupational demand in Indonesia and are

based on data from a new pilot survey designed with this objective. The IOEO produces a score that classifies occupations into bright, dim, flagged, and stable based on their short-term prospects. The Occupational Prospects report conforms a statistical annex with a rich description of the demand of all occupations in sectors and regions covered by the sample.

**Indonesia's workforce is becoming more skilled, but signs of skills mismatches are emerging in this process.** Even though formal education levels have increased during the past decade, the education system is not developing the quality of learning and skills that the private sector in Indonesia demands and needs to be competitive with high-income countries. There are three clear signs of skills mismatches. First, employers report having difficulty hiring high-skilled workers.<sup>2</sup> Second, the unemployment rate for youth is rising. In 2019 it was three times that of the working-age population (18.9 percent vs. 5.3 percent) and the unemployment rate among vocational school graduates was almost twice (10.4 percent). Moreover, the unemployment rate is high among all senior and vocational high school graduates as well as among workers with a tertiary education; although these persons who have higher wage aspirations and can usually afford spending more time on job search.

**As a result of the structural transformation, workers reallocate to more productive, higher-wage sectors.** During the past decade, employment has shifted away from agriculture and toward manufacturing and services. In 2007 the agriculture sector employed 41 percent of the workforce. Between 2009 and 2019, the agricultural sector reduced the percentage of the total workforce it employed from 39.7 to 33 percent, shifting the workforce towards more productive sectors. Employment in the service sector increased by 17.8 percentage points (from 41.5 to 59.3 percent) and in the manufacturing sector by 9.5 percentage points (from 18.8 to 28.3 percent). Higher real median wages, which increased 63 percent between 2009 and 2019, is the usual

mechanism triggering these shifts toward more productive sectors in competitive labor markets.<sup>3</sup> In addition, similar shifts occur due to allocative efficiency gains. Workers move from less to more productive firms within a sector, who due to technological improvements pay better and may demand different skills.

**Most workers in Indonesia are employed in semi-skilled occupations, although this share is declining.**<sup>4</sup>

Indonesia continues to live a structural transformation moving away from agriculture.<sup>5</sup> Between 2007 and 2017, the percentage of semi-skilled jobs decreased from 74.5 percent to 69.1 percent. This reduction was driven, in part, by the adoption of new technologies that replaced occupations with a high content of routine manual tasks (World Bank and CMEA 2020). It also was the result of a deterioration in the quality of the education system for this segment of the workforce. At the same time, while the share of low-skilled jobs almost didn't change (from 18.1 percent

to 18.9 percent), the share of high-skilled jobs almost doubled (from 7.4 percent to 12.0 percent) (figure 1.1). Since only 12.1 percent of workers have a tertiary education, skills shortages are building up.

**In the future, investments in human capital will require more from the Indonesian population.**

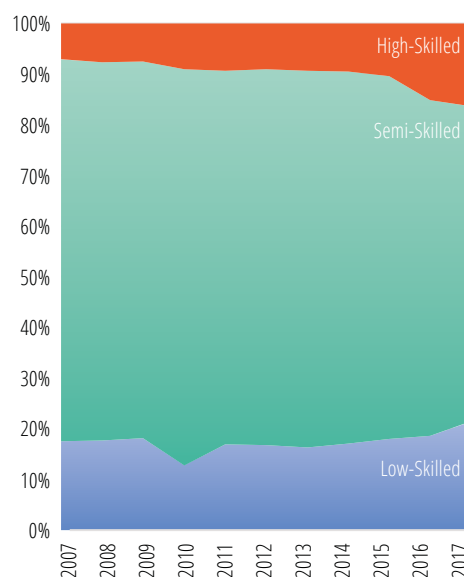
Achieving a high school diploma will not guarantee a productive working life. Workers will need to invest in skills demanded by the private sector and in training and retraining as the content of job tasks changes or as some occupations appear while others disappear. This means that employers and workers will need to pay close attention to the occupations in demand and to the skills needed to carry them out. Since employers are also investing too little in training,<sup>6</sup> the government of Indonesia (GoI) has a role to play in providing information and incentives to help employers and students to make sound investment decisions.

**Addressing mismatches—in particular, skills shortages—is critical, as**

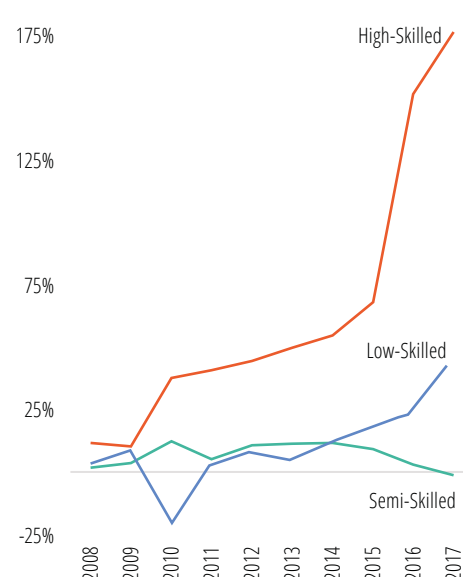
**Fig. 1.1**

In the last years, middle skilled jobs have started to be replaced with high skilled jobs

**A- Distribution of jobs by skill group, 2007-2017**



**B- Accumulated jobs growth by skill category since 2007**



**Source:** World Bank calculations based on National Labor Force Survey (Sakernas).

**Note:** For consistency, the graphs present statistics up to 2017 due to changes in the KBJI version in the datasets.

**mismatches negatively affect output, productivity, competitiveness, and innovation.** Mismatches of skills and qualifications could be of many types—horizontal or vertical.<sup>7</sup> Skills shortages are the most common mismatches in Indonesia. They have many causes, which are summarized in table 1.1.

**To ameliorate these mismatches, the GoI is committed to developing the labor market information needed to inform both public policies and private/individual decisions regarding skills investments.** Currently, labor market information is scarce, scattered across different government websites, and it is

not catered to private audiences. More broadly, the labor market information system has been assessed as a basic to intermediate one in comparison with more mature systems (World Bank, 2020). The GoI is undertaking several activities to revamp its labor market information system, giving priority to developing a comprehensive online platform. The new platform will include a wealth of information on labor market trends, occupations on demand, skills needed in those occupations, and specialized application programming interfaces for students and job seekers to understand where best to place their investments in human capital given

**Tab. 1.1**

### Skills mismatches and its causes

| MISMATCH  | CAUSES   |
|---|--|
| <b>Inadequate labor market information</b>                    | 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 and intermediation services, both public and private.  |
| <b>Low quantity and quality of education</b>                  | 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 that future generations will be better educated. However, Indonesia still suffers from poor-quality schooling. Based on scores from the Organisation for Economic Co-operation and Development’s (OECD’s) Programme for International Student Assessment (PISA), more than half of Indonesian students do not possess adequate skills to compete in the labor market. |
| <b>Limited opportunities for on-the-job training</b>          | According to the World Bank’s Labor Market Stakeholders’ Perception Survey 2016, only one-third of medium firms provide training to workers. Additionally, of the large firms that are required by Indonesian labor regulations to provide worker training, one-third fail to comply.  |
| <b>High labor mobility costs</b>                              | Recent evidence shows that higher housing prices and a rising minimum wage have made it harder for workers to find jobs after negative economic shocks.  |
| <b>Structural changes and rapid technological development</b> | The Indonesian economy is transitioning from an agriculture-based economy toward a more manufacturing-based and service-led economy. This transition, coupled with the quick adoption of new technology, might lead to skills imbalances during market adjustment.   |

Source: Taken from CMEA and World Bank 2020.

their aptitudes and the labor market prospects (see World Bank, 2020).

**A critical part of the efforts in developing the platform that caters labor market information to the general public is the collection, analysis, and dissemination of relevant data. However, GoI counts with limited data sources to carry out this task adequately.** The vast majority of the labor market information results from the analysis of the labor force survey and the economic census data. These sources are usually complemented

by ad-hoc surveys from think tanks, the research community and donors, but they are not institutionalized nor designed to inform the public. To address the data gaps, the GoI and the World Bank are piloting a series of data tools, adapted from best practices implemented in high-income countries (box 1.1). Mirroring this report, each of these pilots, their methodologies and main results are discussed in individual reports which aim to inform the GoI efforts in developing labor market intelligence dashboard planned for the new platform.

**Box 1.1**

### Indonesia's Skills Monitoring System

Indonesia's Occupational Employment Outlook is one of four current initiatives, supported by the World Bank, to collect relevant labor market data to be used by the labor market information platform planned by the Ministry of Manpower. These four tools are complementary techniques aimed at providing a thorough and comprehensive understanding of Indonesia's skills supply and demand. The following are the other three initiatives:

- **Indonesia's Critical Occupations List (COL)**, implemented in collaboration with the Coordinating Ministry of Economic Affairs (CMEA), draws on international best practices from Australia, Malaysia, and the United Kingdom. Internationally, COLs have been used to create targeted education and migration policies that address critical skills gaps. Indonesia's COL identifies a list of occupations that meet two criteria: (a) they are in short supply and (b) they are strategic for the Indonesian economy. The COL contains 35 occupations, which represent jobs from sectors such as manufacturing, telecommunication and information technology (IT), accommodation and food services, construction, information and communication technology (ICT), and other professional scientific services. The COL methodology relies on existing data sources and consultations with employers. Given its scope and cost, it can (and should) be repeated on a yearly basis.
- **Indonesia's Occupational Tasks and Skills (IndOTaSk)** is a pilot survey that looks at the skills needed to carry out occupations in high demand. The pilot instrument adjusts selected modules of the US O\*NET model—a database describing the skills, capacities and other workers requirements for almost a thousand occupations in the US—to Indonesia's context. IndOTaSk collects information on tasks performed and skills needed in 50 high-demand occupations, selected from the COL and Indonesia Occupational Employment Outlook.
- **Online Vacancies Outlook** collects online data on vacancies and skills demanded at the occupational level for up to 25 job boards and 100 employer sites in Indonesia. It allows real-time data analysis and provides a more granular description of the skills demanded for occupations with online postings. This tool is designed to complement, not replace, other initiatives, since more highly skilled, formal jobs are more likely to be found online.

All of these initiatives form a data toolbox to develop the labor market information dashboard and career guidance functions of the LMIS. They provide information for job seekers and employers about skills and occupations that are in demand. Moreover, these functions contribute to supporting workforce development and for helping policy makers to determine where investments should be made with regard to training programs and incentives for apprenticeship programs.

Finally, the World Bank is preparing another companion report with recommendations on the development of labor market information dashboard, that will combine the above mentioned and other. That report will provide encompassing lessons from the four pilot data collection efforts.

**This Technical Report describes the methodology used for developing the Occupational Employment and Vacancy Survey (OEVS) pilot and illustrates potential data applications.** It complements the Short-Term Occupational Prospects Report, which presents occupational statistics for all surveyed occupations at a more disaggregated level—the 4-digit Indonesian Standard Classification of Occupations (Klasifikasi Baku Jenis Pekerjaan Indonesia [KBJI]) and is intended for both end users and practitioners, as well as policy makers. The OEVS pilot was developed as a proof of concept to be scaled up by the government of Indonesia. It is designed as a hybrid instrument between an occupational employment and wage structure survey and a vacancy survey. The following section describes the details of the methodological approach implemented.

**The report introduces the Short-Term Occupational Prospects Score that is used to identify the occupations with better employment prospects.** The companion report discusses in detail 10 indicators of occupational demand at different levels of specificity (1-, 2-, 3-, and 4-digit levels). These indicators have been carefully selected to assess the current state of occupations in Indonesia and must be interpreted holistically.<sup>8</sup> A score synthesizes the information stemming from these var-

ious indicators and categorizes 4-digit level occupations into bright, dim, stable, and flagged. The score should be interpreted as the short-term projections of occupational demand. Under the assumption that the demand for occupations changes relatively slowly over time,<sup>9</sup> the indicators described below can be thought of as short-term projections.

**The most important message from the analysis is that occupations assessed to have bright employment prospects in Indonesia are not necessarily found in high-value-added sectors or require high level of qualifications.** While it is true that occupations with bright employment prospects pay higher wages, are most likely demanded in high-value-added services and manufacturing sectors, and by large firms, this is not the rule as it happens in other countries. Nine of the 42 occupations classified as bright in this report, are demanded by firms operating in low-value-added sectors, which tend to be small and informal. 18 of the 42 bright occupations have only minimal education requirements—even if they are demanded by firms in high-value-added sectors. This important result suggests that Indonesia still have a long way to go in terms of the structural transformation of the economy and its implications for the labor market. In this process, it will be fundamental to lift demand- and supply-side constraints simultaneously.

## 2. Methodology







## Occupational Demand Surveys are a Central Element of Labor Market Information Systems

**The OEVS is part of a proposed data toolbox that aims to monitor long-term trends in labor demand in a comprehensive yet granular manner.** More specifically, the OEVS provides data that are used to produce short-term occupational prospects scores that, over time, can feed long-term projections to capture demographic changes. It collects granular data on the stock and flow of employment in narrowly defined occupations, with a level of precision not available in other survey instruments. When scaled up, the data can help to answer a range of questions: What are the most common jobs in Indonesia? How much is the labor demand increasing across narrowly defined occupations? In which regions and sectors are occupations with bright prospects expanding and in which ones are occupations with dim prospects severely contracting?

**Countries invest in this type of occupational demand surveys because monitoring the demand for occupations is an essential part of the labor market information system (LMIS) and of workforce development policy.** Most countries

carry out data collection exercises like this on a regular basis. Some countries use traditional data sources (surveys, censuses, administrative data), and some complement these sources with real-time big data (online vacancy data). The answers to the above questions are therefore updated frequently. Once the data tools are established, several rounds of occupational data can be used to estimate medium- and long-term labor demand.

**The consumers of labor market information are multiple, comprising students, workers, firms, policy makers, and practitioners involved in career guidance and job counseling.** The data need to be analyzed and prepared so that they can be digested by each of these users. Usually this responsibility falls to the labor market observatory (LMO).<sup>10</sup> LMOs work with researchers, statisticians, psychologists, marketing specialists, and communicators to present the information in the most appropriate manner to that audience. Box 2.1 describes some of the experiences with LMOs around the world.

### Box 2.1

#### Examples of Labor Market Observatories around the World

Labor market observatories (LMOs) aggregate, analyze, and curate information on trends in the labor market to help potential and current students, job seekers, training providers, employers, and policy makers to make informed decisions related to skills development. They analyze and monitor trends in labor supply and demand to identify mismatches. To function properly, LMOs should have access to labor market data from diverse sources, collaborate with other agencies, have a sound statistical infrastructure, and respond to the demands of their users. The following are internationally recognized examples of LMOs:

**Mi Futuro** (Chile) collects information from education institutions on graduate outcomes and pairs it with data from tax and pension administrations to provide publicly available information on the incomes of graduates of professional and technical programs.

The **Sistema Nacional de Información de Educación Superior** (SNIES) and **Observatorio Laboral para la Educación** (OLE) (Colombia) provide information to help families to evaluate the quality and potential benefits of various courses of study. SNIES is a comprehensive information system on higher education, and OLE provides information on the characteristics of graduates and labor market outcomes (income and employability).

**Labor Market Information Portal (Australia)** contains up-to-date labor market data at the national, state, regional, and local levels to help people to understand their local labor market.

**Direction de l'animation de la recherche, des études et des statistiques (France)** analyzes labor market data and produces studies and statistics on the areas of work, employment, and vocational training.

**Occupational Employment Statistics (United States)**, a program of the US Department of Labor, produces employment and wage estimates annually for more than 800 occupations at the national, state, and metropolitan/nonmetropolitan areas. National estimates of occupations for specific industries are also available.

**Denmark Employment Statistics (Denmark)** produces labor market statistics and analysis using a wide variety of data sources (municipalities, job centers, business registries, social welfare, and immigration). Time series can be customized by, for example, gender, age, and region.

**Skills Panorama (European Centre for the Development of Vocational Training [CEDEFOP])** is an online tool offering data, information, and intelligence on the skills needed in countries, occupations, and sectors across the European Union member states. It pools several databases to monitor skills and jobs, including CEDEFOP's Skills Forecast, European Jobs Monitor, and Skills and Job Survey, the European Union's Labor Force Survey, and the OECD's Programme for the International Assessment of Adult Competencies and PISA, among others.

**Source:** Based on information from Rutkowski, de Paz, and Levine 2018; Sorensen and Mas 2016.

**In particular, policy makers use the data for designing and monitoring workforce development policies and programs.** At the highest level, the data are an input to the design of overall growth policy and efforts to address any constraints on the growth of labor supply and demand for priority economic sectors. The information can influence budgetary planning to make sure that the education system is ready to serve those education fields associated with the occupations that are in high demand. It can also inform the design of financial incentives for firms, students, and job seekers to invest in education and training in the areas that are in demand. At the working level, career guidance and job search counselors can use this information to provide sound advice to youth and job seekers on education and training decisions and job search efforts.

**Shifts in occupational demand can be measured through different types of data tools, each of them with strengths and weaknesses.** The most common type of survey used for this purpose

is an occupational employment and structure survey or a structural employment survey. These surveys seek to describe the occupational structure of firms, looking at narrowly defined occupations (usually at 4 digits of the occupational classification), and collect information on employment, wages, and education. They complement other firm and household surveys and are the main source of information for employment projections. Data tools should be assessed in a holistic manner, as they complement one another.

**Firm-level surveys are best suited to monitor occupational employment dynamics.** First, employers know well the occupations needed to produce a given output. Hence, they know the increases and decreases in employment that occurred in the recent past and have plans about changes in the near future. This information can be linked to firm characteristics to understand the underlying processes that could lead to those changes (see section 5 on the drivers of short-term occupational

prospects). For example, an occupation could be increasing due to the introduction of a new technology in a firm, or an occupation could be disappearing due to the firm's integration in a global value chain that leads to the replacement of part of the production process.

**In addition, firm surveys can be designed to cover the whole economy or key sectors.** Some countries like the United States collect firm data to make it representative of the whole economy; others like Singapore do it only for priority sectors. While it is always desirable to have data representative of the country, flexibility is important because these surveys can be costly to implement. They are long because they need to cover the occupational structure of the firm; they need to encompass a large sample to have enough statistical power to measure occupational demand accurately at the industry and local geographical level. Depending on the main objective of the survey, having sectoral surveys could be a reasonable compromise and could lead to different implementation arrangements. For example, in Singapore, the data collection of the sectoral occupational and skills demand surveys is the duty of the council responsible for the sectoral skills. In the United States, the Bureau of Labor Statistics (BLS) has this duty.

**The main disadvantage of firm surveys is that they might miss the informal economy.** Similar to other firm surveys, the sampling frame of occupational employment and wage structure surveys is drawn from economic censuses that might miss informal firms—that is, firms not officially registered to conduct business. The severity of this omission varies from country to country, depending on the level of informality and the coverage of the informal sector in the economic census. For example, Indonesia's economic census provides good coverage of non-agricultural formal and informal enterprises. The good news is that the severity of the bias can be measured by comparing the percentage of the workforce that is covered by this type of survey vis-à-vis the workforce as measured by population and labor force surveys.

**Occupational employment and wage surveys are usually complemented by other surveys.** These surveys include (a) vacancy surveys that capture short-term dynamics in employment and which are usually not disaggregated by occupations; (b) education requirement surveys that further explore the educational needs of occupations; (c) skills surveys that aim to measure not only the qualifications needed to complete a job in a certain occupation but also the skills content of the tasks embedded in it; (d) employer-employee surveys to further explore the links between the skills and productivity; and (e) longitudinal data for labor force and employer-employee surveys to explore transitions and career maps. Countries that collect these surveys at the national level usually have each of these specialized instruments. Other countries that collect data at the sectoral level develop hybrid surveys that cover many of the above dimensions in one survey instrument.

Appendix A discusses the best practices around the world of these types of surveys.

### Indonesia Occupational Employment and Vacancy Survey

**The OEVS was designed to track shifts in occupational demand, identify occupations that are major sources of employment, observe occupational growth or contraction and produce short-term predictions.** The design of the OEVS draws on the experiences of the OES and JOLTS in the United States. It is a mixture of a structure employment survey and a vacancy survey and has also drawn on the experience of similar hybrid surveys in Georgia and Mongolia. This survey is one of various instruments that are being piloted to test concepts and to develop a comprehensive data collection toolbox for Indonesia's workforce development planning.

**The OEVS collects information on firms' current employment and short-term demand changes at the occupational level.** Questions include firms' charac-

teristics (including sector at the 5-digit KBLI), current employment description (for example, type of contracts and employees), information on the stock of employment by occupation (including education level and wages), information on employment flows by occupation (including unopened vacancies, current opened vacancies, hiring needs and difficulty within the last year, employment growth and contraction within the last year, and planned employment growth and contraction within the next year), and firms' training practices (Appendix H contains the full questionnaire). Occupations are coded at the 4-digit level using 2014 KBJI.

**The OEVS is a representative sample of selected economic sub-groups in selected regions of Indonesia.** The economic sub-groups are spread among (a) selected high-value-added services; (b) low-value-added services strategic for Indonesia's growth; and (c) the manufacturing industry.<sup>11</sup> These sectors were selected because they are aligned with the priority sectors for Indonesian growth: the manufacturing sector is a creator of good jobs and tourism is a generator of a large share of jobs, even if low-skilled. Box 2.2 provides the details of the sampling frame, sample size, other data collection features.

## Box 2.2

### Features of the survey design and data collection

The sample frame was constructed using the 2016 Economic Census Listing Directory for the services group and the 2017 Medium and Large Manufacturing Survey Directory for the manufacturing group. The sample was designed to be representative at the subgroup level, with stratification according to economic activity (KBLI code), geographic coverage, and business scale (using the Statistics Indonesia [BPS] definition of micro, small, medium, and large enterprises).

The sampling parameter used to calculate the sample size was the anticipated proportion of the vacancy rate. It was hypothetically set at 5 percent, benchmarking other countries with available vacancy rates since Indonesia does not have a vacancy rate yet. It used a two-stage sampling method with a reliability level of 95% (), an anticipated response rate of 80 percent, and a margin of error of 2 percent.<sup>12</sup> In the first stage districts were selected according to multivariate probability proportional to size (MPPS); in the second stage companies were selected according to the target population through a systematic sampling method (see Table 2.1). The sample size was set high enough to be representative at the firm level with a relative standard error (RSE)<sup>13</sup> of about 18 percent for services firms and 20 percent for manufacturing firms. This provides a relatively precise estimate, expressed in percentage, of how likely the survey estimate is to deviate from the actual population. An estimate with a high RSE is subject to high sampling error and should be interpreted with caution. BPS usually publishes data with an RSE below 25 percent, but the cutoff percentage may be higher depending on how unique the variable of interest is. For surveying, say, very rare diseases, an RSE of up to, say, 40 percent may be used.<sup>14</sup>

Because the OEVS is a pilot developed based on assumptions on key variables never collected for Indonesia the standard error turned out to be higher than recommended for obtaining robust estimations of occupational employment and vacancies at the 4-digit KBJI (Appendix B contains the proportion of occupations that have indicators with high RSEs). To convey the scale of the pilot, the Indonesian OEVS can be compared with the OES run in the United States. The former covers at least 31 percent of the employment in the sampled subsectors, while the unweighted sum of employment in the latter is approximately 58 percent of total national employment.<sup>15</sup>

Therefore, in this pilot phase, the survey does not allow for a full accounting of all occupations, but it does reveal trends affecting the most prominent occupations for the included subsectors.<sup>16</sup> The main weakness of the smaller sample size is that the analysis cannot be carried out at local geographic units.

The OEVS successfully interviewed 3,839 firms. The survey was carried out between December 2019 and March 2020.<sup>17</sup> Interviewers recorded responses on laptops using CAPI technology. Thus, data were entered directly using a predesigned data entry program. Consistent with sample design, most surveyed firms were located in Java: the most relevant provinces were DKI Jakarta, West Java, and East Java (with 30.6 percent, 23.3 percent, and 23.4 percent of firms located there, respectively) and, to a lesser extent, Central Java (with 11.8 percent of firms located there).

**Tab. 2.1**

### OEVS Sampling Frame and Coverage

| Group                     | Geographic and firm-scale coverage  | Subgroup                                 | Firms surveyed | Survey target | % Covered    |
|---------------------------|---|--|----------------|---------------|--------------|
| High-value-added services | Java and Bali<br>Medium and large   | Information and communication technology | 233            | 250           | 93.2         |
|                           |   | Finance and business                     | 631            | 630           | 100.1        |
|                           |   | Transport and logistics                  | 390            | 400           | 97.5         |
|                           |   | Construction                             | 205            | 220           | 93.2         |
|                           |   | <b>Group total</b>                       | <b>1,459</b>   | <b>1,500</b>  | <b>97.3</b>  |
| Low-value-added services  | Java and Bali<br>All firms scales   | Creative economy                         | 1,022          | 1,000         | 102.2        |
|                           |   | Tourism                                  | 518            | 500           | 103.6        |
|                           |   | <b>Group total</b>                       | <b>1,540</b>   | <b>1,500</b>  | <b>102.7</b> |
| Manufacturing industry    | North Sumatra, West Java, Banten, Central Java, East Java, and South Sulawesi<br>Medium and large | Food and beverage                        | 222            | 245           | 90.6         |
|                           |   | Textiles and products of textiles        | 263            | 265           | 99.2         |
|                           |   | Chemical                                 | 200            | 220           | 90.9         |
|                           |   | Electronic                               | 57             | 120           | 47.5         |
|                           |   | Automotive                               | 98             | 150           | 65.3         |
| <b>Group total</b>        | <b>840</b>  | <b>1,000</b>                             | <b>84.0</b>    |               |              |
| <b>Total</b>              |   |  | <b>3,839</b>   | <b>4,000</b>  | <b>96.0</b>  |

Source: OEVS data.

The consumers of labor market information are multiple, comprising **students, workers, firms, policy makers, and practitioners** involved in career guidance and job counseling.



### 3. Firms and Employment Panorama



**Because the OEVS is a pilot survey, this section describes the characteristics of firms and employment, with the objective of validating the design of the survey sampling and the messages coming up from other publications.** This section quickly contrasts the OEVS results with other nationally representative surveys and finds overall consistency.<sup>18</sup> This is, nevertheless, not a one-to-one comparison, as the OEVS pilot does not cover the whole economy. In a few instances, this could be a source of concern, and these instances are noted. For a more detailed analysis from these alternative data sources, see World Bank (forthcoming).

**More important, the pilot survey provides information for measuring labor turnover and other labor market indicators never collected before.** Measuring turnover is an important dimension, as it indicates a fraction of the workers in need of job search support. Other indicators relate to the variance in the type of skills or occupations of firms. Further details of the workers characteristics can be found in Appendix C.



[Redacted]

[Redacted]

[Redacted]

## Firms Panorama

**The majority of firms are micro enterprises dedicated to low-value-added services, but they are not the major generators of jobs, let alone high-productivity jobs.**<sup>19</sup> 90.4 percent of interviewed firms are micro however, they employ just 37.4 percent of all workers in the sample. These results are consistent with—but starker than—those of the 2016 economic census.<sup>20</sup> Analysis from manufacturing surveys reveals that micro firms in manufacturing are low productivity (contributing only 6.2 percent to total value added), do not grow (only 4.1 percent and 0.4 percent become small and medium firms, respectively), and employ less than a quarter of all Indonesian workers (23.0 percent) (World Bank, forthcoming).

**Conversely, a few high-value-added services and manufacturing firms generate a large number of jobs.** Firms in these two economic groups constitute a small proportion of all firms (4.8 percent and 0.3 percent, respectively), but they employ a significant number of workers (24.2 percent and 15.3 percent, respectively). These firms tend to be older—in particular manufacturing ones, averaging 40 years since initiation of activities—and structured as limited liability companies, a sign of formality and associated to be more likely to comply with labor regulations and provide quality jobs.

## Employment Panorama

**Where you work matters more than what you do or what your training is.** In Indonesia, as shown in other studies, the size of the firm and the activity of the firm are more important determinants of wages than the education attainment or the occupation chosen.<sup>21</sup> A plant operator with less than secondary education working in a large manufacturing firm is likely to earn as much—or even more—than a college graduate working in a small low-value-added services firm. Unfortunately, there is a massive variation on wages and other job features across firm characteristics.

**While most workers in the sample are low educated who hold full-time jobs, there is some variation across firms in these characteristics.** Most workers (95.3%) are full-time, and under direct payroll. A higher proportion of part-time workers is observed in wholesale firms (11.3%). Women are in general underrepresented, being 41.3 percent of all employees. Most jobs, in particular those in smaller firms, have quite low educational requirements. Almost two-thirds of jobs in low-value-added services have no educational requirement and an additional 16.7 percent require only low secondary school. Over two-thirds of jobs are semi-skilled ones and Service and Sales Workers account for almost a third of all workers (29.6%).

**Wages increase with the scale of the firm and higher productivity firms pay higher wages.** The breakdown of median wage by firm size and occupation shows that larger firms pay better wages across all occupations. As expected, with the exception of micro firms, high-skilled occupations—like managers, professionals, technicians, and associate professionals—are better paid than low-skilled ones, consistent with positive rewards to investments in human capital and alignment of wages and productivity. Firm size is an important determinant of wages: a high-skilled worker employed in a low-productivity micro firm is likely to earn less than a low-skilled worker in a large firm. The median wage for firms in low-value-added services, irrespective of the sector, is lower than that of high-value-added services and manufacturing firms.

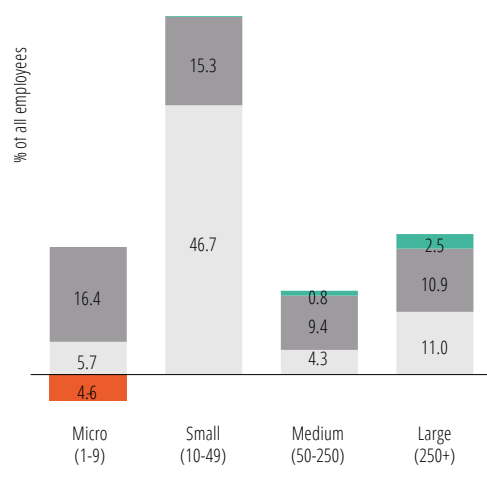
## Job Creation and Destruction

**Jobs at medium and large firms and at very young and very old firms are likely to have better prospects. These firms are more likely to increase total employment given their characteristics.** While job turnover rate, net job creation and net job destruction is also highly associated to the economic activity or the nature of the work, firm size seems to be a higher order of importance factor. The rest of the section explores the variation in these

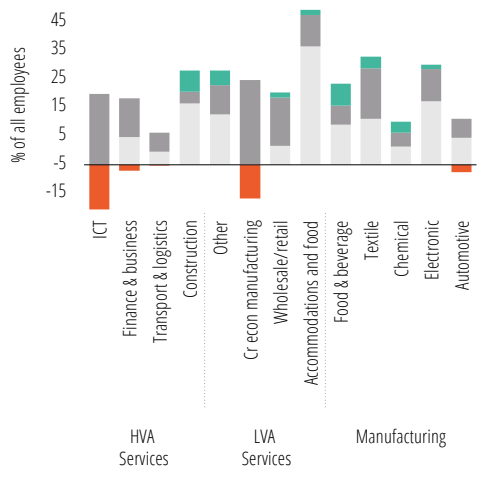


**Fig. 3.1** Larger firms create jobs while micro firms destroy them

**a. Job creation or destruction, by firm size**



**b. Job creation or destruction, by firm sector**



■ Job creation  
■ Employee replacement due to voluntary retirements  
■ Employee replacement (other reasons)  
■ Job destruction

**Source:** Based on OEVS data.  
**Note:** HVA = high-value-added. LVA = low-value-added.

indicators across the characteristics of firms. Last year the net job destruction was of 1.1 percent.<sup>22</sup> Interesting patterns arise by examining hires and terminations across firm characteristics (figure 3.1.a).<sup>23</sup> Micro firms are more likely to destroy jobs (-4.6 percent), while small, medium, and large firms are more likely to create them (0.1 percent, 0.8 percent, and 2.5 percent, respectively). Job destruction in micro firms has happened in creative economy manufacturing,<sup>24</sup> ICT, and finance and business firms. Small firms have a stable number of workers but high turnover: they replace 62 percent of all employees on average each year. This is mostly among accommodation and food-related firms, which tend to be highly seasonal. Larger, formal firms are creating more jobs. Most job destruction is observed in firms that have between 6 and 20 years since its opening of activities. Job turnover is also higher among middle-aged firms (figure 3.2.a).

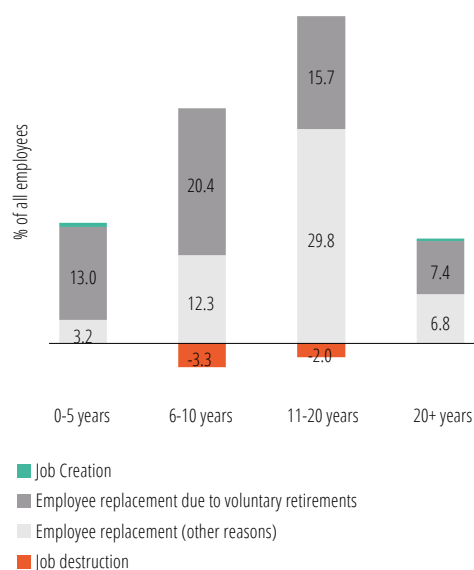
**Manufacturing firms in the textile and food and beverage sectors also are creating more new jobs.** The net job creation rate is 3.5 percent and 6.6 percent, respectively. This is consistent with the top sectors in 2013–14 in terms of net job creation, which were in labor-intensive and low-technology ones (World Bank, forthcoming).<sup>25</sup> Within manufacturing, OEVS firms in chemical and electronic sectors are also creating jobs, but they absorb fewer workers (figure 3.1.b). Job creation is also happening in low-value-added services: firms in wholesale and retail trade and in accommodations and food services are creating jobs (1.6 percent and 1.4 percent, respectively). These are positive signs, since a recent analysis of Indonesian jobs found that the manufacturing sector and services (especially in wholesale and retail trade, restaurants, and hotels) were one of the primary contributors to the growth of middle-class jobs during the last decade (World Bank, forthcoming).

**Fig. 3.2**

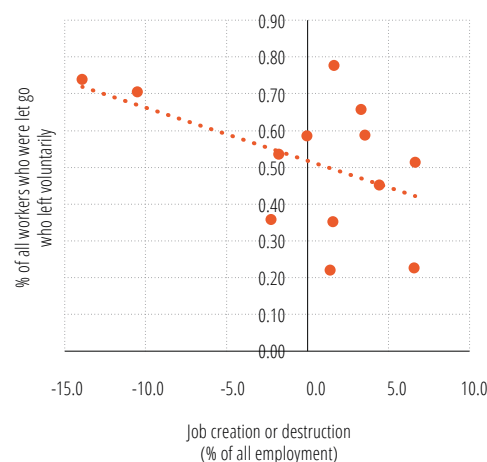
Job creation happens in either new or very old firms,

and workers seem to be willingly separating when higher job destruction is observed

**a. Job creation or destruction, by firm age**



**b. Correlation between job change and share of workers let go who did so voluntarily**



Source: Based on OEVS data.



-4.6 %

**micro firms**

are more likely to destroy jobs

while

0.1 %

**small firms**

0.8 %

**medium firms**

are more likely to create them

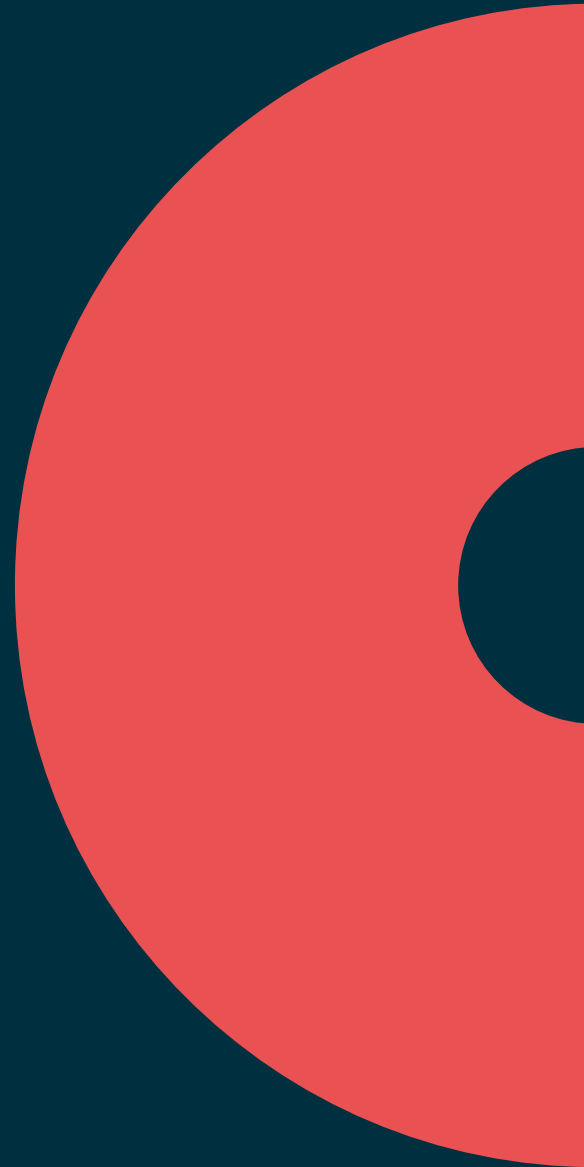
2.5 %

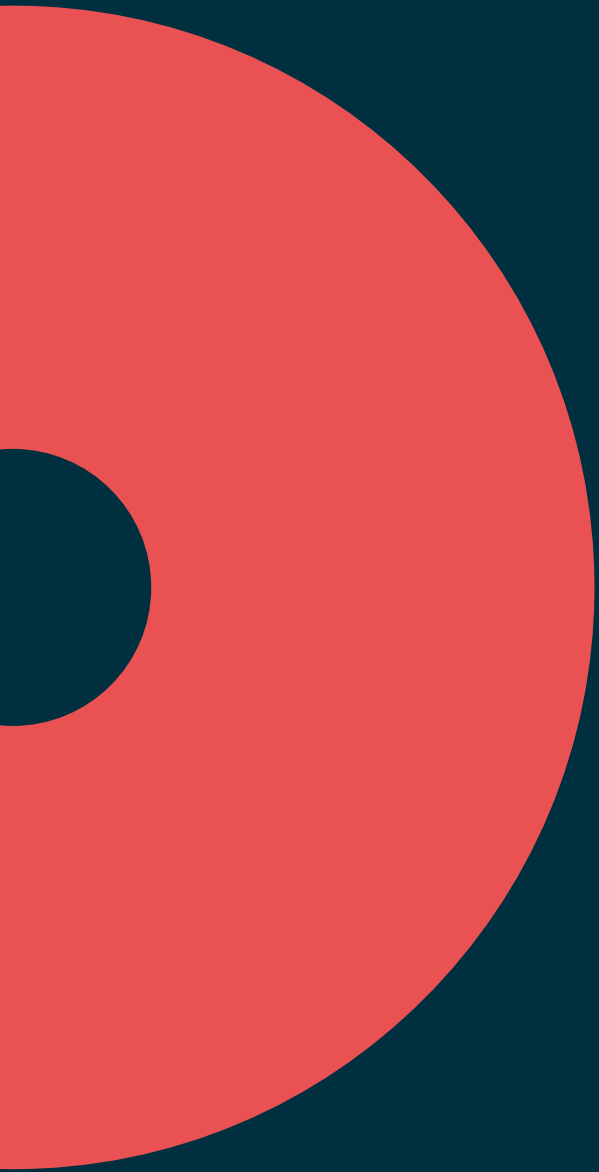
**large firms**

## 4. Short-Term Occupational Dynamics

This section identifies occupations that have good prospects in the short run by analyzing a complementary set of indicators at a very disaggregated level (4-digit KBJI). Several indicators need to be considered in a holistic manner to assess the prospects of an occupation. These indicators can be grouped as follows: (a) *occupations today*, indicators capturing the current level of employment; (b) *short-term dynamics*, indicators capturing employment creation and destruction within the last year; (c) *job opportunities*, indicators capturing current and imminent demand of employers; and (d) *skills shortages*, indicators capturing occupations for which there is a lack of workers with appropriate skills.

Each of these sets of indicators provides unique complementary information to shed light on the short-term prospects of occupations.<sup>26</sup> Thus, after describing each set of indicators, the information is synthesized into a single score that categorizes occupations into bright, stable, dim, and flagged. A more in-depth description of bright occupations follows, because these occupations should be the focus of workforce development policies.





## Occupations Today

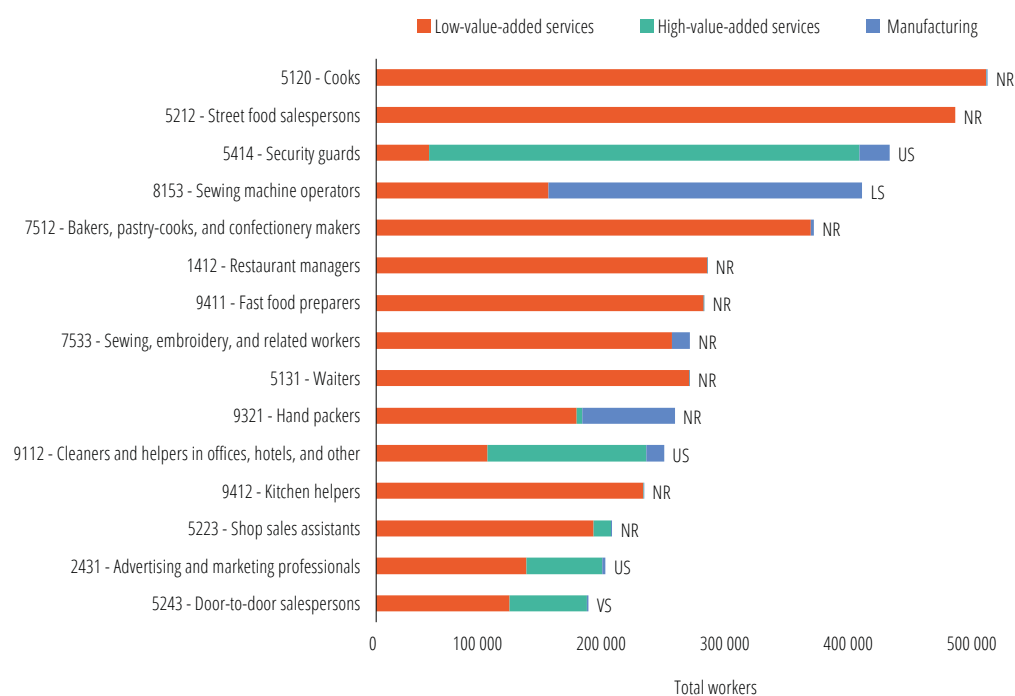
**Total demand—defined as the volume of workers today plus available vacancies—is an important indicator for understanding which occupations have good employment prospects.**<sup>27</sup> Identifying these occupations is relevant because slight changes in their demand will affect many workers. Total current demand is a stock, not a flow, indicator. While it does not provide information about how the occupation will be demanded in the future, it constitutes the baseline for the occupational analysis and should be taken into consideration. OEVS is the first survey that attempts to estimate total demand at higher-digit occupational level.

**Consistent with Indonesia's workforce, the detailed occupational analysis shows that the majority of employment**

**is concentrated in low-skilled occupations in low-value-added services.** Figure 4.1 shows the top 15 occupations with the highest volume of employment. The bars are colored, showing the distribution of employment according to economic group (with the caveat that only selected subgroups are in the sample), and the label at the end of the bar indicates the most common minimum level of education that employers demand for that occupation. Half of these occupations are food-related activities. More specifically, a large number of workers are cooks (KBJI 5120) and street food salespersons (KBJI 5212). This is consistent with OEVS firms' characteristics and levels of informality: firms in the accommodation and food sectors are massively informal and hire almost 30 percent of all workers. Most firms hiring these occupations do not require a minimum level of education.

**Fig. 4.1**

Top 15 Occupations with the Highest Demand (Employment Volume)



**Bar labels:** Education requirements

|                            |    |                    |     |
|----------------------------|----|--------------------|-----|
| No educational requirement | NR | Vocational School  | VS  |
| Lower-secondary school     | LS | Master             | M   |
| Upper-secondary school     | US | Ph.D. or Doctorate | PhD |

**Source:** Based on OEVS data.

**Note:** Bar labels indicate the most common minimum educational requirement.



**Very few of the top 15 occupations are associated with high-value-added firms, confirming messages from other reports that Indonesia still needs to industrialize and professionalize.** In higher-productivity firms, the most demanded occupations are security guards (KBJI 5414), hired at high-value-added services firms, and sewing machine operators (KBJI 8153), hired at manufacturing firms. Both occupations require at least some level of secondary education.

### Short-Term Dynamics

**Because the demand for occupations changes relatively slowly over time, the observed changes in the recent past can be used to extrapolate the trend into the near future.**<sup>28</sup> Short-term dynamics tell how sizable job creation/destruction in an occupation within the last year was.<sup>29</sup> Occupations with good short-term dynamics are those that employers increasingly demanded within the last year, while those that were not demanded or that suffered a decline in demand are said to have poor short-term dynamics. It is assumed that the dynamics observed during the last 12 months will prevail in the coming 12 to 24 months.

**Short-term dynamics can be measured through two indicators:** net change in employment levels (in absolute terms)<sup>30</sup> and rate of employment growth (relative to the level of employment) within the last year.<sup>31</sup> Both indicators are relevant and complementary. **Net change in employment** helps to identify occupations in which the highest number of jobs were created or destroyed within the last year, signaling occupations in which a large number of workers found or lost employment (either voluntarily or not). The **net percentage growth rate**, instead, signals the pace at which the change happens (quickly or slowly). Occupations with high growth rates need to be monitored closely, especially to see whether the trends are maintained and generalized in the labor market in the future.

**The occupations that require more attention from policy makers are those with significant changes for both indicators.** Such changes pose a challenge to the education system and to employers because they mean that a large number of persons will need to be trained in a short amount of time. If the education system cannot respond quickly, firms' productivity and economic growth could suffer. However, this seldom happens, as the changes tend to occur gradually, giving the education system time to adapt and absorb signals from the labor market.

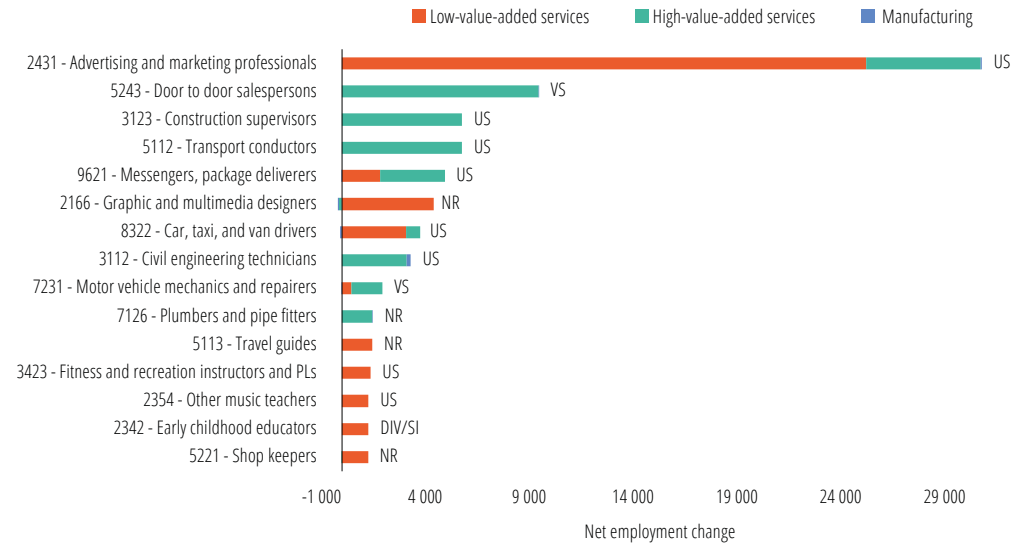
**Low-value-added firms are creating the highest number of jobs in absolute terms, while high-value-added firms are growing quickly.** Figure 4.2 shows the top 15 occupations in terms of the number of new jobs, while figure 4.3 shows the top 15 occupations in terms of growth.

**Only three occupations are in the top 15 for both indicators of good short-term dynamics.** Advertising and marketing professionals (KBJI 2431), which is one of the largest occupations today, and graphic and multimedia designers (KBJI 2166) experienced a large increase in employment in both absolute terms (30,797 and 4,219 new jobs, respectively) and relative to the baseline (20.6 percent and 34.4 percent growth, respectively). Low-value-added services firms generate most of these jobs. Civil engineer technicians (KBJI 3112) also experienced a large increase in both absolute and percentage change (3,306 jobs and 39.8 percent growth). High-value-added firms and, to a lesser extent, manufacturing firms create these types of jobs.

**Equally important is to examine the occupations that are fading away.** Policy makers will need to shift resources away from these occupations (figure 4.4). Some education institutions and programs will need to close or adjust. Many workers currently employed in these occupations will need to find jobs in occupations that are in demand. Sometimes this occupational shift will only require upskilling, if related higher-skilled occupations are in demand.

**Fig. 4.2**

### Top 15 Occupations with Highest Net Employment Creation



**Bar labels:** Education requirements

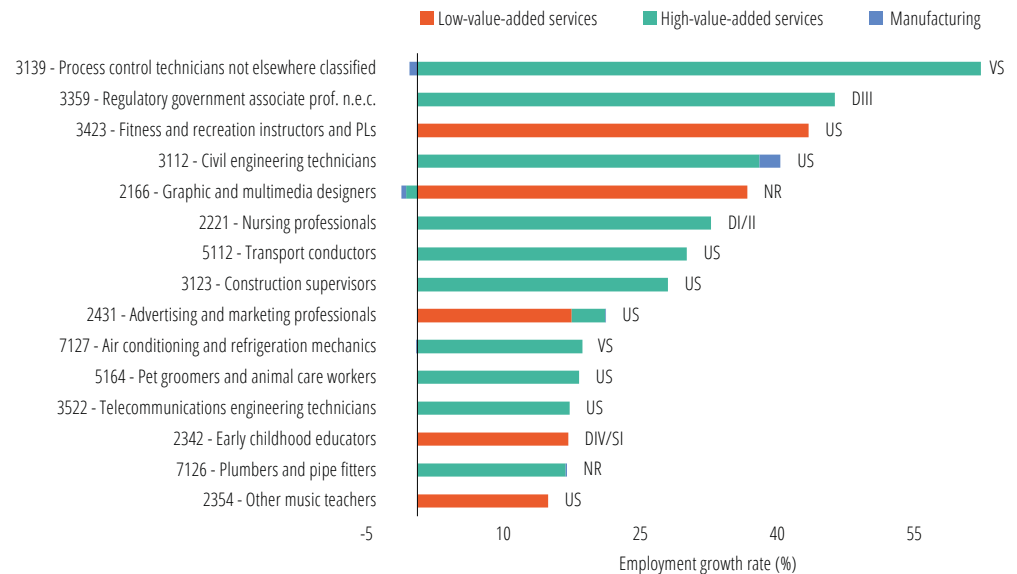
|                            |    |                    |     |
|----------------------------|----|--------------------|-----|
| No educational requirement | NR | Vocational school  | VS  |
| Lower-secondary school     | LS | Master             | M   |
| Upper-secondary school     | US | Ph.D. or Doctorate | PhD |

**Source:** Based on OEVS data.

**Note:** Bar labels indicate the most common minimum educational requirement.

**Fig. 4.3**

### Top 15 Occupations with the Fastest Growth



**Bar labels:** Education requirements

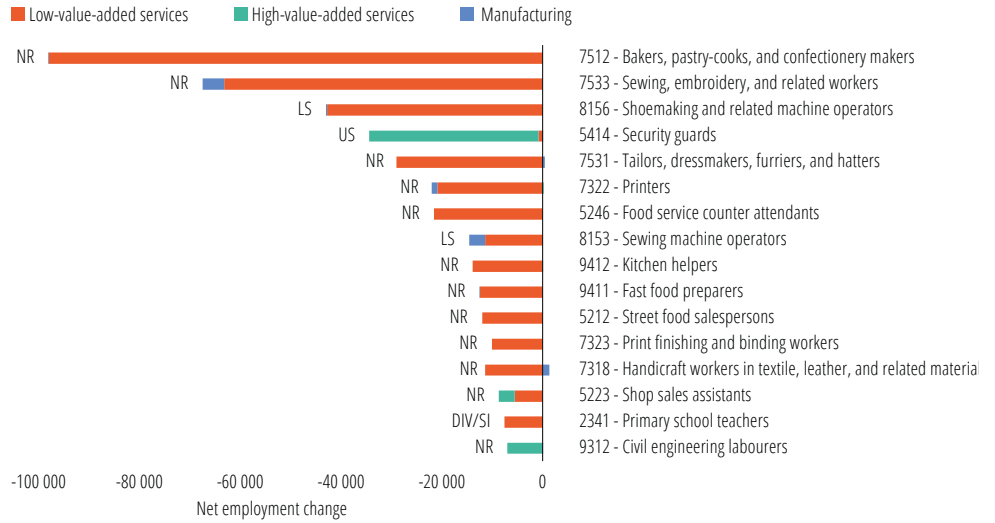
|                            |    |                         |        |
|----------------------------|----|-------------------------|--------|
| No educational requirement | NR | Diploma I/II            | DI/II  |
| Lower-secondary school     | LS | Diploma III             | DIII   |
| Upper-secondary school     | US | Diploma IV and Strata I | DIV/SI |
| Vocational school          | VS | Master                  | M      |
|                            |    | Ph.D. or Doctorate      | PhD    |

**Source:** Based on OEVS data.

**Note:** Bar labels indicate the most common minimum educational requirement.

**Fig. 4.4**

Top 15 Occupations with the Highest Net Employment Destruction



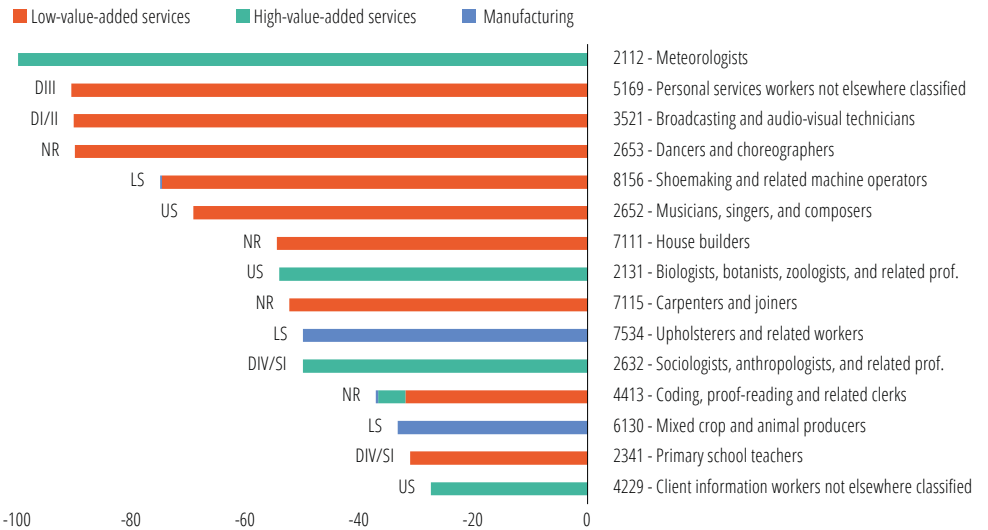
**Bar labels:** Education requirements

|                            |    |                         |        |
|----------------------------|----|-------------------------|--------|
| No educational requirement | NR | Diploma I/II            | DI/II  |
| Lower-secondary school     | LS | Diploma III             | DIII   |
| Upper-secondary school     | US | Diploma IV and Strata I | DIV/SI |
| Vocational school          | VS | Master                  | M      |
|                            |    | Ph.D. or Doctorate      | PhD    |

**Source:** Based on OEVS data.  
**Note:** Bar labels indicate the most common minimum educational requirement.

**Fig. 4.5**

Top 15 Occupations with the Fastest Job Destruction



**Bar labels:** Education requirements

|                            |    |                         |        |
|----------------------------|----|-------------------------|--------|
| No educational requirement | NR | Diploma I/II            | DI/II  |
| Lower-secondary school     | LS | Diploma III             | DIII   |
| Upper-secondary school     | US | Diploma IV and Strata I | DIV/SI |
| Vocational school          | VS | Master                  | M      |
|                            |    | Ph.D. or Doctorate      | PhD    |

**Source:** Based on OEVS data.  
**Note:** Bar labels indicate the most common minimum educational requirement.

**Several occupations with poor short-term dynamics are in textile-related occupations at low-value-added services firms.** Occupations such as sewing machine operators (KBJI 8153), sewing, embroidery, and related workers (KBJI 7533), shoemaking and related machine operators (KBJI 8156), tailors, dressmakers, furriers, and haters (KBJI 7531), and handicraft workers in textiles, leather, and related materials (KBJI 7318) have the highest job destruction in absolute terms. This is consistent with the overall job destruction observed at creative economy manufacturing firms. However, these poor short-term dynamics are present in the low-value-added group, while jobs in several of these occupations are being created in the manufacturing group, indicating signs of possible structural transformation from low-productivity to higher-productivity firms (which still require these occupations, but not as many workers).

**The poor short-term dynamics of other occupations could be the result of technological changes or lower demand for products.** Printers (KBJI 7322) and print finishing and binding workers (KBJI 7323) are among the top declining occupations in absolute terms. These occupations might be suffering a decay in demand due to changes in consumption patterns (for example, people switching from print to digital materials), and those same changes may also be related to the good short-term dynamics observed for graphic and multimedia designers (KBJI 2166).

## Job Opportunities

**Occupations have promising job opportunities if the number of job openings is high, the number of firms hiring workers is high, and the rate of turnover is low.** If many vacancies are posted, then it is more likely for a job seeker to find a match. However, total vacancies alone are not sufficient for measuring sustained opportunities because openings may be related to seasonal or short-term work. Thus, the continuous availability of vacan-

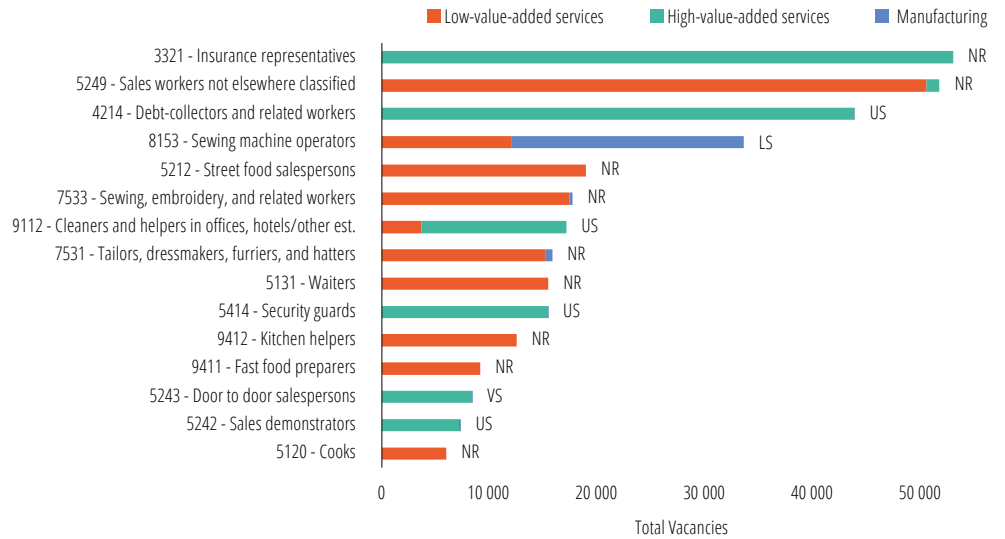
cies is important as well. Vacancies are more likely to be available year-round and at multiple locations if multiple firms are hiring than if only a few firms are. Also, the chances of getting a job improve if more firms are hiring than if only a few are. In addition, job turnover needs to be considered when measuring job opportunities because occupations with high churning tend to have more firms hiring and more opened vacancies but not necessarily promising job opportunities. Thus, three indicators are used to measure good job opportunities: total vacancies (number),<sup>32</sup> total firms that tried to hire within the last year (number),<sup>33</sup> and turnover rate (percent).<sup>34</sup> Figures 4.6 through 4.8 present these indicators.

**Some occupations that have good short-term dynamics also have good job opportunities.** For example, door-to-door salesperson (KBJI 5243) has good short-term dynamics and shows positive signs for all indicators measuring job opportunities: it is among the top occupations with the most opened vacancies, it is found among the firms that are hiring the most (ranks 18 out of 353), and it has a relatively low turnover rate (ranks 82 out of 353).

**But in other cases, data show seemingly contradictory trends, calling for further analysis.** For example, three of the occupations for textile production have poor short-term dynamics and are among the top occupations with the highest number of vacancies and firms hiring (KBJI 8153, 7533, and 7531). At first glance, this seems contradictory. However, these trends could be the result of two underlying forces. First, they can be related to seasonality, since all three occupations have relatively high turnover rates (they fall within the top 60 out of 352 occupations). Second, for the particular case of sewing machine operators (KBJI 8153), opened vacancies are predominantly in manufacturing firms, while destruction is in creative industry manufacturing firms, another sign of possible structural transformation.

**Fig. 4.6**

Top 15 Occupations with the Highest Number of Vacancies



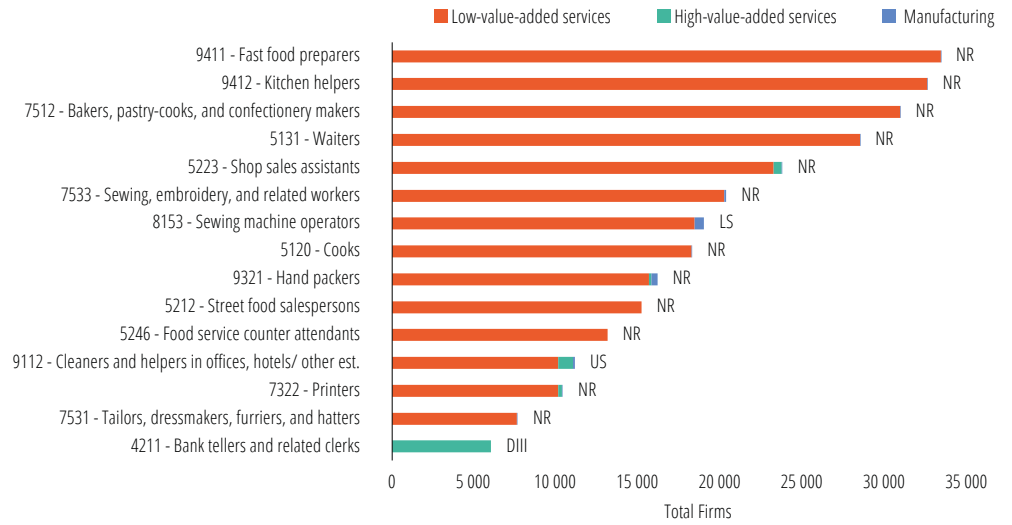
**Bar labels:** Education requirements

|                            |    |                         |        |
|----------------------------|----|-------------------------|--------|
| No educational requirement | NR | Diploma I/II            | DI/II  |
| Lower-secondary school     | LS | Diploma III             | DIII   |
| Upper-secondary school     | US | Diploma IV and Strata I | DIV/SI |
| Vocational school          | VS | Master                  | M      |
|                            |    | Ph.D. or Doctorate      | PhD    |

**Source:** Based on OEVS data.  
**Note:** Bar labels indicate the most common minimum educational requirement.

**Fig. 4.7**

Top 15 Occupations with the Highest Number of Firms That Tried to Hire

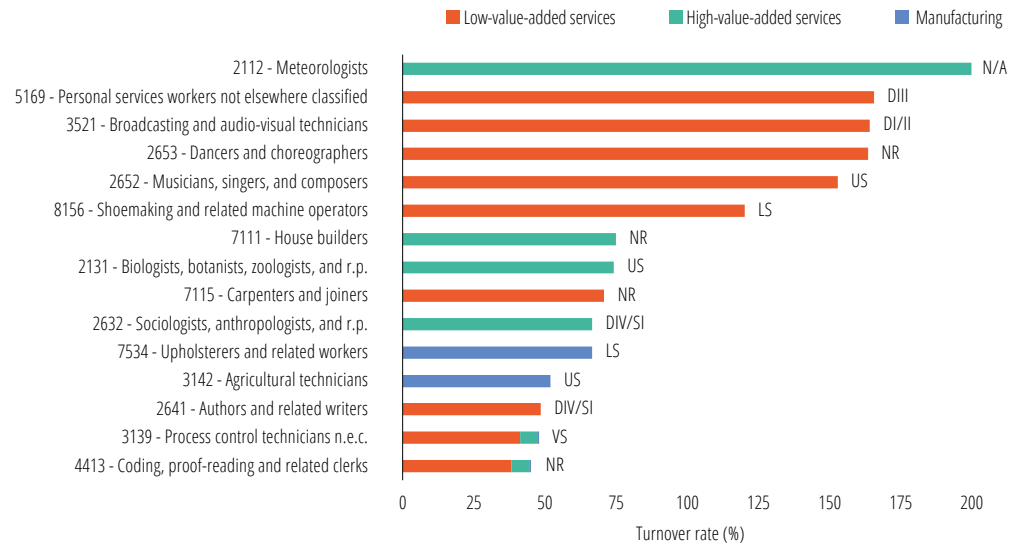


**Bar labels:** Education requirements

|                            |    |                         |        |
|----------------------------|----|-------------------------|--------|
| No educational requirement | NR | Diploma I/II            | DI/II  |
| Lower-secondary school     | LS | Diploma III             | DIII   |
| Upper-secondary school     | US | Diploma IV and Strata I | DIV/SI |
| Vocational school          | VS | Master                  | M      |
|                            |    | Ph.D. or Doctorate      | PhD    |

**Source:** Based on OEVS data.  
**Note:** Bar labels indicate the most common minimum educational requirement.

Top 15 Occupations with the Highest Rate of Turnover



**Bar labels:** Education requirements

|                            |    |                         |        |
|----------------------------|----|-------------------------|--------|
| No educational requirement | NR | Diploma I/II            | DI/II  |
| Lower-secondary school     | LS | Diploma III             | DIII   |
| Upper-secondary school     | US | Diploma IV and Strata I | DIV/SI |
| Vocational school          | VS | Master                  | M      |
|                            |    | Ph.D. or Doctorate      | PhD    |

Source: Based on OEVS data.

Note: Bar labels indicate the most common minimum educational requirement.

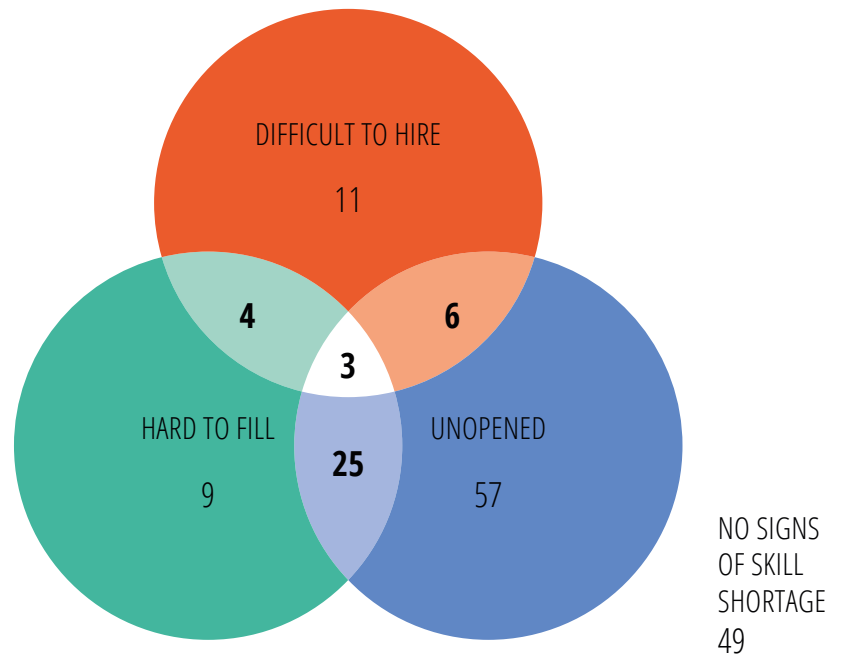
### Skills Shortages

**Skills shortages arise when the supply of and demand for an occupation do not grow—or contract—in sync.**

However, identifying skills shortages is crucial for designing interventions that address these misalignments.<sup>35</sup> Although there is no single indicator to measure skills shortages, the following ones are signs of shortages: (a) hard-to-fill occupations,<sup>36</sup> (b) difficult-to-hire occupations due to lack of skills,<sup>37</sup> and (c) occupations with unopened vacancies because firms think they will not find workers with the needed skills.<sup>38</sup> While the last two measures explicitly ask firms whether they think there are skills shortages, the first one is an objective measure. Specifically, if a vacancy has been opened for a long time and there is a supply of unemployed workers with those skills, it can be inferred that these workers do not possess the skills required for the position. Figure 4.9 shows all possible combinations of signs of a skills shortage for the

353 surveyed occupations. Appendix D shows the list of 38 occupations with more than one sign of skills shortage (intersections). For example, authors and related writers (KBJI 2641), journalists (KBJI 2642), and lawyers (KBJI 2611) show all three signs of skills shortages.

**Some occupations with good short-term dynamics and relatively good job opportunities also show signs of skills shortages.** These occupations need the most attention from policy makers and individuals, as they indicate potentially good payoffs and various opportunities to take advantage of them. For example, advertising and marketing professionals (KBJI 2431) and graphic and multimedia designers (KBJI 2166) appear in the top list for both indicators of short-term dynamics, have relatively good job opportunities (rank top 16 and 111 for vacancies, rank 23 and 21 for firms hiring, and have moderate turnover rates), and they show more than one sign of skills shortages.



Source: Based on OEVS data.

**Instead, other occupations with poor short-term dynamics also have good job opportunities and multiple signs of skills shortages.** For example, three of them are in textile-related occupations: sewing machine operators (KBJI 8153), sewing, embroidery, and related workers (KBJI 7533), and tailors, dress-makers, furriers, and hatters (KBJI 7531). These apparently contradictory results may be related to changes in the demand for skills within the occupation or to structural transformation of the market. For example, the task content of the occupation might be shifting, requiring skills different from what current workers have acquired.

### Short-Term Occupational Prospects

**No single indicator can describe the occupational prospects for many years to come.** However, if all of the indicators are examined together, it is possible to assess whether 4-digit occupations are more likely to have good prospects in the next couple of years.

This assessment relies on the assumption that the structural transformation is gradual and that the demand for skills changes at a relatively slow pace. For this purpose, the short-term occupational prospects score categorizes occupations into four groups—bright, steady state, dim, and flagged—according to the 10 indicators described. Figure 4.10 is a graphical representation of the score, and figure 4.11 shows what type of occupations fall into each of the four groups.<sup>39</sup>

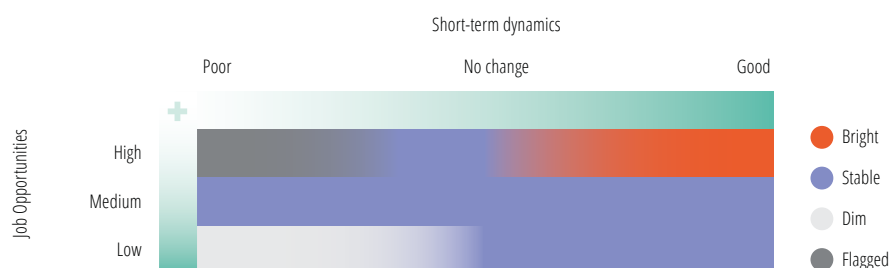
**Future versions of the short-term occupational prospects score should include wage information.** Wages are informative of changes in demand. In competitive markets, when employers compete for scarce occupations, they offer higher wages. Hence, occupations with bright prospects are likely to exhibit increasing wages. Workers that are losing their jobs and face difficulties in finding new opportunities will be willing to accept lower wages. Occupations with dim prospects are likely to see decreasing or stagnant

wages. The OEVS collected wage information by 4-digit KBJI occupations; however, the RSEs of this variable were too large to use it with confidence and was left out of score.

**The categorization of the short-term occupational prospects for all 353 occupations surveyed at the 4-digit KBJI level is included in the companion Short-Term Occupational Prospects Report.** For the specific thresholds used to construct the score, see appendix C of that report.

**Fig. 4.10**

### The Short-Term Occupational Prospects Score



The occupational score for faded areas depends on the occupation’s level of employment and whether there are signs of a skills shortage.

**Fig. 4.11**

### Short-Term Occupational Prospects



**Bright**

These are occupations with high demand for employment for which firms are expressing interest in hiring workers and have either high growth of employment with low turnover or skills shortages that are limiting their occupational growth.



**Stable**

These are occupations that have normal trends of employment growth or some skills shortages but that do not have high enough demand to be considered bright.



**Dim**

These are occupations that either have no demand or are shrinking.



**Flagged**

These are occupations for which there is no sufficient data with which to make an accurate assessment and that, therefore, should be monitored. They may include occupations that have seasonal employment, occupations that are undergoing structural changes, or occupations for which the data are inconsistent and a larger sample is needed with which to make an accurate assessment.



## A Closer Look at Bright Occupations

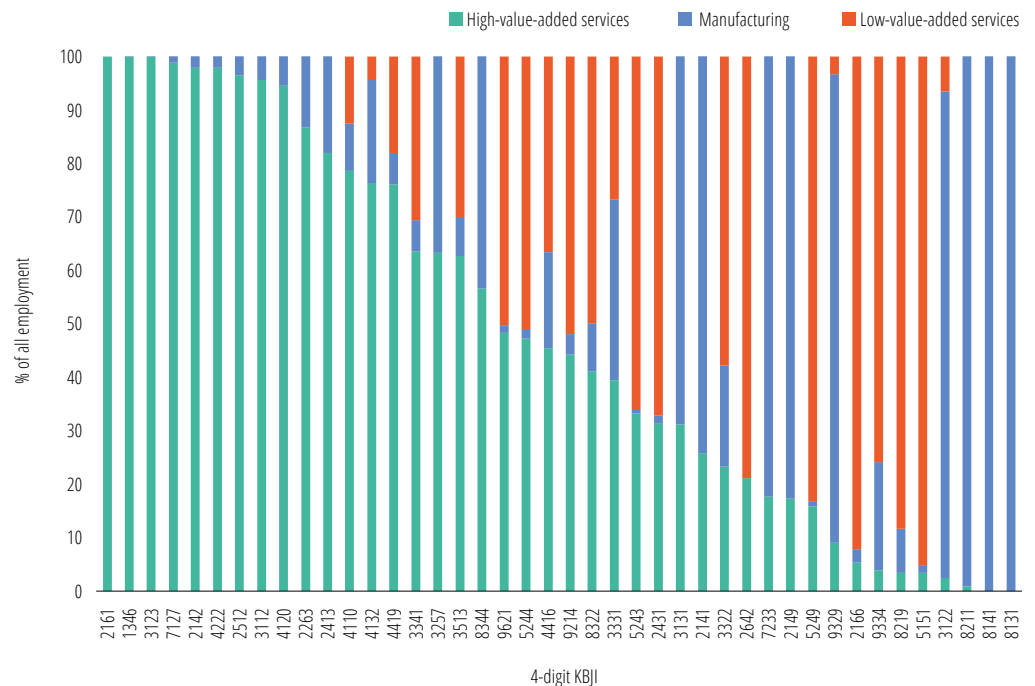
This section takes a closer look at the 42 occupations classified as bright (table 4.1).<sup>40</sup> Jobs in these occupations possess high-quality characteristics. Higher-productivity firms—that is, in high-value-added services and manufacturing—and larger firms demand these bright occupations. Bright occupations require higher minimum education levels and pay higher wages than the average occupation. However, the reverse is not necessarily true: not all of the occupations in high-value-added services and manufacturing have bright prospects.

**High-value-added services and manufacturing firms demand these bright occupations, but still an important share of bright occupations is demanded by firms in low-value-added services.**

These two groups employ all workers in 20 of the 42 bright occupations. Figure 4.12 shows the distribution of employment in bright occupations across economic groups. Each of the bright occupations is a bar, and they are ordered by the proportion of employment in each of the 3 economic groups. The objective of figure 4.12 is to communicate through a quick glance that bright occupations are highly demanded by firms operating in high-value-added economic groups (green). Many firms are in business and finance, construction, food and beverage, and textile sectors. Low-value-added services absorb more than half of workers in 12 bright occupations. These firms are mostly in creative economy manufacturing and in accommodations and food. For a more detailed analysis, see figure F.1 in appendix F, which presents the distribution across KBLI sectors.

**Fig. 4.12**

Distribution of Employment in Bright Occupations, by Economic Group



Source: Based on OEVS data.

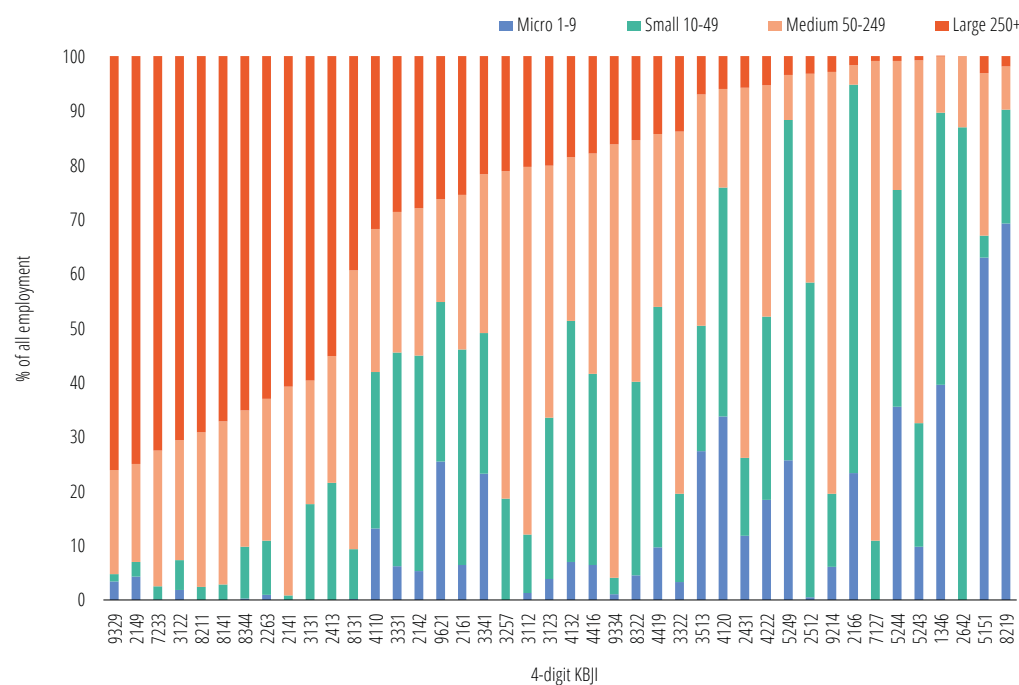
Larger firms are more likely to hire workers in bright occupations, but medium and small are still important demanders of these occupations. Following the same logic of above, figure 4.13 orders the occupations by the average demand of different firm sizes. At first glance, it can be seen that medium and large firms hire more than half of workers (28 out of 42 bright occupations). Large firms do so in 9 bright occupations. Small firms hire half or more of workers in 5 bright occupations. Micro firms, on the contrary, are not major employers of bright occupations. Micro firms employ half or more of workers in just 2 of them: cleaning and housekeeping supervisors in offices, hotels, and other establishments (KBJI 5151) and assemblers not elsewhere classified (KBJI 8219). This is consistent with overall patterns of job creation described under the subsection on job creation and destruction. Firms hiring bright occupations have been opened for 16.7 years

on average, with the exception of 4 occupations present at significantly older firms: journalists (KBJI 2642), clearing and forwarding agents (KBJI 3331), air conditioning and refrigeration mechanics (KBJI 7127), and rubber products machine operators (KBJI 8141) (table F.2 in appendix F breaks down bright occupations by firm age).

**While jobs in bright occupations require more education than the average occupation, the requirements are still relatively low, with only 21 percent demanding postsecondary education.** Most OEVS jobs have low educational requirements: 37 percent require a completed secondary school education and only 12 percent require at least a tertiary degree (Diploma I or above) (figure 4.14). Educational requirements for bright occupations are significantly higher. Overall, 77 percent of employment in bright occupations requires at least a secondary degree.

**Fig. 4.13**

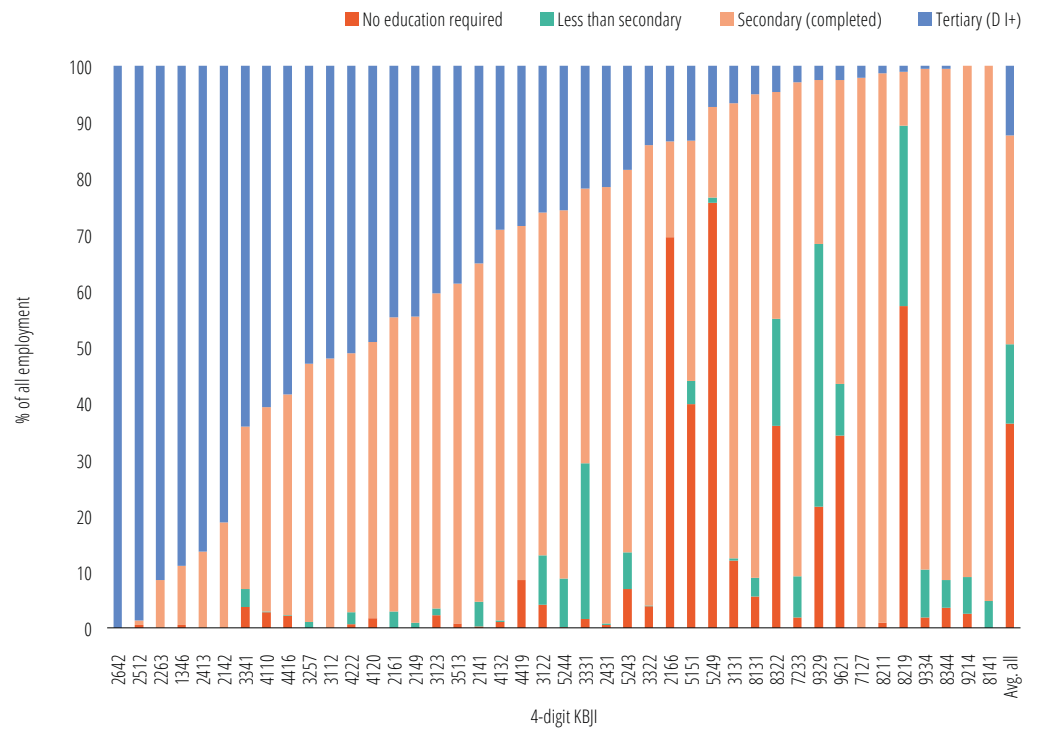
Distribution of Employment in Bright Occupations, by Firm Size



Source: Based on OEVS data.

**Fig. 4.14**

Minimum Educational Requirements, by Occupation

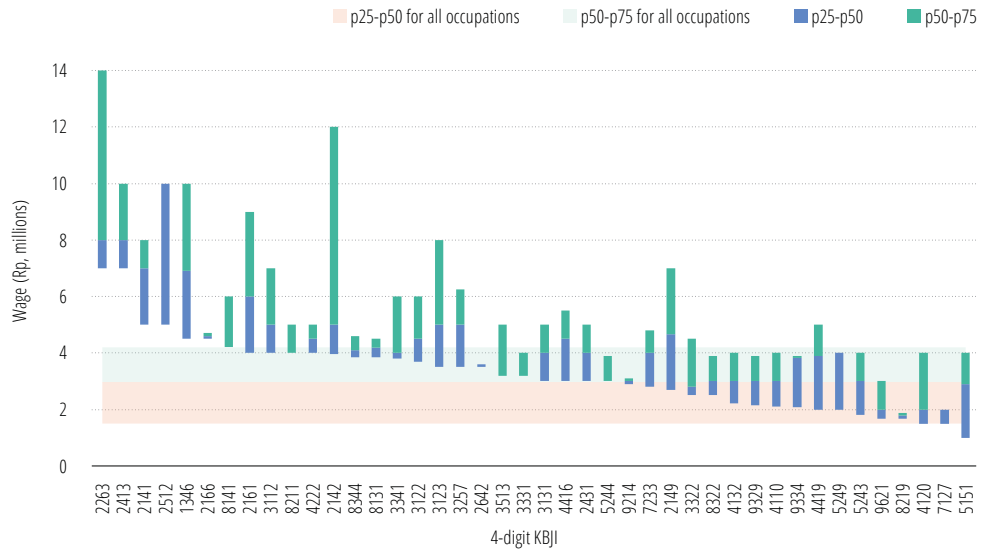


Source: Based on OEVS data.

More specifically, for 34 of the bright occupations, the great majority of jobs require at least a completed secondary degree; for 6 of these occupations, the great majority of jobs require a tertiary degree.<sup>41</sup> For example, financial analysis (KBJI 2413) and software developers (2512) require most workers to have completed at least a Diploma IV degree. The remaining 8 bright occupations require lower educational levels: they either have no requirements or require less than a secondary degree. For example, most jobs (75 percent) for sales workers not elsewhere classified (KBJI 5249) do not require a formal education. Similarly, half of jobs for assemblers not elsewhere classified (KBJI 8219) have no educational requirement, and a third do not require a completed secondary degree.

**Bright occupations tend to pay higher wages.** The median wage for all jobs in the OEVS sample is almost Rp 3 million, but most bright occupations pay higher wages (figure 4.15). The median wage for 35 out of the 42 bright occupations is higher than the overall median wage. In particular, for 15 bright occupations, most workers (75 percent) earn above the median wage. These are mostly managerial and professional occupations. For example, for financial and insurance services branch managers (KBJI 1346), the top 75 percent of workers earn more than Rp 4.5 million and the top 50 percent earn more than Rp 6.9 million. Workers in only 2 of the bright occupations earn lower wages than all workers in the sample. For example, all assemblers not elsewhere classified (KBJI 8219) earn less than the median wage.

Distribution of Wages in Bright Occupations



Source: Based on OEVS data.

Notes: Wages are shown for the 25th percentile (p25), the median, and the 75th percentile (p75) for each occupation. Shaded area = p25, median, and p75 for all 353 occupations.

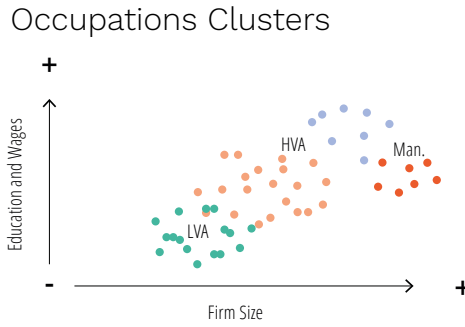
Making Sense of Bright Occupations

While bright occupations have desirable features, there is substantial variation across them. There is variation in terms of their education requirements, economic sector, firm size, and wages. To make sense of the differences, occupations can be grouped using cluster analysis that considers their common features.<sup>42</sup> As a result of the cluster analysis, bright occupations are sorted into four groups:

- **Cluster 1: Occupations with low education requirements in small low-value-added firms (9 occupations).** Workers in these occupations work at small-to-medium firms; two-thirds of employees work at low-value-added services firms, and a quarter work at high-value-added ones. There are minimum educational requirements, and wages are the lowest of the bright occupations and toward the lower distribution of all workers. These occupations represent 46 percent of workers in bright occupations and 7 percent of all employees.

- **Cluster 2: Occupations with medium education requirements in high-value-added firms (18 occupations).** Workers in these occupations work in medium firms; more than half of employees work in high-value-added services, and almost a third work in low-value-added services. Minimum educational requirements and wages are medium when compared to those of other bright occupations or to the average worker. They represent 40 percent of workers in bright occupations and 6 percent of all employees.
- **Cluster 3: Occupations with medium education requirements in large manufacturing firms (8 occupations).** Workers in these occupations work at large firms; they mostly work in high-value-added services, and some work in manufacturing firms. Minimum educational requirements and wages are medium-to-high when compared to those in other bright occupations and those of the average worker. They represent 10 percent of workers in bright occupations and 2 percent of all employees.

Fig. 4.16



Source: Based on OEVS data.  
Notes: LVA = low-value-added firms.  
HVA = high-value-added firms.  
Man. = manufacturing.

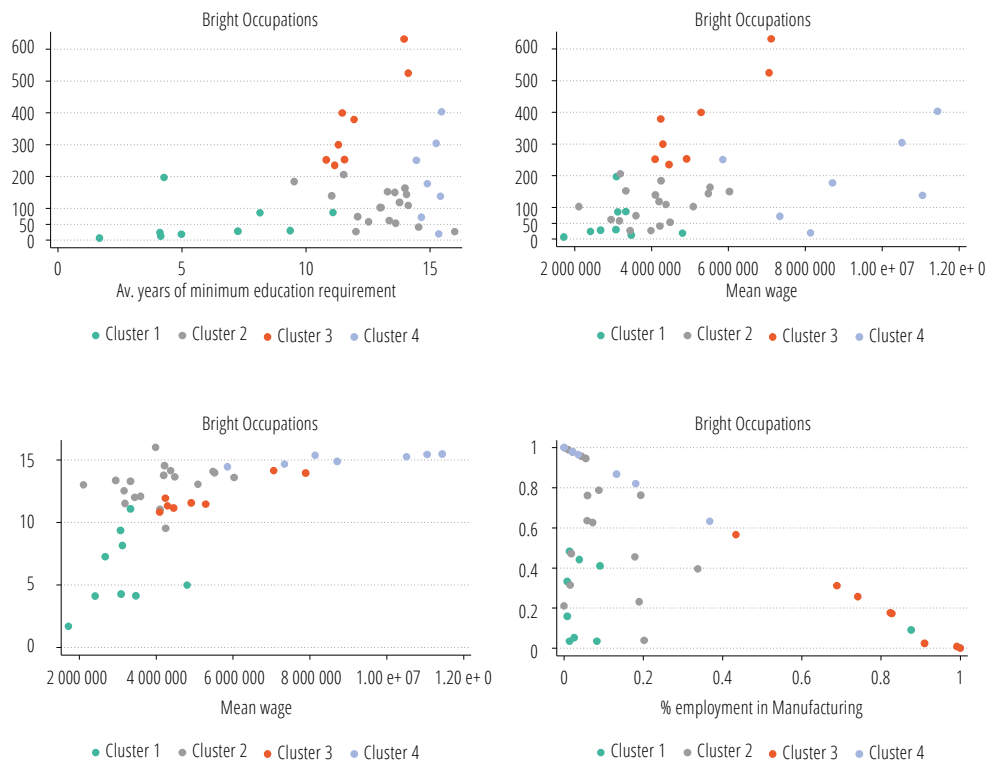
- **Cluster 4: Occupations with high education requirements in high-value-added firms (7 occupations).** Workers in these occupations work

in medium-to-large firms; most employees work in manufacturing firms, and some work in high-value-added services firms. Minimum educational requirements and wages are higher than those in other bright occupations or those of the average worker. They represent a very minimal part of all employees: 3 percent of workers in bright occupations and 0.5 percent of all employees.

Figure 4.16 visualizes the clusters, and figure 4.17 presents more detailed correlations between the characteristics of the firms and workers in these occupations. Table 4.1 lists occupations for each cluster, and Appendix G presents detailed summary statistics.

Fig. 4.17

### Correlations between Main Features of Bright Occupations



Source: Based on OEVS data.

| <p><b>9</b><br/>occupations</p> <p><b>Occupations with low education requirements in small low-value-added firms</b></p>  <p><b>46%</b><br/>of workers in bright occupations</p> <p><b>7%</b><br/>of all employees</p>   | <p><b>18</b><br/>occupations</p> <p><b>Occupations with medium education requirements in high value-added firms.</b></p>  <p><b>40%</b><br/>of workers in bright occupations</p> <p><b>6%</b><br/>of all employees</p>   | <p><b>8</b><br/>occupations</p> <p><b>Occupations with medium education requirements in large manufacturing firms.</b></p>  <p><b>10%</b><br/>of workers in bright occupations</p> <p><b>2%</b><br/>of all employees</p>   | <p><b>7</b><br/>occupations</p> <p><b>Occupations with high education requirements in high value-added firms.</b></p>  <p><b>3%</b><br/>of workers in bright occupations</p> <p><b>0.5%</b><br/>of all employees</p>   |
|---|---|--|---|
| <ul style="list-style-type: none"> <li>• Graphic and multimedia designers</li> <li>• Cleaning and housekeeping supervisors in offices, hotels, and other establishments</li> <li>• Door-to-door salespersons</li> <li>• Sales workers not elsewhere classified</li> <li>• Assemblers not elsewhere classified</li> <li>• Car, taxi, and van drivers</li> <li>• Garden and horticultural laborer</li> <li>• Manufacturing laborer not elsewhere classified</li> <li>• Messengers, package deliverers, and luggage porters</li> </ul> | <ul style="list-style-type: none"> <li>• Advertising and marketing professionals</li> <li>• Journalists</li> <li>• Civil engineering technicians</li> <li>• Construction supervisors</li> <li>• Commercial sales representatives</li> <li>• Clearing and forwarding agents</li> <li>• Office supervisors</li> <li>• Computer network and systems technicians</li> <li>• General office clerks</li> <li>• Secretaries (general)</li> <li>• Data entry clerks</li> <li>• Contact center information clerks</li> <li>• Personnel clerks</li> <li>• Clerical support workers not elsewhere classified</li> <li>• Contact center salespersons</li> <li>• Air conditioning and refrigeration mechanics</li> <li>• Chemical products plant and machine operators</li> <li>• Shelf fillers</li> </ul> | <ul style="list-style-type: none"> <li>• Industrial and production engineers</li> <li>• Engineering professionals not elsewhere classified</li> <li>• Manufacturing supervisors</li> <li>• Power production plant operators</li> <li>• Agricultural and industrial machinery mechanics and repairers</li> <li>• Rubber products machine operators</li> <li>• Mechanical machinery assemblers</li> <li>• Lifting truck operators</li> </ul> | <ul style="list-style-type: none"> <li>• Financial and insurance services branch managers</li> <li>• Civil engineers</li> <li>• Building architects</li> <li>• Environmental and occupational health and hygiene professionals</li> <li>• Financial analysts</li> <li>• Software developers</li> <li>• Environmental and occupational health inspectors and associates</li> </ul> |



## 5. Drivers of Short-Term Occupational Prospects



Policy makers are interested not only in identifying the occupations in high demand to make sure the education and training system can respond effectively, but also in understanding what drives the growth of high-paying occupations and good jobs. These drivers are multiple. While some of the shifts in the occupational landscape can be understood intuitively, other drivers are less clear-cut. This section explores the potential drivers of the emerging findings through anecdotal evidence gathered from 7 key firms (box 5.1) and theories from the academic literature. The channels discussed here are neither exhaustive nor mutually exclusive.





**The in-depth interviews with firms aim to contextualize the potential drivers of the short-term occupational dynamics identified in the previous section.** In particular, interviews sought at understanding global experts' perspective on bright occupations relevant to their firm or sector and included several questions to link these dynamics to a set of selected channels that might explain them. Four channels were subject to scrutiny:

- Technology-induced labor market disruptions and the effect of adopting technology on employment,

- Changes in product and service demand, including as a result of globalization, and the firms' responses to these changes,
- Restructuring of the market for a good or service and its implications for labor demand,
- Changes in policies and regulations.

**Each of these channels is discussed in turn, including findings from the interviews.** The discussions are not tied in name to the firms interviewed. For this reason, they provide perspective on the quantitative findings, but are not representative of a given sector.

**Box 5.1**

### Key Informant Interviews

The interviews with key firms followed a mid-structured questionnaire and are not meant to be representative of occupations or channels. Nevertheless, a balance is struck across the OEVS sampling frame so as to capture many of the bright occupations. Seven firms were selected, two from high-value-added services, three from low-value-added services, and two from the manufacturing industry. Also, a balance was sought in terms of size of the firm, with the smallest firm employing 5 workers and the largest employing 3,000 workers, as well as age of the firm.

### Characteristics of Interviewed Firms

| Group                  | Firm # | Size (number of employees) | Sector(s)                                     | Main activities  | Age   |
|------------------------|--------|----------------------------|---|--|-------|
| HVA services           | 1      | Large (320)                | Finance and business, logistics and transport | Intermediary between consumers and primary food producers        | Young |
| LVA services           | 2      | Small (35)                 | Creative economy, ICT                         | Platform for competitive E-sports online gaming                  | Young |
|                        | 3      | Micro (5)                  | Creative economy                              | Document design and printing                                     | Old   |
|                        | 4      | Medium (200)               | Creative economy, finance and business        | Marketing, advertising and management strategy advisory services | Old   |
| Manufacturing industry | 5      | Large (1,500)              | Textiles                                      | Textile production and manufacturing                             | Old   |
|                        | 6      | Large (600)                | Finance and business                          | Food manufacturing   | Old   |

**Note:** HVA = high-value-added. LVA = low-value-added. ICT = information and communication technology.

**A.** The interview with this firm has been postponed until for late August. The team will complete the entry after a decision meeting or drop it from the table.

## Technology-Induced Labor Market Disruption

**While the adoption of technology is often heralded as an essential component of sustainable economic growth, its application goes hand in hand with labor market disruptions.** Technology adoption is an important precursor to firm growth: it renders productivity gains in the production process and intensifies economies of scale, boosting competition and promoting further innovation (World Bank 2016, 2019c). Based on past theories and some emerging evidence, many observers have predicted that robots will take jobs away from people. Leontief, for instance, wondered whether machines would make workers go “the way of horses” (Taylor 2016). Recent studies for the United States find that counties more “exposed” to robots have reduced employment more than others (Acemoglu and Restrepo 2020) and that the impact has extended to other countries through trade (Artuc, Bastos and Rijkers 2018). The key question that academics have been trying to answer is whether these released workers will find alternative jobs in the same sectors (due to complementarities in production) or other sectors or whether they will simply drop out of the workforce.

**The research and academic community are converging to think that robots are unlikely to create a jobless future because productivity gains take time to materialize.**<sup>43</sup> First, technological innovations tend to occur in high-income countries, and their adoption in low- and middle-income countries usually occurs with a time lag. Generally, labor is considerably cheaper in the latter than in the former. This further slows the relative pace of adoption of new technologies in low- and middle-income countries. Second, and more important, new jobs and occupations that cannot be performed by machines are also likely to appear (World Bank 2016, 2019c). Automation and artificial intelligence are more likely to substitute routine tasks, while nonroutine cognitive and manual tasks will still be on demand, and the fourth industrial revolution (known as IR4.0) will require more

of those too. Therefore, we should expect shifts in occupational demand, but not necessarily a jobless future.

**Indonesia aims to adopt new technologies, similar to what some neighboring countries have been doing in the last decades.** In particular, continued public and private investment in technology and ICT is key to raising productivity in Indonesia. Reaping those gains depends on having a labor force with the right skills to facilitate the technological dividends needed for greater productivity; to date, many of these skills are found in Indonesia’s small, but growing, middle class (World Bank 2019a). As expected given the selection criteria, the majority of firms interviewed for this chapter reported that they have invested significantly in technology (both physical and digital) to raise output or to increase the speed of production. For instance, firm #6 in the food manufacturing sector has invested in machinery that has allowed it to increase the speed of product packaging from 7–10 packs per minute to 50–100. Similarly, firm #1 in the transport and logistics sector has invested in sorting technology, allowing many more goods to be arranged for delivery than when goods were sorted manually. Both of these firms have invested in these machines to handle the growing volume of input factors and to meet the increased demand; they noted there was no notable decline in overall demand for their products and services due to COVID-19; firm #1 noted they did however notice a shift in consumer demand and that they were able to adjust to meet that demand.

**Globally, the greatest productivity gains are in sectors that invest in digital technologies to complement skills and enhance productivity by improving production and management processes (World Bank 2019c).** Firms #1 and #4 (in the marketing and advertising industry) noted that their investment in software has allowed them to monitor much better both their production process and the essential inputs in their value chain. For instance, for firm #1, the use of ICT is essential in predicting future supply chain requirements to meet fast-evolving demand; a case in point being that

firm #1 found that COVID-19 seemingly led its consumers to demand more perceived health products such as ginger and garlic; accordingly producers were notified to increase production of these products. Another two firms in the creative economy (firms #4 and #5) reported that they have invested in software to increase the transparency, accountability, and efficiency of their digital production processes. Firm #4 in the marketing and advertising sector noted that, in recent years, its clients have come to demand greater insight into what their finances are spent on in the firm; to satisfy that demand, the firm has begun to use software platforms for different stages of the creative production process. This trend may be accelerated by COVID-19, where due to the lower availability of traditional marketing platforms; every rupiah spent on digital marketing has come under closer scrutiny than ever before.

**Consistent with theoretical predictions, for some firms, investing in technology may not necessarily lead to substitution of labor, but it explains the higher demand for a new set of occupations.**

While many of these new occupations comprise new hires, some emanate from within the firm, if upskilling or training is provided to existing employees. Consistent with the quantitative results described in section 4 (short-term occupational dynamics), firm #3 noted that, although it has not been hiring recently, at the time when it procured new machinery, it had to reskill its employees in order to manage the new machinery and had to hire new staff specialized in a new occupation—*graphic designers*—to manage digital content. This is one of the bright occupations. However, firm #6 has taken a different approach in response to a shift in the occupations needed in the production process. To maintain relatively low turnover, the firm has chosen to reskill employees who are no longer needed since machinery has made some production steps redundant. The retrained staff now contribute to other parts of the business in a new occupation. Firms #2 and #4 reported that they have been hiring workers in bright occupations related to the use of digital technology.

**Depending on the pace and scale of change and the adaptability of the skills system, skills shortages might arise.** Firm #6 noted that, while relatively stable throughout the last few years, labor costs are expected to decline in the future. This suggests that, for the occupations they employ, reductions in the number of workers per capital unit due to the adoption of technology are expected to be larger than any wage increase. Firm #1 acknowledged that its recent investment in technology also has led to higher demand for new occupations, such as *applications programmers, software developers, contact information clerks*, and also *commercial sales representatives*. It has found the latter occupation to be particularly difficult to fill. It has also been particularly difficult to find skilled female candidates, echoed by the findings that show generally low and significant variation in female participation across all sectors, particularly in high-value-added services sectors. This firm has been hiring more workers in the past few years in a range of bright occupations. A major reason is that it has shifted from being a trading intermediation firm to being a technology company that can function at scale; in order to satisfy Financial Services Authority (Otoritas Jasa Keuangan [OJK]) regulations and run efficiently, it has had to invest in technology and hire workers for new occupations, including those listed above but also *van drivers* as the logistical part of the business has grown.

**In this context, the qualitative results are aligned with the theoretical prediction that the use of technology shifts occupational demand.** Some skills and occupations will become obsolete as some tasks are performed by robots, automated by digital software, or even completed through machine learning algorithms. However, it is likely that the skills and occupations needed to wield these new technologies will continue to be in high demand to support the adoption and use of new technology to innovate further but also to respond quickly to soften the impact on the firm due to shocks to the market as seen with COVID-19. Hence, technology adoption is a key factor to consider when carrying out medium-term predictions of future jobs demand.

## Changes in Product Demand and Globalization

**Changes in consumer preferences are one of the consequences of the demographic transition, climate change, urbanization, globalization, and innovation mega trends.** In turn, new firms and existing firms adjust to cater to the new demand. The results from section 4 (short-term occupational dynamics) suggest that a range of bright occupations are in high demand because new industries are providing new products and services. These bright occupations include *graphic designers*, *application programmers*, and *marketing and advertising professionals*, for instance. A potential explanation of the growing demand for these bright occupations may be the entrance of firms in new markets (global or domestic), which are often digital and, as such, rely more and more on these occupations.

**The rise of the digital economy in Indonesia has led to a burgeoning of new products, services, and bright occupations.** Firm #2, which is active in the creative digital economy, provides an interesting example. This innovative firm combines two existing, though relatively new, markets—online gaming and e-sports. E-sports are large events where gamers get together to compete for prizes, while online gaming, tied to gaming consoles, usually does not directly entail real-world prizes. Firm #2 combines the two into a mobile phone platform, allowing users to compete with gamers across the region for prize money at much lower costs and barriers to entry than the traditional e-sports model. Accordingly, it is one of the fastest-growing services in the gaming industry. As the products and services provided by firm #2 and also firm #4 (in the marketing and advertising sector) are mostly digital, they require occupations that are generally technical, although only a few positions in these firms require tertiary education. Nonetheless, both firms have been actively hiring workers in several of the occupations mentioned above—*applications programmers*, *software developers*, *contact information clerks* and also *commercial sales representatives*, which are very promising occupations

with good short-term dynamics. When asked about the advent of COVID-19; firm #2 reported there had an increase in activity, an understandable trend as the services it provides rely on the use of smartphones but also due to the lower costs of advertising, rendering the acquisition of new users cheaper. Firm #4 in turn noted a drop in demand and especially so for traditional advertising; one they sought to fill by switching services, and the associated labor supply as much as possible, to the digital realm.

**Within these occupations, however, the skills required by a firm may extend beyond the direct technical requirements of, say, a graphic designer.** Both firms #2 and #4 noted that occupations in their firms require more and more “generalists” than “specialists.” While they have clear departments or “verticals,” specific tasks require close collaboration across several verticals and, as such, require workers who are highly skilled in their particular vertical but also able to work across verticals. This is consistent with the messages coming from theory, which predict that key foundational skills such as problem solving and working in teams will become more important in future labor markets (Dicarlo et al. 2016; World Bank 2016). This notion of high-skilled bright occupations needing to be adaptive was echoed by firms #2, #3, and #4 as well. Firm #4 noted that, while several years ago it would hire a “TV planner” to buy and sell TV spots, employers now look for candidates who can communicate a product to potential clients via TV, radio, print, and digital media, requiring a shift in the older mentality of skills required for a given occupation. Indeed, firm #3, a micro firm in the printing business, noted that finding a graphic designer with the right fit for the firm has proved difficult and that it went through several employees over the past years before finding one with the core technical skills required of the occupation but also with enough knowledge of the subsector itself. Graphic designer has been identified in this report as a bright occupation and in the Critical Occupations List 2018 as being critical and in shortage (World Bank and CMEA 2019).

**The shift in consumer preferences from physical to digital products may open opportunities for firms to reach new markets, but firms that do not adapt may lose out.** This notion held particularly for firm #3, a micro business focusing on printing and design. In the earlier years, the firm was a pure printing business, but several years ago it had to enter the digital realm as its clients began demanding less printing and more design and digital production. The firm noted that, as demand for physical printing products declined, the need for occupations such as *print finishing* and *binding workers* also declined, in line with findings on the top 15 occupations with net employment destruction. This particular occupation is closely linked to an overall shift in consumption patterns toward digital products. Accordingly, the firm has had to shift its production process and hire *graphic designers* to match increased demand for digital products. The respondent from this firm also noted that, just before COVID-19, demand had already shifted to more digital products than physical ones and that, due to COVID-19, the demand has now shifted entirely to digital products as reported by other firms interviewed for this chapter.

**While demand for digital services has grown steadily in Indonesia, COVID-19 has supported the growth of firms that were either already active in the digital realm or were able to shift to reach the digital marketplace.** This trend was echoed by most of the firms interviewed for this section. Intuitively, with many would-be consumers shifting to digital platforms, online shopping platforms have likely seen a boost in sales at the expense of physical retailers due to shop closure. What this has meant is that advertising activities have had to reach consumers through digital channels much more than before. Firm #4 noted a steep decline in the costs of advertising, making user acquisition also cheaper. *Marketing and advertising* and *commercial sales representatives*, high in demand before the pandemic, have probably fallen, although those firms and employees able to shift their work to the digital realm have likely remained in demand.

**Other occupations are identified as bright and could be growing due to new products and service markets, even if not explored in the qualitative analysis.** For example, air conditioning and refrigeration mechanics could be growing as the market has expanded for products that have been popularized and have become affordable for a large share of the population than before. Contact center information clerks could be proliferating because more services are being provided online that require this type of client support. But for other occupations, demand and supply could be moving together, placing them among the stable occupations.

Last but not least, changes in product demand also result of increased trade. While the academic literature has extrapolated the simple world model of trade of two products and two factors of production—the famous Heckscher Ohlin 2X2 model—to a world of many goods and factors, the conclusions remain. When a country opens to trade, the factors of production move from the importing to the exporting sector. In our context, this implies that the demand for skills needed in the exporting sector increase, and the demand for skills in the importing sectors contract. This reallocation is also reflected in the skills premiums, as shown by Brambilla et al. 2011. The authors find that both country and industry characteristics are important in explaining returns to schooling and skill premiums. The incidence of exports within industries, the average income per capita within countries, and the relative abundance of skilled workers explain skills premiums, and eventually factor reallocation. In sum, exports are positively linked with skills premiums, wages and the demand for skills.

## Market Restructuring

**As the world becomes more globalized and barriers to trade and entry into foreign markets ease, global and “local” value chains are having to change.** This qualitative study reveals two ways in which value chains in Indonesia are changing. Firm #1 provides a service that consolidates several

steps in the value chain, shortening the time and capital needed to bring agricultural products to the Indonesian consumer. Redundant processes in a renewed value chain would lead to higher unemployment for intermediaries that are caught in the middle, but also to higher employment for firms that are restructuring the market. The net impact on employment might not be significant, depending on the industry. Indeed, firm #1 has had to scale up its operations, which has led to its continued growth in output as well as in hiring, including hiring of many occupations identified as bright in this study. These sorts of changes to the structure of the market may initially contribute to higher employment, as firm #1 has been hiring *lorry and van drivers* but foresees that, when the firm reaches a larger scale, it will stop using a third-party firm and opt to integrate transportation much more vertically.

**To some extent, vertical integration may bring changes in occupational demand, with firms choosing to produce inputs or services that are part of their production process within the firm rather than outside of it or expanding them to cover forward linkages.** Whether doing this makes sense depends on a variety of factors, such as firm size, age, complexity, operating environment, number of steps in the value chain, number of firms competing in each segment of the value chain, geographic spread of the value chain, reliability of input providers, and so on. Besides firm #1, which has been using a third party to transport its goods but sees a growing value to housing this activity within the firm once it reaches larger scale, firms #6 and #7 have made steps to integrate vertically the services they require to operate. Firm #6, for instance, noted that, as its textile production process relies on machines, a mechanical failure would halt production. Accordingly, it has begun building up an in-house maintenance department because using third parties takes too long and is not cost-effective. Firm #7 noted that ordering parts from abroad also takes a long time and that it is now ordering

parts—and machinery—from domestic markets. Firm #7 now has an in-house garage in its food manufacturing plant and has been hiring industrial mechanics or repairers to maintain its machines directly. On the whole, vertical integration through market restructuring could be an important driver of the shifts seen in this report. As firms move services such as transportation, maintenance, and graphic design into their own production process, they begin hiring workers with these skills.

**Over time, these small increases in employment could be offset by increases in country-level efficiency through, first, a domestic improvement in the value chain and, second, participation in global value chains (ADB 2019).** Firm #1 has taken the first approach, while firm #6 has taken the second, working to become export ready. Although 79 percent of demand in Indonesia is created domestically, there are stark benefits to becoming part of the global value chain. Accordingly, firm #6 in the textile industry detailed its path to becoming “export ready,” which has included acquiring a new set of occupations in the firm. These occupations include *manufacturing supervisors*, who were brought in from abroad to oversee management of the firm’s factories, and *health and sanitation professionals*. This demand has been driven by the firm’s need to comply with standards and regulations in order to tap the global market to meet both domestic demand for textile inputs, which has already rebounded since COVID-19, and to prepare production processes to absorb future foreign demand. Accordingly, the firm noted that it has been continuously hiring *sewing machine operators*, identified as a bright occupation. The firm also confirmed that it has been raising the minimum education required for this position, favoring applicants with vocational school education and some experience in the industry. In previous years, the firm had benefited from a government training program that linked prospective vocational school graduates with internship positions in firms related to their educational background; after completing their de-

gree, some graduates chose to return to the firm where they had interned, and the firm gained a more skilled employee with some sense of the requirements of the work.

**While most of the examples coming from the qualitative work relate to vertical integration, other types of market restrictions can result in shifts in occupational demand.** In some cases, instead of vertical integration, firms find it more convenient to outsource a segment of the production line or some of the inputs and services needed. The reasons could include changes in technology, changes in transportation costs and other inputs, globalization, changes in the scale and number of firms in the industry, and changes in regulations, to name the most common. One of these examples could be security guards, cleaning, and building or machinery maintenance. In the past, these services were performed more by wage workers. Today, many firms are delivering these services to third parties. As a result of outsourcing, the total demand for the associated occupations could change. On the one hand, demand could decline as the economies of scale of buying these services outside the firm lead to a more efficient use of labor. On the other hand, demand in other sectors of the economy could rise as improved efficiency lowers prices. The overall effect will vary from country to country, depending on the stage of the outsourcing process and the structure of the economy.

### Changes in Policies and Regulations

**Changes in regulations related to labor or the business and trading environment of the industry can also lead to shifts in short-term occupational demand.** For example, changes in regulations to comply with occupational safety and health or sanitation standards may generate demand for inspectors at different points of the production line. New regu-

lations for the care industry, specifically for child or elder care, can also lead to the professionalization of jobs that currently do not require technical skills, qualifications, or certifications.

**Besides fulfilling standards related to becoming export ready, two of the firms interviewed said that they have been hiring workers in bright occupations to comply with other standards or regulations.** Firm #8 mentioned that, in order to satisfy a growing number of standards related to occupational health and hygiene, it has set up a quality assurance team that conducts internal audits and deals with health inspections. It delved into the export market several years ago, which means that it has had to satisfy several more standards. Firm #1 detailed that, as the firm transformed from a trading to a more technology-reliant finance and business company, it has had to follow strict criteria set out by OJK. As part of shifting into new products and services, firm #1 has had to expand the structure of the firm itself, which has required hiring several occupations that are considered bright because firms need to comply with a growing set of standards related to export and health and sanitation.

**While this channel has not played a key role in the period of analysis, it is expected to have a somewhat larger impact in the near future given the recent reforms adopted in the Jobs Creation Omnibus Bill.** During the in-depth interview with the firms, relatively less was observed with respect to responses from firms to policy and institutional changes. This is not a surprise as no large reforms were introduced in 2019. However, the Omnibus Bill approved on October 5, 2020 puts forward a substantive reform affecting firms' productivity and labor market institutions. If this effort is institutionalized by the GoI, it will serve to monitor the responses of occupations to these recent reforms.





## 6. Summary and Recommended Next Steps

The piloting of the OEVS and release of the Indonesia Occupational Employment Outlook reports constitute an effort to build the foundational data toolbox for workforce development policy. Piloting this survey was important because, given the current mix of surveys that BPS collects, it aims to fill a data gap, by gathering detailed information on employment and vacancies at firms classified by narrowly defined occupation. This tool complements three others tools also piloted for the first time by the World Bank in Indonesia: namely, the Critical Occupations List, which combines quantitative and qualitative data to identify the jobs that are in short supply and are critical for Indonesia's growth, the assessment of skills on demand by adjusting the O\*NET Survey to the local context (IndOTaSk), and the analysis of online vacancy data.



**This Technical Report provides background information on how other countries collect, analyze, and use similar data to the OEVS and describes the construction and implementation of the OEVS survey.** It presents the methodology for data collection and the survey instrument, as well as the limitations of the pilot survey, which covers only three sectors and selected regions of the country. It then analyzes the pilot data to ensure that the survey design is aligned with the main characteristics of firms and the workforce gleaned from larger national surveys with more statistical power.

**The most important outcome of the Indonesia Occupational Employment Outlook is the short-term occupational prospects score based on a holistic assessment of 10 complementary indicators of short-term occupational demand.** The Short-Term Occupational Prospects Report presents the full list of indicators and the assessment used to determine the bright and dim occupations, while this Technical Report provides a further analysis of the bright and dim occupations. Only 15 percent of Indonesia's workforce is employed in bright occupations, and another 2 percent is employed in dim

occupations. As expected, the majority of the workforce is employed in stable occupations, as the changes in occupations are gradual because the pace of structural transformation—although more accelerated than in the past—is gradual.<sup>44</sup>

**While bright occupations tend to require mostly high-skilled workers, Indonesia is at a point in the structural transformation where many low- and semi-skilled occupations also have good job prospects.** Through cluster analysis, section 4 (making sense of bright occupations) in this Technical Report groups occupations by four main characteristics. Almost a quarter of the bright occupations are in the low-value-added economic group, with micro and small firms that require minimal levels of education and pay lower wages. Almost half of the bright occupations demand upper-secondary education and are in the manufacturing economic group. These occupations are in medium-size firms offering wages that are good enough to support middle-class consumption. Less than a quarter of the occupations are associated with high-skilled, high-value-added firms, either in manufacturing or in services. The firms demanding these occupations tend to



## Bright

**42** occupations

**15%** of employment



## Dim

**90** occupations

**2%** of employment

be large if they are manufacturing firms and to be medium or large if they are high-value-added service firms.

**This analysis raises another very important point: the returns to the occupation will depend considerably on the characteristics of the firm.** This result is not unique to Indonesia; it is observed globally (Abowd and Kramarz 1999). The analysis confirms that a low-skilled worker with a secondary education or less working for a high-value-added large firm in Indonesia earns on average as much as a college graduate working in a micro or small low-value-added firm. Hence, workforce development policy needs to be developed in sync with incentives to promote productivity gains on the labor demand side.

**The main drivers of occupational shifts are explored through a combination of theory and in-depth interviews with key informants.** Some of the main drivers identified include technological change and, in particular, the digital economy; restructuring of the market through vertical integration and outsourcing; and development of new industries stem-

ming from changes in preferences driven by changes in technology and demographics.

**The companion Short-Term Occupational Prospects Report details the definitions of the indicators of occupational demand and the values and rankings for all occupations in Indonesia.** While this information could be hard to digest for end users, it should be useful for practitioners (career guidance and job counselors) assisting them and constitutes a solid base for preparing the labor intelligence and career guidance dashboards of the forthcoming labor market information platform of the government of Indonesia. The website will present the information with multiple entry points and in an easily digestible manner to be used directly by students, job seekers, and workers interested in upskilling and reskilling. The information will be connected with other databases to help end users to understand where to obtain the relevant education and training needed in a given occupation, including links to the results of other data tools currently being developed, which are described in box 2.1.



## Stable

**129** occupations

**15%** of employment



## Flagged

**92** occupations

**68%** of employment

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## Appendix

## Appendix A.

### Best practices around the World

This annex describes the most salient practices for monitoring occupational employment used around the world, followed by their application to Indonesia.

#### United States

In the United States, the Bureau of Labor Statistics is in charge of collecting and analyzing labor market data. In other words, it is responsible for collecting data and therefore constitutes the LMO of the country.<sup>45</sup> To monitor labor market dynamics, including the shifts in occupations and skills, the BLS carries out three well-established firm-level surveys: the Occupational Employment Statistics (OES), the Jobs Openings and Labor Turnover Survey (JOLTS), and the Occupational Requirements Survey (ORS). These surveys, with other tailored surveys, such as the Current Population Survey<sup>46</sup> and O\*NET, constitute the main sources of labor market information data feeding the LMIS.

The **OES** is a semiannual panel survey designed to produce employment and wage estimates for workers with disaggregation for close to 800 occupations. The data have been publicly available since 1988, but the survey was initiated in the early 1970s. Every six months, the OES surveys between 180,000 and 200,000 nonfarm establishments. To avoid burdening employers, the panel is designed to interview the same firm at most once every three years, collecting information from a sample of 1.1 million unique establishments every three years, which represents about 57 percent of the employment in the United States.<sup>47</sup> Participation is voluntary but relatively high, largely due to awareness campaigns and the value of the analysis produced for firms. The questionnaire is very simple. In addition to asking basic firm-related information, it asks for the total number of employees per occupation in a certain wage range.<sup>48</sup> With this information, the BLS can estimate employment and wages for about 800 occupations, using Standard Occupational Classifications (SOCs), at the national, state, metropolitan/nonmetropolitan area, industry, and ownership level.<sup>49</sup> The

BLS partners with state workforce agencies to carry out the survey. The agencies are responsible for delivering the survey through mail, fax, phone, web, e-mail, and follow-up calls.

The OES survey is the only comprehensive source of national employment and wage estimates by occupation, informing various stakeholders and feeding several dissemination products in the United States. At the national and state level, it is used to develop information regarding current and projected demand for employment and job opportunities, industry skills and technology studies, and market analysis. These analyses are used for very practical purposes, such as education and workforce development plans, vocational counseling and planning, and job placements for career-technical training programs. In addition, several government programs use the OES data. For example, the Employment and Training Administration program uses the data for administering the H1-B visa program for workers in specialty occupations and for helping job seekers and employers to determine salary ranges on CareerOneStop.<sup>50</sup> Foundations, academic and government researchers, private investment boards, and economic development programs also use the data.

The **JOLTS** is a monthly firm-level survey designed to collect demand-side data on labor shortages at the national level. Launched in 2000, JOLTS has a monthly sample of approximately 16,400 nonfarm public and private establishments throughout the country, covering part-time and full-time workers as well as permanent, short-term, or seasonal workers.<sup>51</sup> Participation is voluntary. The questionnaire collects basic firm-related information, how often employees are paid, and the total number of employees, job openings, hires, and separations (including quits, layoff, and discharges).<sup>52</sup> The survey collects overall numbers, not data at the occupational level. Establishments are surveyed using computer-assisted personal interview (CAPI) devices for the first six months and using web, fax, e-mail, or mail for the remainder

of their time. JOLTS was designed to understand the dynamics of the labor market, and the data are used to inform national economic policy, business cycle analysis, industry retention rates, economic research and planning,<sup>53</sup> industry studies, and education and job training programs. JOLTS users can be public or private. For example, the government uses JOLTS to understand the strength of the labor market, make predictions (for example, a decay in hiring rates may follow a rise in the unemployment rate), and understand cyclical or structural changes in the labor market; private industries use JOLTS to measure their relative cost-efficiency when comparing their turnover rate with that of the industry.

The **ORS** is a firm-level survey that collects information regarding cognitive and physical demands at the occupational level. The survey, piloted in 2012 and launched in 2015, is a nationally representative survey carried out annually. In order to maximize the sample, the BLS publishes estimates pulling together three years of data collection, reaching a sample of about 25,300 establishments, and representing about 140.8 million civilian workers.<sup>54</sup> The questionnaire collects data at the occupational level (6-digit Standard Occupational Classification [SOC] codes) on physical demands (for example, standing, lifting, pushing, posture, auditory, vision), environmental conditions (exposure to heat, cold, water, humidity, hazardous contaminants), and cognitive demands (personal contact, problem solving, exposure to other people) as well as information on minimum education, on-the-job training, experience, and credentials.<sup>55</sup> Establishments can answer the survey through personal visits, by phone, or via e-mail. ORS data are used for a variety of purposes, including assisting the Social Security Administration in its disability adjudication process, benchmarking job descriptions or developing targeted recruitment plans, helping insurance companies to assess risk management, assisting temporary-help firms to match an employee properly to job openings, conducting research (in academia or government), and tracking the nature of work.

The response rate for these surveys is quite good, mostly due to the fact that firms find the analysis produced to be useful. During the past decade, the response rate has been above 70 percent for OES and above 60 percent for JOLTS.<sup>56</sup> The ORS response rate for 2019 round was 69 percent (McNulty and Yu 2019). Considering the level of detail of these surveys and their voluntary nature, these response rates are quite high. This is, in part, due to the value that employers place on the information provided.

## The European Union

Eurostat, the statistics office of the European Union, promotes and is working toward harmonizing the Structure of Earnings Survey (**SES**). This survey provides accurate and harmonized data on earnings at the occupational level in European Union member states as well as candidate countries and countries from the European Free Trade Association for policy-making and research purposes.<sup>57</sup> The harmonized data are available on request from 2002 onward. Data from 24 countries were harmonized in the latest published SES (2014).<sup>58</sup> SES is a joint effort between Eurostat and the national statistics institutes: while national statistics institutes are responsible for selecting the sample, preparing the questionnaires using a common coding scheme, and conducting the survey, Eurostat compiles and harmonizes the data. Thus, there is no unique questionnaire for the SES across countries. Instead, each country collects data for the SES, following quality and reliability standards, from tailored questionnaires, existing surveys, administrative sources, or a combination of such sources. The SES is conducted every four years (as this is the most common frequency across countries) and includes data from establishments with at least 10 employees operating in all areas of the economy except the agriculture sector and the public administration.<sup>59</sup> All paid employees working at these establishments are covered. The harmonized SES data include level of remuneration by specific workers' characteristics—sex, age, occupation using the International Labour Organization's International



Standard Classification of Occupations (ISCO)-08, length of service, highest educational level attained, type of employee, and contract—and basic employers' characteristics—economic sector using the European classification,<sup>60</sup> size, and location.<sup>61</sup> Users include national and international institutions, trade unions and employment associations, private institutions, and researchers.

## Singapore

Singapore has two annual firm-level surveys that collect occupation-level information: the Job Vacancy Survey (JVS) and the Occupational Wage Survey (OWS). The **JVS**, carried out by the Ministry of Manpower, collects comprehensive occupational information on job vacancies in order to identify shifts in hiring patterns due to changing demands of the economy (Ministry of Manpower 2019). The survey was first conducted in 1990. Its sample covers more than 15,000 firms, including private sector establishments with at least 25 employees and the public sector. The questionnaire, besides basic firm-level information, collects detailed information on vacancies, including job title (which is later classified into Singapore Standard Occupational Classification—SSOC 2015), gross monthly wage that firms are ready to pay, required skills and experience, minimum qualifications, and how hard the vacancy is to fill (whether it was unfilled for at least six months or whether it was hard to fill by locals). The JVS is conducted through web, fax, e-mail, or mail, with clarifications made over the phone.

The **OWS**, carried out by the Central Provident Fund Board on behalf of the Ministry of Manpower, collects monthly wages on all employees working at private firms (see CPF Board 2019; Ministry of Manpower 2018). It became available in 1999 and covers a representative sample of about 3,000 private sector establishments with at least 25 employees, stratified by industry. The questionnaire collects data on each employee at the firm, including job title (which is then coded to SSOC), mode of payment, monthly starting wage, basic and gross wages, type of employee (part-time/

full-time), type of contract, and job location.<sup>62</sup> The OWS is conducted through web, fax, e-mail, or mail, with clarifications made over the phone.

Besides the national government, the Infocomm Media Development Authority, an industry association, carries out an Annual Survey on Infocomm Media Manpower to assess the profiles of information and communication professionals.<sup>63</sup> The survey was first implemented in 1999, is regulated under Section 5 of the Statistics Act (Chapter 317), and is compulsory. The survey covers a representative sample of public and private establishments from all industrial sectors selected from the Establishment Sampling Frame of the Department of Statistics (IMDA 2019). The questionnaire includes basic firm and employment information and detailed information on 41 information and communication roles related to employment (total, minimum qualification), vacancies (experience level and whether vacancy is hard to fill), and expected changes in employment over the next three years. The survey also asks two specific questions on 91 skills: Does the firm need more employees with the specific skill? Can the firm find locals with the skill? The survey is delivered through web, fax, e-mail, or mail.

## Tailored and Stand-Alone Approaches

Other countries have introduced tailored surveys that combine more than one approach. For example, in 2015 Georgia carried out the **Occupational Demand Survey (ODS)**, a firm-level survey that aims to capture detailed occupational changes in employment and vacancies during the previous 12 months. The ODS sample consisted of 6,000 firms from across the country and represented about 10 percent of the total number of firms in the country. The survey collected information on the current stock as well as planned flows (increases and decreases) of occupational employment and current job openings using ISCO-08 classification at 4 digits. Although the survey attempted to collect information on wages, it had limited success. The primary stakeholders of this informa-

tion included the end users (students, job seekers, workers, and employers) and policy makers. The results of the ODS were disseminated through reports and were used to develop labor market trends in a newly introduced labor market information web portal. Policy makers in Georgia used the results of the survey to inform planning of the technical and vocational education and training (TVET) budget. More specifically, the Ministry of Education used the data to predict enrollment and initiate a dialogue with the Ministry of Finance on budget needs. The Office of Public Employment Services used the ODS results to allocate short-term training for newly unemployed workers, with a focus on youth.

The Ugandan Bureau of Statistics (UBOS) carried out the **2016/17 Uganda Manpower Survey**. This was the first comprehensive survey on manpower that had been carried out in Uganda. It had three modules: formal sector, informal employers, and educational institutions. The formal sector survey targeted more than 6,000 establishments, and the questionnaire asked for detailed occupational information on current levels of employment, vacancies, and three-year employment projections. Detailed information in-

cluded job title (coded to ISCO-08 classification at 4 digits), type of job, minimum educational requirements, wages, nationality, and skills (categories).<sup>64</sup> The survey was delivered over a 12-month period through 42 trained field staff using hand-held CAPI devices. So far, UBOS has published a report with basic descriptive statistics on this comprehensive survey, but the main objective of the survey was for stakeholders to carry out more in-depth analysis so as to inform policy debate.

The Government of Mongolia carried out **the Barometer Survey** in 2019. The survey aimed at determining short-term labor market demand by qualification and economic sectors in order to provide sound information to policy makers. The survey had three parts: (i) general information of entities and organizations; (ii) labor-force demand and labor-force shortage of 2020, including employment level and vacancies; (iii) human resources, including training practices. The survey collected occupational data at the 6-digit level using the International Standards for Classification of Occupations (ISCO). It included 3,642 entities and organizations pertaining to 18 economic sectors in 21 provinces and 9 districts.

**Tab. A.1**

List and links to occupational structure surveys around the world

| Country        | Survey       | Collects data on                                 | Questionnaire   |
|----------------|--------------|--|---|
| United States  | OES          | Employment and wage estimates by occupation      | <a href="https://www.bls.gov/respondents/oes/pdf/forms/uuuuuu_fillable.pdf">https://www.bls.gov/respondents/oes/pdf/forms/uuuuuu_fillable.pdf</a>   |
| United States  | JOLTS        | Employment, job openings, hires, and separations | <a href="https://www.bls.gov/jlt/jltc1.pdf">https://www.bls.gov/jlt/jltc1.pdf</a>   |
| United States  | ORS          | Jobs requirements at the occupational level      | <a href="https://www.bls.gov/ors/information-for-survey-participants/collection-materials.htm">https://www.bls.gov/ors/information-for-survey-participants/collection-materials.htm</a>   |
| European Union | SES          | Earnings by individual characteristics           | <a href="https://ec.europa.eu/eurostat/documents/203647/203707/SES_variables_list.xls/b287a6fc-19b2-493d-a3f2-4ee70d3439b1">https://ec.europa.eu/eurostat/documents/203647/203707/SES_variables_list.xls/b287a6fc-19b2-493d-a3f2-4ee70d3439b1</a> |
| Singapore      | JVS          | Job vacancies                                    |   |
| Singapore      | OWS          | Wages by occupation                              | For a template of the questionnaire, see p. 10: <a href="https://www.cpf.gov.sg/assets/employers/Documents/OWS_2019_Booklet.pdf">https://www.cpf.gov.sg/assets/employers/Documents/OWS_2019_Booklet.pdf</a>                                       |
| Uganda         | MAPU 2016/17 | Employment and vacancies by occupation           | <a href="https://www.ubos.org/wp-content/uploads/publications/O8_20182018_Uganda_Manpower_Survey_Report.pdf">https://www.ubos.org/wp-content/uploads/publications/O8_20182018_Uganda_Manpower_Survey_Report.pdf</a>                               |

## Appendix B. Reliability of indicators: RSE

The table below shows the total number of occupations exceeding a certain RSE threshold. For example, for indicator 'total employment', at the 1-digit level, 1 out of 9 of occupations (or 11%) had an RSE greater than 25 and 1 out

of 9 occupations (or 11%) had an RSE greater than 40. Similarly, at the 4-digit level, 250 out of 353 occupations (or 71%) had an RSE greater than 25 and 159 out of 353 occupations (or 45%) had an RSE greater than 40.

| Occupation digit level          | 1  |      | 2  |      | 3   |     | 4   |     |    |     |    |     |     |     |     |     |
|---------------------------------|----|------|----|------|-----|-----|-----|-----|----|-----|----|-----|-----|-----|-----|-----|
| Total occupations               | 9  |      | 39 |      | 119 |     | 353 |     |    |     |    |     |     |     |     |     |
| RSE threshold                   | 25 |      | 40 |      | 25  |     | 40  |     |    |     |    |     |     |     |     |     |
| Occupations exceeding threshold | #  | %    | #  | %    | #   | %   | #   | %   |    |     |    |     |     |     |     |     |
| Total employment                | 1  | 11%  | 1  | 11%  | 14  | 36% | 6   | 15% | 69 | 58% | 35 | 29% | 250 | 71% | 159 | 45% |
| Net change in employment        | 9  | 100% | 9  | 100% | 35  | 90% | 35  | 90% | 92 | 77% | 90 | 76% | 204 | 58% | 194 | 55% |
| Net employment growth           | 9  | 100% | 8  | 89%  | 36  | 92% | 36  | 92% | 93 | 78% | 90 | 76% | 206 | 58% | 197 | 56% |
| Turnover rate                   | 4  | 44%  | 0  | 0%   | 32  | 82% | 16  | 41% | 89 | 75% | 60 | 50% | 205 | 58% | 167 | 47% |
| Vacancies                       | 7  | 78%  | 3  | 33%  | 28  | 72% | 20  | 51% | 63 | 53% | 50 | 42% | 137 | 39% | 116 | 33% |
| Vacancy rate                    | 8  | 89%  | 4  | 44%  | 35  | 90% | 29  | 74% | 79 | 66% | 72 | 61% | 156 | 44% | 144 | 41% |
| Number of firms hiring          | 4  | 44%  | 1  | 11%  | 23  | 59% | 14  | 36% | 61 | 51% | 45 | 38% | 164 | 46% | 134 | 38% |
| Unopened vacancies              | 5  | 56%  | 2  | 22%  | 23  | 59% | 19  | 49% | 49 | 41% | 41 | 34% | 97  | 27% | 85  | 24% |

## Appendix C. Firm and Employment Panorama

### Firm Characteristics

**The majority of firms are micro enterprises dedicated to low-value-added services, but they are not the major generators of jobs, let alone of high-productivity jobs.**<sup>65</sup> Micro firms, defined by either firm size (for manufacturing) or revenue size (for services), represent 93 percent of firms in the sample. Those in low-value-added services are ubiquitous in Indonesia, representing 90.4 percent of all interviewed firms; they are dedicated mostly to accommodation and food services (68.1 percent), creative economy manufacturing (18.1 percent) (for example, tailoring and sewing or making artisan bamboo kitchen tools), and wholesale and retail trade (10.9 percent). However, employment in this type of firm accounts for only 37.4 percent of all jobs. These results are consistent with those of the 2016 economic census.<sup>66</sup> Analysis from manufacturing surveys reveals

that micro firms in manufacturing are low productivity (contributing only 6.2 percent to total value added), do not grow (only 4.1 percent and 0.4 percent become small and medium firms, respectively), and employ less than a quarter of all Indonesian workers (23.0 percent) (World Bank, forthcoming).

**Conversely, a few high-value-added services and manufacturing firms generate a large number of jobs.** Firms in these two economic groups constitute a small proportion of all firms (4.8 percent and 0.3 percent, respectively), but they employ a significant number of workers (24.2 percent and 15.3 percent, respectively). With the exception of firms in the ICT industry, most firms in these two economic groups are larger than micro firms (figure C.1). About half of firms in high-value-added services are small or larger, and most manufacturing firms (76.4 percent) are medium or larger (figure C.2).

**Fig. C.1**

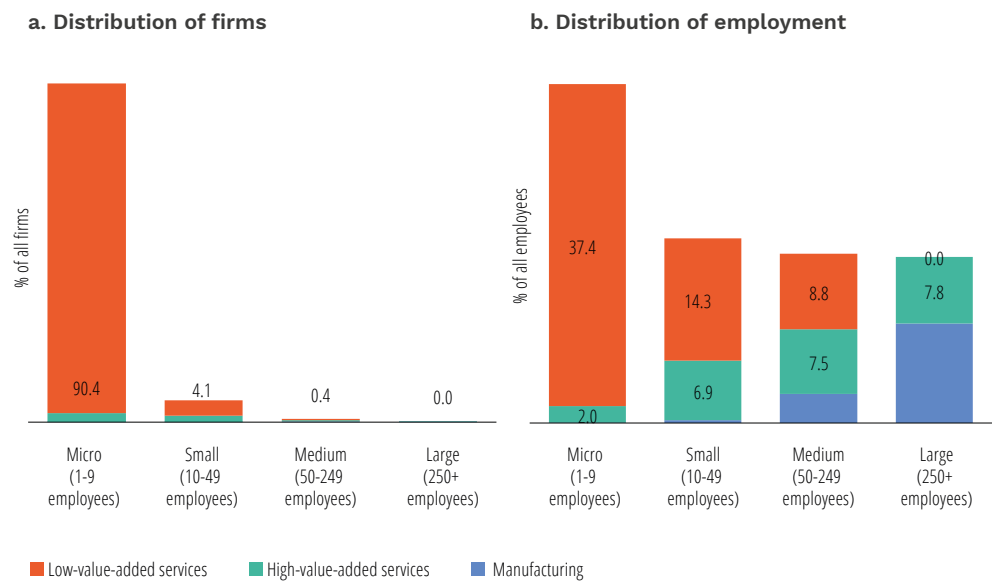
While there are fewer high-value-added services and manufacturing firms, they generate a large number of jobs



**Source:** Based on OEVS data.  
**Notes:** HVA = high-value-added. LVA = low-value-added.

**Fig. C.2**

Most OEVS firms are micro and dedicated to low-value added services, but the few firms in high-value added services and manufacturing create a large number of jobs



**Source:** Based on OEVS data.

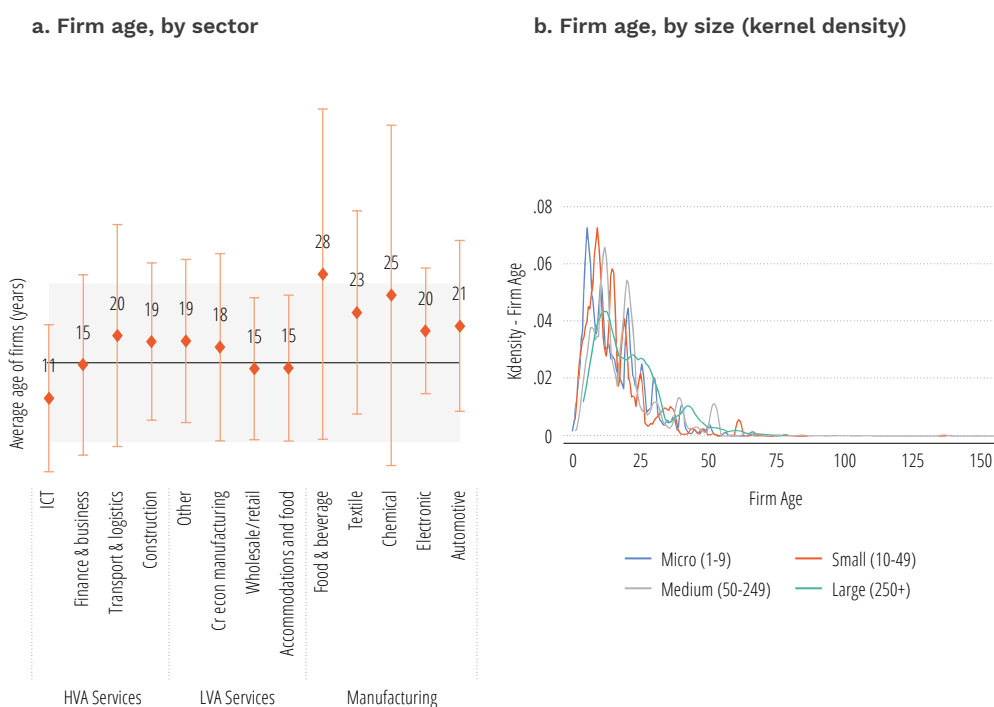
**Firm age is related to their economic group and size.** On average, firms in low-value-added services have been around for more than 16 years (figure C.3). Firms in high-value-added services, excluding ICT firms, have a similar average age (17 years). ICT firms, which are mostly micro, are the youngest (average age 11), while manufacturing firms are the oldest. On average, manufacturing firms have been operating for more than 25 years, and some have been active for more than 40 years. Similarly, larger firms are older than smaller firms.

**Most OEVS firms are informal, similar to the findings of nationally representative surveys.**<sup>67</sup> By far the majority of

low-value-added firms, most of which are micro firms, are household enterprises (94.9 percent) (figure C.4).<sup>68</sup> This type of firm does not have a legal basis. This is consistent with the latest census report, which found that only 4 percent of firms have legal status with the government (BPS 2017), and with a recent analysis (World Bank, forthcoming). Instead, most larger firms, mostly in manufacturing or high-value-added services, are limited liability companies and more likely to be foreign-owned (figure C.5). Analysis from other sources finds that larger firms in manufacturing are likely to comply with labor regulations and provide better quality jobs than medium and small firms do (World Bank, forthcoming).

**Fig. C.3**

Firm Age is highly associated to the economic group and firm size



**Notes:** Gray horizontal line = average for all firms. Gray area = average +/- 1 standard deviation. HVA = high-value-added. LVA = low-value-added.

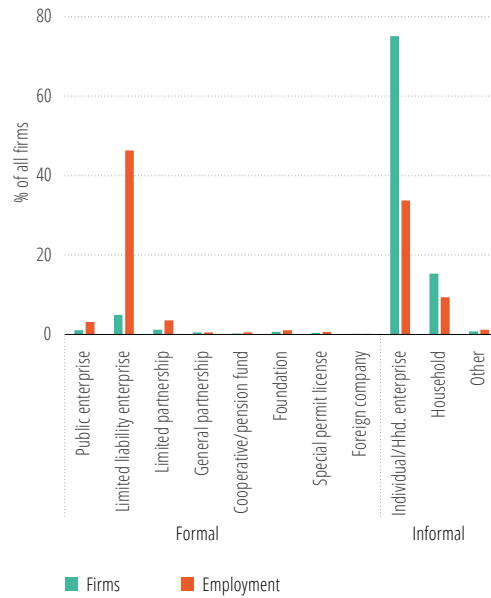
**Notes:** One large firm had been operating for 331 years. This observation was trimmed out of the graph for presentation purposes.

**Source:** Based on OEVS data.

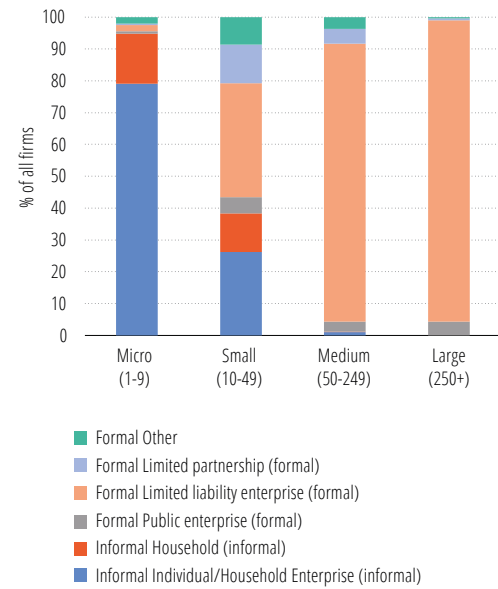
**Fig. C.4**

Most firms are informal, but a large share of employees work at formal firms

**a. Distribution of firms and employment, by type**



**b. Distribution of firms and employment, by type and size**

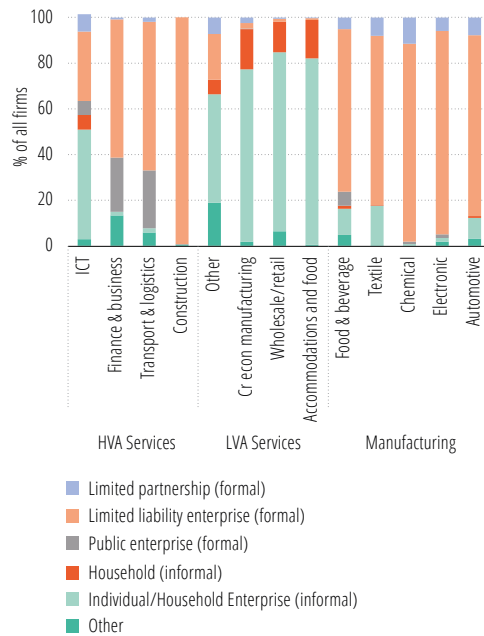


Source: Based on OEVS data.

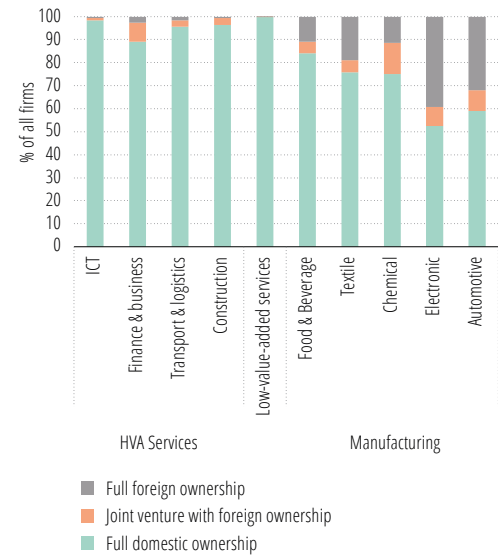
**Fig. C.5**

Most firms are domestic, and foreign owned firms are concentrated in manufactures

**a. Distribution of firms and employment, by sector and type**



**b. Distribution of firms, by sector and ownership**



Source: Based on OEVS data.

Note: HVA = high-value-added. LVA = low-value-added.

## Employment Panorama

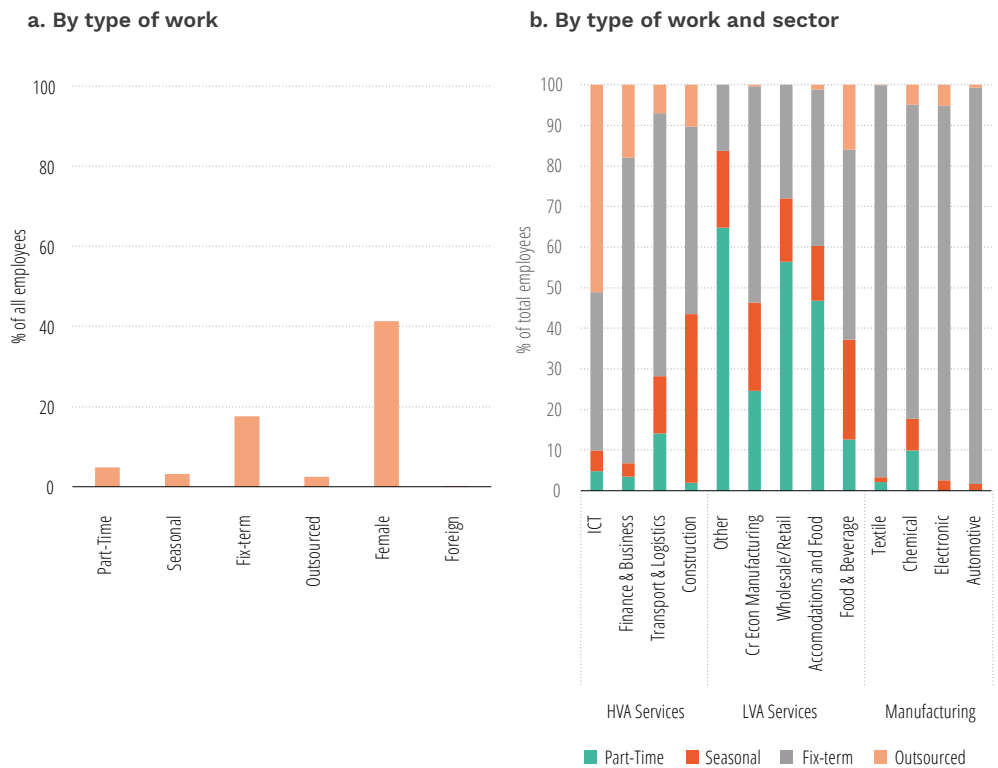
**Where you work matters more than who you are or what your training is.** In Indonesia, as shown in other studies<sup>69</sup> the size of the firm and the activity of the firm are more important determinants of wages than the education attainment or the occupation chosen. A plant operator with less than secondary education working in a large manufacturing firm is likely to earn as much—or even more—than a college graduate working in a small low-value-added services firm. Unfortunately, there is a massive variation wages and other job features across firm characteristics.

**While most OEVS firms offer full-time wage jobs, this type of security varies across occupations and firm activity.** The most common type of jobs are full-time, full-year, and under direct payroll of the firm. While on av-

erage only 4.7 percent of employees are part-time, this form of contract is more prevalent in wholesale and retail firms (11.3 percent). Similarly, 3.2 percent of all employees are seasonal and employed mostly in construction firms (15 percent). Firms outsource 2.4 percent of all employees, but ICT firms outsource 28.8 percent of all employees (figure C.6). Almost one-fifth of employees are under a fixed-term contract (17.7 percent), mostly in finance and business (42.3 percent), textiles (48.9 percent), and electronics (59.4 percent). However, not working full-time/full-year or under the direct payroll of the firm needs to be associated with worse paying jobs. Some of these job features are inherent to the nature of job/occupation, and what needs to be examined is whether these are associated to occupations that are in excess of supply—that is not growing and with decreasing wages.

**Fig. C.6**

Type of Work and Workers Employed



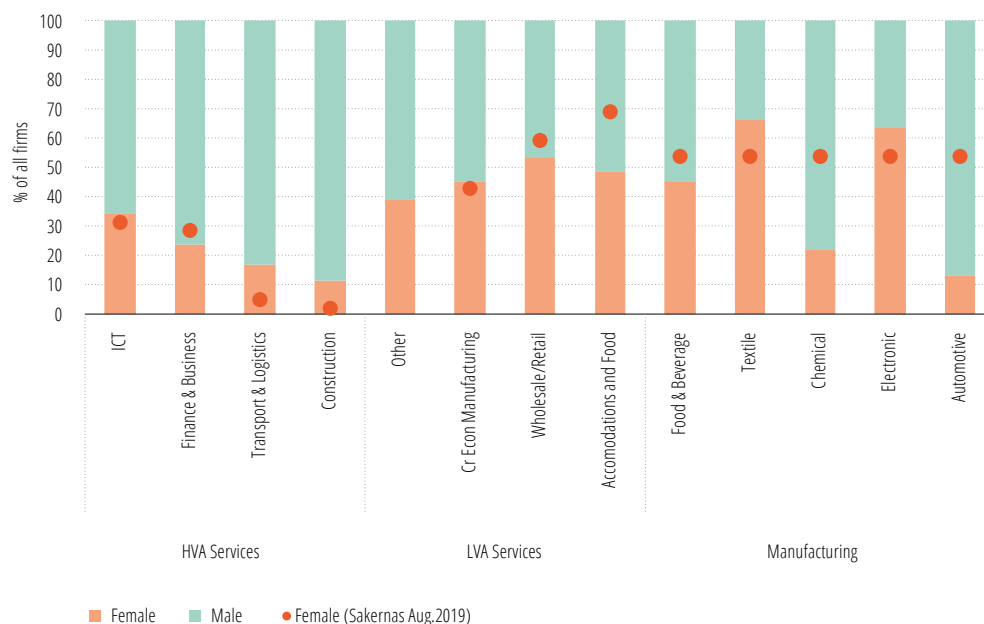
**For women, where they work may matter even more as they are found in low paying sectors.** Less than half of employees are female (41.3 percent), but with great variation in female participation across economic activities. High-value-added services firms tend to hire fewer women than low-value-added services firms (20.9 percent vs. 47.0 percent), ranging from 11.4 percent in construction firms to 28.8 percent in ICT firms (figure C.7). Half of the employees in manufacturing firms are women, but fewer women work in in more capital-intensive industries such as automotive and chemical firms (12.9 percent and 22.2 percent, respectively), while many work in more labor-intensive industries such as textile and electronic firms (66.0 percent and 63.3 percent, respectively). These patterns are very similar to the nationally representative data from Sakernas and Medium and Large Manufacturing Firms Census.<sup>70</sup>

**Working in small firms is associated with low wages even for high-educated workers, but most of these firms require quite low educational attainment.** Almost two-thirds of jobs in low-value-added services have no educational requirement, and an additional 16.7 percent require only lower-secondary school (figure C.8). This requirement is surprisingly low considering that, in 2019, 60.3 percent of workers had completed at least some secondary education (BPS 2019). Manufacturing firms, in a middle ground, have a higher proportion of jobs requiring secondary education (either vocational or general).<sup>71</sup> On the other extreme, high-value-added services jobs require higher qualifications: almost all workers need at least a secondary school diploma (group average, 95.1 percent); in particular, half of jobs in ICT require a Diploma IV.

**Fig. C.7**

### Firms hire fewer females, except in three sectors

**Employment, by gender and sector**



**Source:** Based on OEVS data.

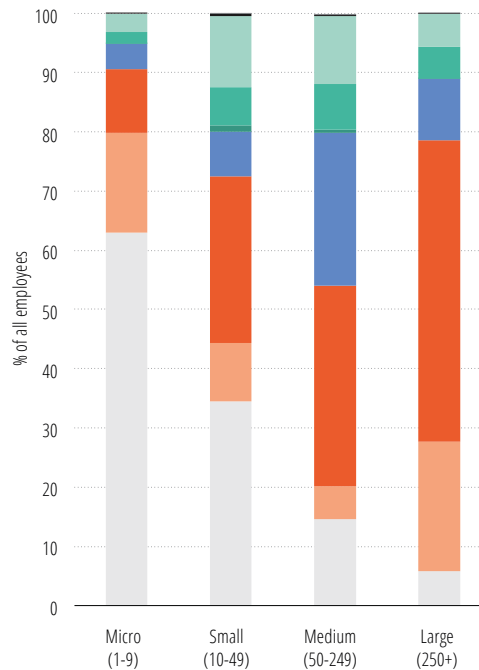
**Note:** Percentages of female workers by major sector category are based on data from Sakernas (BPS 2019). The percentage is the same for all manufacturing sectors, since the report does not disaggregate the data further. HVA = high-value-added. LVA = low-value added.



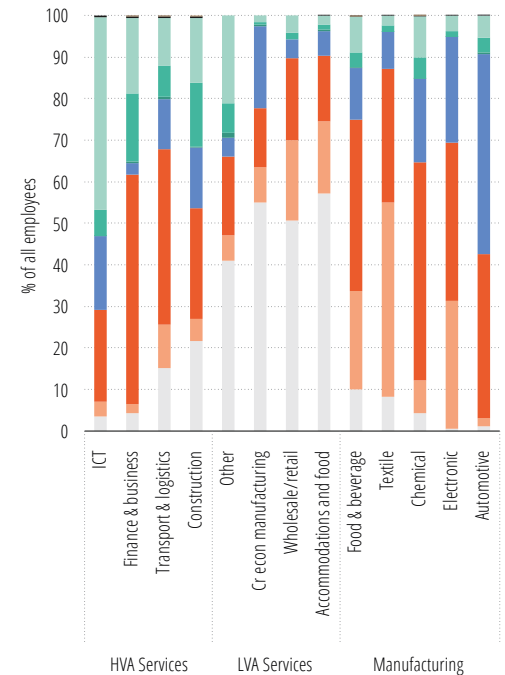
Educational requirements are quite low, particularly for micro and small firms

*... but it also depends on the firm's activity*

**a. Minimum qualifications required, by firm size**



**b. Minimum qualifications required, by sector**



Strata II (Master)
  Diploma I/II
  Diploma IV/Strata I
  Lower-secondary school
  None required

Strata III (PhD/Doctor)
  Diploma III
  Vocational school
  Other
  Upper-secondary school

**Source:** Based on OEVS data.  
**Note:** HVA = high-value-added. LVA = low-value-added.

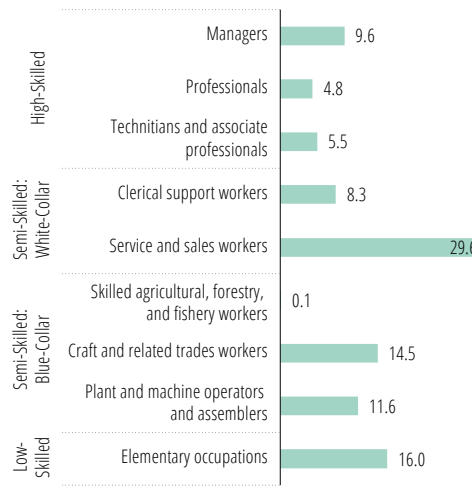
**More than two-thirds of jobs are semi-skilled occupations.**<sup>72</sup> Of course, what you do depends on where you work, i.e. different occupations are found in different sectors. Almost a third of jobs are in service and sales (29.6 percent) (figure C.9). These jobs are demanded mostly by firms in low-value-added services, particularly in activities related to wholesale and retail trade and accommodation and food services. Very low qualifications are needed to perform this occupation: 44 percent of jobs do not require any formal education, and an additional 14 percent require lower-secondary school. In contrast, firms

in high-value-added services demand relatively higher skill levels: more than half (53 percent) require at least a tertiary education (Diploma I or above). Only firms in ICT and finance and business demand higher levels of skills (84 percent), such as technicians and associate professionals, managers, and clerical support workers. Jobs in manufacturing firms are mostly blue-collar, particularly for certain types of plants and for machine operators and assemblers. This is consistent with the findings of World Bank (forthcoming), which reports that most manufacturing jobs are blue-collar and that very few are white-collar.

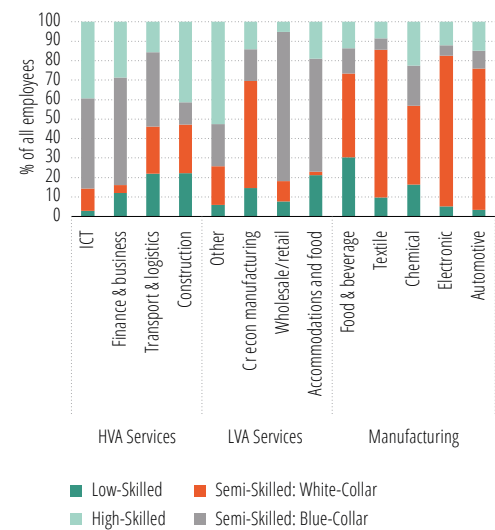
**Fig. C.9**

Mid-level skill occupations are the most demanded but occupational demand vary by sector

**a. Employment distribution, by 1-digit occupation**



**b. Employment distribution, by sector and 1-digit occupation**



**Source:** Based on OEVS data.  
**Note:** HVA = high-value-added. LVA = low-value added.

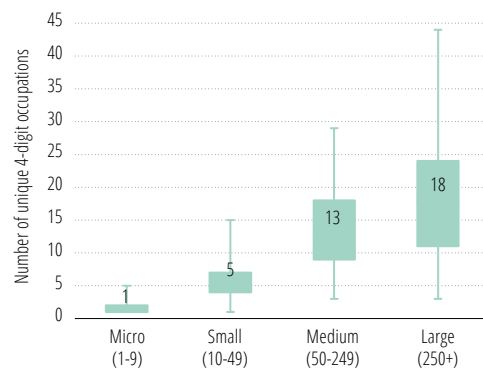
**A more granular look into firms shows a high degree of specialization, with firms employing two unique occupations at 4-digit KBJI on average.** As expected, the larger the firm, the larger the number of unique occupations employed (figure C.10). While the

median micro firm employs 1 unique occupation, the median small firm employs 5, the median medium firm employs 13, and the median large firm employs 18. Moreover, regardless of firm size, employment is highly concentrated in one, two, or three unique

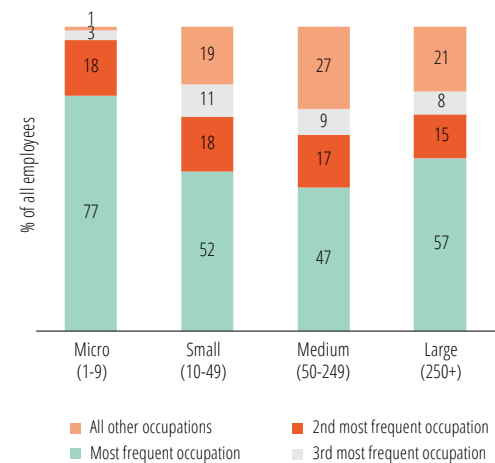
**Fig. C.10**

Distribution of Occupations, by Firm Size

**a. Distribution of unique 4-digit occupations demanded, by firm size**



**b. Concentration of employment within the most frequent occupation, by firm size**



**Source:** Based on OEVS data.

occupations. For example, the median large firm (employing 18 unique occupations) employs 57 percent of its workers in just one occupation, 15 percent in a second occupation, and 8 percent in a third one, leaving 21 percent of employment for the remaining 15 occupations.

**Wages increase with the scale of the firm.** The breakdown of median wage by firm size and occupation shows that larger firms pay better wages across all occupations (figure C.11). As expected, with the exception of micro firms, high-skilled occupations—like managers, professionals, technicians, and associate professionals—are better paid than low-skilled ones, consistent with positive rewards to investments in human capital and alignment of wages and productivity. Firm size is an important determinant of wages: a high-skilled worker employed in a low-productivity micro firm is likely to earn less than a

low-skilled worker in a large firm. Specifically, the median monthly wage for managers and professionals at micro firms (Rp 3 million) is lower than the median monthly wage for semi- and low-skilled workers at large firms (between Rp 3.89 million and Rp 3.5 million).

**Sectors associated with higher productivity pay higher wages.** The median wage for firms in low-value-added services, irrespective of the sector, is lower than that of high-value-added services and manufacturing firms. This is consistent with an analysis based on manufacturing survey data: labor productivity and wages tend to be higher in high-technology-intensity activities (such as chemical, electronic, and automotive firms) and lower in textiles and food and beverage activities (World Bank, forthcoming). Wage differentials also may be related to firms' formality (larger firms are more often formal).

**Fig. C.11** Median Monthly Wages, by Occupation, Firm Size, and Sector



**Source:** Based on OEVS data.  
**Note:** HVA = high-value-added. LVA = low-value-added.

## Appendix D.

### Occupations with Signs of Skills Shortages

| KBJI | Occupation title  | Shortage sign          |
|------|---|------------------------|
| 1221 | Sales and marketing managers                                      | Hard and unopened      |
| 1323 | Construction managers   | Difficult and unopened |
| 2144 | Mechanical engineers  | Hard and unopened      |
| 2166 | Graphic and multimedia designers                                  | Difficult and unopened |
| 2411 | Accountants   | Difficult and unopened |
| 2431 | Advertising and marketing professionals                           | Hard and unopened      |
| 2434 | Information and communication technology sales professionals      | Difficult and hard     |
| 2514 | Applications programmers  | Difficult and hard     |
| 2611 | Lawyers   | All signs              |
| 2641 | Authors and related writers                                       | All signs              |
| 2642 | Journalists   | All signs              |
| 3122 | Manufacturing supervisors   | Hard and unopened      |
| 3123 | Construction supervisors  | Hard and unopened      |
| 3141 | Life science technicians (excluding medical)                      | Difficult and hard     |
| 3321 | Insurance representatives   | Hard and unopened      |
| 3334 | Real estate agents and property managers                          | Hard and unopened      |
| 3513 | Computer network and systems technicians                          | Hard and unopened      |
| 4229 | Client information workers not elsewhere classified               | Difficult and unopened |
| 4323 | Transport clerks  | Hard and unopened      |
| 5131 | Waiters   | Hard and unopened      |
| 5246 | Food service counter attendants                                   | Hard and unopened      |
| 5414 | Security guards   | Hard and unopened      |
| 7233 | Agricultural and industrial machinery mechanics and repairers     | Hard and unopened      |
| 7422 | Information and communication technology installers and servicers | Hard and unopened      |
| 7511 | Butchers, fishmongers, and related food preparers                 | Hard and unopened      |
| 7531 | Tailors, dressmakers, furriers, and hatters                       | Hard and unopened      |
| 7532 | Garment and related pattern makers and cutters                    | Hard and unopened      |
| 7533 | Sewing, embroidery, and related workers                           | Hard and unopened      |
| 7543 | Product graders and testers (excluding foods and beverages)       | Hard and unopened      |
| 8152 | Weaving and knitting machine operators                            | Hard and unopened      |
| 8153 | Sewing machine operators  | Difficult and unopened |
| 8183 | Packing, bottling, and labeling machine operators                 | Hard and unopened      |
| 8322 | Car, taxi, and van drivers  | Hard and unopened      |
| 9214 | Garden and horticultural laborers                                 | Difficult and hard     |
| 9321 | Hand packers  | Hard and unopened      |
| 9329 | Manufacturing laborers not elsewhere classified                   | Hard and unopened      |
| 9411 | Fast food preparers   | Hard and unopened      |
| 9622 | Odd job persons   | Difficult and unopened |

**Note:** Covers 38 occupations with more than one sign of shortages. Hard = hard-to-fill occupation. Difficult = difficult to hire occupation due to lack of applicants with skills. Unopened = occupation for which firms did not open vacancies due to a lack of trust that they would find workers with the appropriate skills. All signs = occupations with all three signs.

## Appendix E.

### Overlap between Bright and Critical Occupations List (COL) 2018 Occupations

| KBJI | Bright occupations titles                                       | Overlapping COL-specific job title in shortage  |
|------|---|---|
| 2141 | Industrial and production engineers                             | Environmental engineers, production engineers, and process engineers  |
| 2142 | Civil engineers   | Civil engineers   |
| 2166 | Graphic and multimedia designers                                | Graphic designers, layout designers, and animators  |
| 2263 | Environmental and occupational health and hygiene professionals | Environmental engineers, production engineers, and process engineers  |
| 2413 | Financial analysts  | Treasurers (in banking industry)  |
| 2512 | Software developers   | Apps and system developers  |
| 3112 | Civil engineering technicians                                   | Surveyors   |
| 3131 | Power production plant operators                                | Power plant operators   |
| 3257 | Environmental and occupational health inspectors and associates | Safety, health, and quality inspectors  |
| 3322 | Commercial sales representatives                                | Area managers, branch managers, and regional managers in retail   |
| 7233 | Agricultural and industrial machinery mechanics and repairers   | Skilled farmers for organic and sustainable farming and skilled farmers for palm oil and chocolate plantation |
| 8344 | Lifting truck operators   | Heavy-truck drivers   |
| 9214 | Garden and horticultural laborers                               | Skilled farmers for palm oil and chocolate plantation   |

## Appendix F.

### Additional Statistics for Bright Occupations

**Fig. F.1**

Distribution of Employment in Bright Occupations, by Firm Sector



Source: Based on OEVS data.

Note: CR Econ = creative economy. ICT = information and communication technology.

**Fig. F.2**

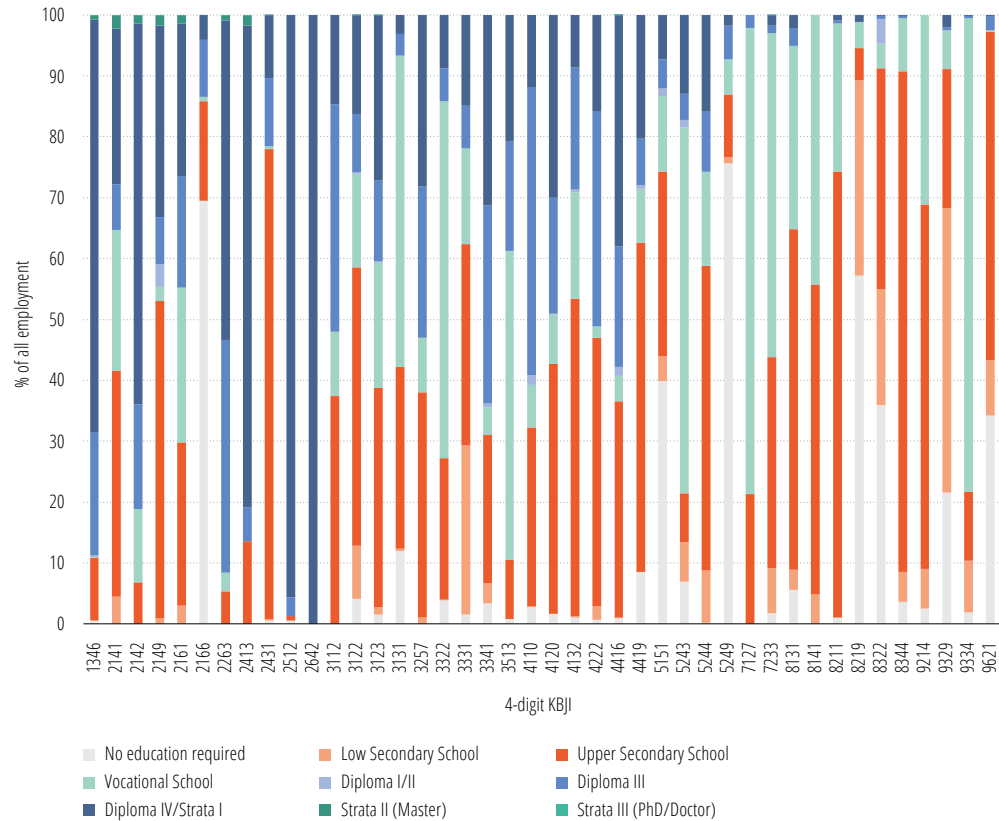
### Average Age of Firms Hiring Bright Occupations



**Source:** Based on OEVS data.  
**Note:** Gray line across occupations is the average age for all firms. Gray area is +/-1 standard deviation for all firms.

**Fig. F.3**

### Education Level Required for Bright Occupations



**Source:** Based on OEVS data.

# Appendix G.

## Clusters for 42 Bright Occupations

| Cluster | Total number of occupations | Firm size (total workers) |                           | Education |               | Wage        |           | Sector                  |       |       |        | Employment |         |             |          |
|---------|-----------------------------|---------------------------|---------------------------|-----------|---------------|-------------|-----------|-------------------------|-------|-------|--------|------------|---------|-------------|----------|
|         |                             | Size                      | Average number of workers | Level     | Average years | Wage level  | Amount    | Main (2 <sup>nd</sup> ) | % LVA | % HVA | % Man. | Level      | Total   | % of bright | % of all |
| 1       | 9                           | Small-medium              | 54                        | Low       | 6.1           | Low         | 3,079,731 | LVA (HVA)               | 64    | 23    | 13     | Larger     | 651,612 | 46          | 7        |
| 2       | 18                          | Medium                    | 106                       | Medium    | 13.1          | Medium      | 4,085,686 | HVA (LVA)               | 27    | 59    | 14     | Larger     | 566,265 | 40          | 6        |
| 3       | 8                           | Larger                    | 372                       | Medium    | 12.0          | Medium-high | 5,279,757 | Man.                    | 1     | 19    | 80     | Smaller    | 145,624 | 10          | 2        |
| 4       | 7                           | Medium-large              | 195                       | High      | 15.1          | High        | 9,008,780 | HVA                     | 0     | 89    | 11     | Smaller    | 44,710  | 3           | 0.5      |

**Note:** HVA = high-value-added. LVA = low-value-added. Man. = manufacturing.

# Appendix H.

## OEVS

### Questionnaire



**INDONESIA OCCUPATIONAL EMPLOYMENT AND VACANCY SURVEY**

|                     |  |
|---------------------|--|
| <b>CONFIDENTIAL</b> | <b>ID BUSINESS/COMPANY</b><br>_____                          |
|                     | <b>IDT. BUSINESS/COMPANY STATUS</b><br><b>NONMANUFACTURE</b> |
|                     | <b>2. MANUFACTURE</b>  |

**Enumerator Information**

|                        |                       |
|------------------------|-----------------------|
| <b>IWR.Interviewer</b> | <b>SUP.Supervisor</b> |
| Name                   | _____                 |
| Phone number           | _____                 |

|               |   |               |   |
|---------------|---|---------------|---|
| <b>COV.A</b>  | IS THIS BUSINESS/COMPANY REPLACEMENT?<br>1. Yes<br>3. No → <b>INFORMED CONSENT</b>  | <b>COV.A1</b> | IF "YES", INPUT BUSINESS/COMPANY ID OF THE ORIGINALLY LISTED BUSINESS/COMPANY<br>_____                        |
|               |   | <b>COV.A2</b> | IF "YES", HOW MANY TIMES HAS THE ENUMERATOR TRIED TO REPLACE THE ORIGINALLY LISTED BUSINESS/COMPANY?<br>_____ |
| <b>COV.A3</b> | <b>NAME PREPOPULATED 2-DIGIT KBLI [CAPI] (PRIMARY CLASS OF BUSINESS/COMPANY)</b><br>2-DIGIT KBLI [CAPI] BASED ON NKS (NOMOR KATEGORI SAMPEL) _____ (CAPI CHECK, PROGRAM LOAD FROM 2-DIGIT KBLI) |               |   |
| <b>COV.A4</b> | Is the main economic activity of this business/company [SAY PREPOPULATED ACTIVITY AT 2-DIGIT KBLI] _____  |               |   |
| <b>COV.A5</b> | What does this business/company do and produce? (WRITE DOWN THE PROCESS, RAW MATERIAL, MANUALLY/BY MACHINE, OWNERSHIP, OPERATION AREAS, LOCATION MOBILE/PERMANENT) _____                        |               |   |
| <b>COV.A6</b> | 1. Yes → <b>SECTION I</b><br>3. No  |               |   |
| <b>COV.A7</b> | CATEGORY _____  |               |   |
| <b>COV.A8</b> | PRIMARY CLASS _____   |               |   |
|               | <b>REPLACE SAMPLE (SEE SAMPLE LIST PROVIDED)</b><br><b>→ INTERVIEW RESULT</b>   |               |   |

**INFORMED CONSENT**

Good morning/afternoon/evening, my name is [Name]. I am collecting data for a study to understand the occupations that are being demanded by employers in Indonesia. In order to inform the government of Indonesia about the demand for labor in Indonesia, Bappenas, in collaboration with the World Bank and SurveyMETER, is conducting an Occupational Employment and Vacancy Survey. The survey collects accurate and complete data about current and expected occupations employed in each surveyed firm as well as basic descriptive information about the firm and its human resources decisions.

Your business/company has been chosen randomly, along with several hundred others, to provide a representative sample of all employers. The information you provide is strictly confidential. Your business/company's name and data will never be identifiable in any report or data set. The information gathered here will help to develop new policies and programs to improve the business's/company's access to workers with the right skills.

The survey will take approximately 1 hour to complete. Should you have any further questions, you may contact Bondan Sikoki at [bondan\\_sikoki@surveymeter.org](mailto:bondan_sikoki@surveymeter.org) (+62-811-253-956) COV.0. Is your business/company willing to be interviewed? 1. Yes 3. No → INTERVIEW RESULT

**SECTION I. BUSINESS/COMPANY INFORMATION**

The term "business/company" in this questionnaire refers to the establishment/workplace. This refers to a *distinct physical location* at which an employer undertakes economic activity. It is not an office, department, building, or assembly line, for example, within a larger, geographically contiguous ensemble.

|             |  |  |             |
|-------------|--|--|-------------|
| <b>I.1</b>  | PROVINCE   | _____  | CODE: _____ |
| <b>I.2</b>  | DISTRICT/CITY  | _____  | CODE: _____ |
| <b>I.3</b>  | SUBDISTRICT  | _____  | CODE: _____ |
| <b>I.4</b>  | VILLAGE/KELURAHAN  | _____  | CODE: _____ |
| <b>I.5</b>  | Village/Kelurahan classification                               | 1. Urban    2. Rural   |             |
| <b>I.6</b>  | Name of business/company                                       | _____  |             |
| <b>I.7</b>  | Address of business/company<br>(WRITE UP TO SUBDISTRICT LEVEL) | _____<br>_____<br>_____<br>_____   |             |
| <b>I.8</b>  | Phone number   | _____  |             |
| <b>I.9</b>  | Fax number   | _____  |             |
| <b>I.10</b> | E-mail   | _____  |             |
| <b>I.11</b> | Website  | _____  |             |
| <b>I.12</b> | Business/company network                                       | <b>A. FIXED LINE</b> _____ <b>W. NOT APPLICABLE</b><br><b>B. CELL PHONE</b> _____ <b>6. NOT APPLICABLE</b><br>1. _____ <b>6. NOT APPLICABLE</b><br>1. _____ <b>6. NOT APPLICABLE</b><br>1. _____ <b>6. NOT APPLICABLE</b><br>1. Sole → SECTION II    4. Representative<br>2. Headquarter → SECTION II    5. Factory (manufacturing)<br>3. Branch office    6. Support/auxiliary unit |             |
| <b>I.13</b> | [If answer to I.12 has a code of 3,4,5,6]:                     | a. Headquarter name: _____<br>b. Headquarter address: _____<br>c. Province: _____<br>d. District/city: _____   |             |

**SECTION II. RESPONDENT INFORMATION**

For a business/company with fewer than 20 workers, the respondent should be the owner/CEO/manager. For larger establishments, ideally the human resource manager and a production manager should respond together; otherwise ask the human resource manager first, then the production manager. If neither is available, ask the CEO/owner/general manager.

Names of person(s) interviewed, with phone number, e-mail address, gender, and age group for each. If multiple persons from the same business/company have been interviewed, indicate which modules have been completed by each person.

|  | 1                             | 2                             | 3                             |
|--|-------------------------------|-------------------------------|-------------------------------|
| <b>II.0</b> Module   |                               |                               |                               |
| <b>II.1</b> Name   |                               |                               |                               |
| <b>II.2</b> Cell phone   | 1. _____<br>6. NOT APPLICABLE | 1. _____<br>6. NOT APPLICABLE | 1. _____<br>6. NOT APPLICABLE |
| <b>II.3</b> Sex  | 1. Male<br>3. Female          | 1. Male<br>3. Female          | 1. Male<br>3. Female          |
| <b>II.4</b> Age  | ____ Years                    | ____ Years                    | ____ Years                    |
| <b>II.5</b> Start time of interview                                | ____:____                     | ____:____                     | ____:____                     |
| <b>II.6</b> End time of interview                                  | ____:____                     | ____:____                     | ____:____                     |
| <b>II.7</b> Length of interview (calculated by CAPI)               | ____                          | ____                          | ____                          |
| <b>II.8</b> Position in the business/company                       | ____                          | ____                          | ____                          |
| <b>II.9</b> Unit/department  | ____                          | ____                          | ____                          |
| <b>II.10</b> When did you start to work for this business/company? | ____/____/____                | ____/____/____                | ____/____/____                |

**Code for II.8:**

- 01. Human resource manager
- 02. Owner/proprietor
- 03. President/vice president/chief executive officer (CEO)
- 04. Partner
- 05. Director
- 06. General manager
- 07. Finance officer
- 08. Manager
- 09. Production manager
- 95. Other, specify \_\_\_\_\_

**Code for II.9:**

- A. Marketing
- B. Production
- C. Operation
- D. Finance
- E. Human resource
- F. Legal
- G. General Affairs
- V. Other, specify \_\_\_\_\_
- W. NA

## SECTION III. MODULE 1: BASIC INFORMATION &amp; BUSINESS/COMPANY

I would like to begin by asking a few background questions.

|   |   |  |
|---|---|--|
| III.1   | <b>CAPI CHECK ANSWER IF THE ANSWER TO I.12 = 3,4,5, OR 6</b><br>What year did the parent company of this business/company begin operation?                                | 1. Year <input type="text"/> <b>8. DON'T KNOW</b>  |
| III.2   | What year did this business/company begin operation?  | 1. Year <input type="text"/> <b>8. DON'T KNOW</b>  |
| III.3   | NAME PREPOPULATED 2-DIGIT KBLI [CAPI] (PRIMARY CLASS OF BUSINESS/COMPANY)   | <input type="text"/> (CAPI CHECK, PROGRAM LOAD FROM <del>NKS-KBLI</del> )  |
| III.4   | 2-DIGIT KBLI [CAPI]   | <input type="text"/>   |
| III.5ax   | What does this business/company do and produce?<br>(WRITE DOWN THE PROCESS, RAW MATERIAL, MANUALLY/BY MACHINE, OWNERSHIP, OPERATION AREAS, LOCATION MOBILE/PERMANENT)     |  |
| III.5c  | CLASS   | <input type="text"/>   |
| III.5d  | SUBCLASS  | <input type="text"/>   |
| III.5e  | GROUP   | <input type="text"/>   |
| III.6   | WHAT IS THE MAIN ECONOMIC ACTIVITY OF THIS BUSINESS/COMPANY?<br><b>CAPI LOAD FROM III.5e</b>  | a. 5-digit KBLI : <input type="text"/><br>b. Name of 5-digit KBLI: _____   |
| III.7   | What is the type of business/company?   | 01. Public enterprise (government-owned enterprise) 05. Cooperative/pension fund (Badan Usaha Milik Negara/Daerah, BUMN/D)<br>02. Limited liability enterprise (Perusahaan Terbatas, PT) 06. Foundation<br>03. Limited partnership (Commanditaire Vennootschap, CV) 07. Special permit license<br>04. General partnership 08. Foreign company/inst. represent<br>09. Individual/household enterprise<br>10. Household 95. Other, specify _____ |
| III.8   | Which of the following describes the shareholders in this business/company?   | 1. Full domestic ownership 3. Full foreign ownership<br>2. Joint venture with foreign ownership  |
| III.9   | Please choose the best description for the (average) revenues of this business/company during the last 3 years.   | 1. Substantially decreased 4. Increased<br>2. Decreased 5. Substantially increased<br>3. We're stable 6. Don't know (DO NOT READ!)   |
| III.10  | In the next 3 years, you predict that the revenues of this business/company will: (READ )   | 1. Substantially decrease 4. Increase<br>2. Decrease 5. Substantially increase<br>3. Remain stable 6. Don't know (DO NOT READ!)  |
| III.11  | How many workers are currently employed in this business/company?<br>(THOSE UNDER DIRECT PAYROLL OF BUSINESS/COMPANY? [NOTE: ZERO ANSWER IS VALID ANSWER TO BE RECORDED]) |  |
| Total number of workers in this business/company's direct payroll   |   |  |
| A. Of which, how many are part-time workers (vis-à-vis working full-time)                                   |   |  |
| B. Of which, how many are seasonal workers (vis-à-vis working all year)                                     |   |  |
| C. Of which, how many have a fixed-term (temporary) contract (vis-à-vis an open-ended contract)             |   |  |
| D. Of which, how many are subcontracted/outsourced workers under the direct payroll of the business/company |   |  |
| E. Of which, how many are women (vis-à-vis men)   |   |  |
| F. Of which, how many are foreign workers (vis-à-vis national)  |   |  |
| III.12  | How many workers were newly hired in the last 12 months (including those who were hired but then left within the past 12 months, i.e., total newly hired)                 | <input type="text"/>   |
| III.13  | How many workers left the business/company in the last 12 months? (ENUMERATOR NOTE: including those who voluntarily resigned and those who were fired/forced to leave)    | <input type="text"/>   |
| Of which, how many voluntarily resigned?  |   |  |

Now I would like to ask questions about the workforce at this business/company. Please think about the last pay day of this business/company (could be the first day of the month). Workers include workers who are subcontracted if they are under the direct payroll of this business/company, independent workers if they are temporal or permanent, seasonal or year-round, full-time or part-time, foreigners or nationals. However, they exclude freelancers and interns, as well as subcontracted/outsourced workers who are hired through a third-year, contract-based NOT consider the direct payroll of the business/company. (Note to enumerators: This definition excludes those without the company)

**MODULE 2: INFORMATION ON EMPLOYMENT STOCK BY OCCUPATION**

Now I would like to ask questions about workers who are currently employed in your business/company. [Note to Enumerator: The same definition of "workers" applies. Workers include those who are subcontracted if they are under the direct payroll of this business/company, independent if they are temporal or permanent, seasonal or full-year round, full-time or part-time, foreigners or nationals. However, they exclude freelancers and interns as well as subcontracted/outsourced workers who are hired through a third-party company and NOT under the direct payroll of the business/company.]

|              | IV.5              | IV.6                                 | IV.6a  | IV.7   | IV.1a                            | IV.1  | IV.2  | IV.3  | IV.4  |
|--------------|-------------------|--------------------------------------|--|--|----------------------------------|---|---|---|---|
|              | Number of workers | Minimum qualification level required | Wage/salary payment cycle  | Average monthly wage (in rupiah) [Enumerator to convert to monthly wage] | Main activity of [...]<br>JOBDES | Please specify, what occupations [1-digit KBJI] for which there are workers in this business/company [USE DROP-DOWN MENU] | Please specify, what occupations [2-digit KBJI] for which there are workers in this business/company [USE DROP-DOWN MENU] | Please specify, what occupations [3-digit KBJI] for which there are workers in this business/company [USE DROP-DOWN MENU] | Please specify, what occupations [4-digit KBJI] for which there are workers in this business/company [USE DROP-DOWN MENU] |
| Occupation 1 | _____             | _____                                | 1. Per hour<br>2. Per day<br>3. Per week<br>4. Per month<br>5. Lump sum<br>6. Per unit of work | _____<br>_____<br>_____<br>_____<br>_____<br>_____                       |                                  |   |   |   |   |
| Occupation 2 | _____             | _____                                | 1. Per hour<br>2. Per day<br>3. Per week<br>4. Per month<br>5. Lump sum<br>6. Per unit of work | _____<br>_____<br>_____<br>_____<br>_____<br>_____                       |                                  |   |   |   |   |
| Occupation 3 | _____             | _____                                | 1. Per hour<br>2. Per day<br>3. Per week<br>4. Per month<br>5. Lump sum<br>6. Per unit of work | _____<br>_____<br>_____<br>_____<br>_____<br>_____                       |                                  |   |   |   |   |
| Etc.         | _____             | _____                                | 1. Per hour<br>2. Per day<br>3. Per week<br>4. Per month<br>5. Lump sum<br>6. Per unit of work | _____<br>_____<br>_____<br>_____<br>_____<br>_____                       |                                  |   |   |   |   |

**Code for IV.6:**

- 01. Lower-secondary school (SMP) or below
- 02. Upper-secondary school (SMA)
- 03. Vocational school (SMK)
- 04. Diploma I/II
- 05. Diploma III
- 06. Diploma IV/Strata I
- 07. Strata II (master's)
- 08. Strata III (PhD/doctorate)
- 95. Other, specify \_\_\_\_\_
- 96. No education qualification required

**MODULE 3: INFORMATION ON EMPLOYMENT FLOWS BY OCCUPATION**

Now I would like to ask questions about vacancies and employment flows in this business/company. [Note to Enumerator: The same definition of “workers” applies. Workers include workers who are subcontracted if they are under the direct payroll of this business/company, independent if they are temporal or permanent, seasonal or full-time or part-time, foreigners or nationals. However, they exclude freelancers and interns, as well as subcontracted/outsourced workers who are hired through a third-party company and NOT under the direct payroll of the business/company.]

|            |  |                              |
|------------|--|------------------------------|
| <b>V.1</b> | Has this business/company thought about opening a vacancy during the last 12 months but ended up not doing it because it is afraid that it would not find the skills needed? | 1. Yes<br>3. No → <b>V.3</b> |
|------------|--|------------------------------|

|            |  |                              |
|------------|--|------------------------------|
| <b>V.2</b> | Please list the occupations in which this business/company thought about opening a vacancy but did not do it:                  |                              |
|            | <b>Description</b>   | <b>KBJI</b>                  |
|            | Occupation 1   |                              |
|            | Occupation 2   |                              |
|            | Occupation 3   |                              |
|            | Occupation 4   |                              |
|            | Etc.   |                              |
| <b>V.3</b> | Did this business/company try to hire workers in the last 12 months? (REGARDLESS OF WHETHER THEY WERE EVENTUALLY HIRED OR NOT) | 1. Yes<br>3. No → <b>V.5</b> |

|            |   |              |   |  |
|------------|---|--------------|---|--|
| <b>V.4</b> | Please list the occupations in which this business/company tried to hire: |              |   |  |
|            | <b>V.4A</b>   | <b>V.4B</b>  | <b>V.4C</b>   | <b>V.4D</b>  |
|            | Description   | 4-digit KBJI | Was it difficult to hire workers for this occupation? | If hiring was difficult, what was the main reason? |
|            | Occupation 1  |              | 3. No ↓ 1. Yes  |  |
|            | Occupation 2  |              | 3. No ↓ 1. Yes  |  |
|            | Occupation 3  |              | 3. No ↓ 1. Yes  |  |
|            | Occupation 4  |              | 3. No ↓ 1. Yes  |  |
|            | Etc.  |              | 3. No ↓ 1. Yes  |  |

**Code for V.4D:**

- 1. No or few applicants
- 2. Applicants lacked required skills
- 3. Applicants demanded wages higher than the business/company was offering
- 4. Applicants did not like working conditions
- 5. Other, specify \_\_\_\_\_
- 8. DON'T KNOW

|            |  |                              |
|------------|--|------------------------------|
| <b>V.5</b> | Does this business/company have job openings, or is it planning to announce vacancies in the next two weeks? | 1. Yes<br>3. No → <b>V.7</b> |
|------------|--|------------------------------|

| V.6 Please list the occupations in which this business/company has/will have vacancies in the next two weeks: |              |   |   |  |
|---|--------------|---|---|--|
| V.6A  | V.6B         | V.6C  | V.6D  |  |
| Description   | 4-digit KBJI | What is the number of vacancies in this occupation?<br>[ENUMERATOR: COMPLETE WITH 9998 IF DOESN'T KNOW] | How long has the vacancy been opened? [NUMBER OF WEEKS]<br>[ENUMERATOR: COMPLETE WITH 9998 IF DOESN'T KNOW; COMPLETE WITH 0 IF THE VACANCY HAS NOT YET BEEN OPENED] |  |
| Occupation 1  |              |   |   |  |
| Occupation 2  |              |   |   |  |
| Occupation 3  |              |   |   |  |
| Occupation 4  |              |   |   |  |
| Etc.  |              |   |   |  |

**Employment growth**  
**[ENUMERATOR NOTE: "An increase in employment" means an increase in net term. i.e., hiring minus firing/forced to leave/resignation]**

|             |  |
|-------------|--|
| <b>V.7a</b> | Are there any occupations in this business/company with an increase in employment in the past 12 months?<br>1. Yes<br>3. No → <b>V.8</b> |
|-------------|--|

| V.7 Please list the occupations in which this business/company increased employment in the last 12 months: |              |   |  |  |
|--|--------------|---|--|--|
| V.7A   | V.7B         | V.7C  | V.7D   |  |
| Description  | 4-digit KBJI | By how many persons is employment higher in this occupation than it was 12 months ago? [ENUMERATOR: COMPLETE WITH 9998 IF DOESN'T KNOW] | How many people currently work in this occupation?<br>[ENUMERATOR: COMPLETE WITH 9998 IF DOESN'T KNOW] |  |
| Occupation 1   |              |   |  |  |
| Occupation 2   |              |   |  |  |
| Occupation 3   |              |   |  |  |
| Etc.   |              |   |  |  |

|            |   |                               |
|------------|---|-------------------------------|
| <b>V.8</b> | Does this business/company plan to increase employment in the next 12 months? | 1. Yes<br>3. No → <b>V.11</b> |
|------------|---|-------------------------------|

|              |  |                             |  |  |
|--------------|--|-----------------------------|--|--|
| <b>V.9</b>   | Please list the occupations in which this business/company plans to increase employment in the next 12 months: |                             |  |  |
|              | <b>V.9A</b><br>Description   | <b>V.9B</b><br>4-digit KBJI | <b>V.9C</b><br>By how many persons does this business/company expect to increase employment in this occupation in the next 12 months? [ENUMERATOR: COMPLETE WITH 9998 IF DOESN'T KNOW] | <b>V.9D</b><br>How many people currently work in this occupation? [ENUMERATOR: COMPLETE WITH 9998 IF DOESN'T KNOW] |
| Occupation 1 | _____  | _ _ _                       | _ _ _  | _ _ _  |
| Occupation 2 | _____  | _ _ _                       | _ _ _  | _ _ _  |
| Occupation 3 | _____  | _ _ _                       | _ _ _  | _ _ _  |
| Occupation 4 | _____  | _ _ _                       | _ _ _  | _ _ _  |
| Etc.         | _____  | _ _ _                       | _ _ _  | _ _ _  |

|             |  |  |
|-------------|--|--|
| <b>V.10</b> | Why is this business/company increasing total employment? Please provide a ranking for up to 3 reasons (IF RESPONDENT CAN'T GIVE 3 REASONS, 1 OR 2 REASONS ARE ACCEPTABLE) [SHOW SHOWCARD] | A. Increase in investment in machinery/equipment <input type="checkbox"/><br>B. Increase in production <input type="checkbox"/><br>C. Business expansion; opening new branches/outlets <input type="checkbox"/><br>D. Supportive seasonal factors, such as weather conditions <input type="checkbox"/><br>E. Increase in market demand and/or orders <input type="checkbox"/><br>V. Other _____ <input type="checkbox"/> |
|-------------|--|--|

**Employment contraction**  
**ENUMERATOR NOTE: "A decrease in employment" means a decrease in net term. i.e., firing/forced to leave/resignation minus hiring.**

|             |   |                               |
|-------------|---|-------------------------------|
| <b>V.11</b> | Has this business/company decreased employment in the last 12 months? | 1. Yes<br>3. No → <b>V.13</b> |
|-------------|---|-------------------------------|

|              |  |                              |  |   |
|--------------|--|------------------------------|--|---|
| <b>V.12</b>  | Please list the occupations in which this business/company decreased employment in the last 12 months: |                              |  |   |
|              | <b>V.12A</b><br>Description  | <b>V.12B</b><br>4-digit KBJI | <b>V.12C</b><br>By how many persons is employment lower in this occupation than it was 12 months ago? [ENUMERATOR: COMPLETE WITH 9998 IF DOESN'T KNOW] | <b>V.12D</b><br>How many people currently work in this occupation? [ENUMERATOR: COMPLETE WITH 9998 IF DOESN'T KNOW] |
| Occupation 1 | _____  | _ _ _                        | _ _ _  | _ _ _   |
| Occupation 2 | _____  | _ _ _                        | _ _ _  | _ _ _   |
| Occupation 3 | _____  | _ _ _                        | _ _ _  | _ _ _   |
| Occupation 4 | _____  | _ _ _                        | _ _ _  | _ _ _   |
| Etc.         | _____  | _ _ _                        | _ _ _  | _ _ _   |



|             |   |                         |
|-------------|---|-------------------------|
| <b>V.13</b> | Does this business/company plan to decrease employment in the next 12 months? | 1. Yes                  |
|             |   | 3. No → <b>MODULE 5</b> |

| Please list the occupations in which this workplace plans to decrease employment in the next 12 months: |              |   |   |
|---|--------------|---|---|
| <b>V.14A</b>  | <b>V.14B</b> | <b>V.14C</b>  | <b>V.14D</b>  |
| Description   | 4-digit KBJI | By how many persons is this business/company expected to decrease employment in this occupation in the next 12 months? [ENUMERATOR: COMPLETE WITH 9998 IF DOESN'T KNOW] | How many people currently work in this occupation? [ENUMERATOR: COMPLETE WITH 9998 IF DOESN'T KNOW] |
| Occupation 1  | _____        | _____   | _____   |
| Occupation 2  | _____        | _____   | _____   |
| Occupation 3  | _____        | _____   | _____   |
| Etc.  | _____        | _____   | _____   |

|                         |  |  |       |
|-------------------------|--|--|-------|
| <b>V.15</b>             | Why is this business/company decreasing total employment? Please provide a ranking for up to 3 reasons (IF RESPONDENT CAN'T GIVE 3 REASONS, 1 OR 2 REASONS ARE ACCEPTABLE) [SHOW SHOWCARD] | A. Reduction in investment in machinery/equipment                      | _____ |
|                         |  | B. Substitute workers with machines                                    | _____ |
|                         |  | C. Decrease in production  | _____ |
|                         |  | D. Business contraction; reduction in number of branch offices/outlets | _____ |
|                         |  | E. Unsupportive seasonal factors                                       | _____ |
|                         |  | F. Work efficiency   | _____ |
|                         |  | G. Retirement/resignation  | _____ |
| V. Other, specify _____ | _____  |  |       |

|   |   |   |
|---|---|---|
| <b>VII.1</b>  | Does your business/company provide training for your workers? Training includes any formal (in class) or informal (mentoring, on-the-job, learning by doing, internships, etc.) training  | 1. Yes<br>3. No → VII.10  |
| <b>VII.2</b>  | Does this business/provide training?<br>A. When newly hired?<br>B. On a regular basis for all workers<br>C. On a regular basis for some workers<br>D. Depending on business needs<br>E. <b>if (VII.2) D = 1</b> What is an example of the most recent reason for training based on business need? | <p>1. Yes<br/>3. No</p> <p>1. Every less than 3 months<br/>2. Every 3–5 months<br/>3. Every 6–11 months</p> <p>1. Yes<br/>3. No</p> <p>1. Yes<br/>3. No</p> <p>04.. Business expansion with large number of newly hired<br/>05. Long time since the last training<br/>95. Other _____</p> |
| <b>VII.3</b>  | Who do you usually train? <b>[SELECT ALL THAT APPLY]</b>  | <b>VII.7</b>  |
| A. Low-skill workers (lower-secondary school; upper-secondary school)                         | What do you usually train on:<br>A. Technical skills<br>B. Socioemotional skills (e.g., interpersonal skills, team work, work ethic)<br>C. Management skills<br>D. Business values and company's goals/objectives<br>V. Other, specify _____  | <b>VII.5</b><br>Who usually provides the training for your workers?<br><b>[SELECT ALL THAT APPLY]</b><br>A. More experienced workers/supervisors<br>B. Accredited schools<br>C. Private training providers (i.e., nonaccredited training providers)<br>V. Other, specify _____            |
| B. Medium-skill workers (vocational school [SMK], Diploma I/II, Diploma III)                  | A. Technical skills<br>B. Socioemotional skills (e.g., interpersonal skills, team work, work ethic)<br>C. Management skills<br>D. Business values and company's goals/objectives<br>V. Other, specify _____   | <b>VII.6</b><br>Where is the training delivered?<br><b>[SELECT ALL THAT APPLY]</b><br>A. At the business/company<br>B. In a school<br>C. Training venue<br>V. Other, specify _____  |
| C. High-skill workers (Diploma IV/Strata I, Strata II [master's], Strata III [PhD/doctorate]) | A. Technical skills<br>B. Socioemotional skills (e.g., interpersonal skills, team work, work ethic)<br>C. Management skills<br>D. Business values and company's goals/objectives<br>V. Other, specify _____   | <b>VII.6</b><br>Where is the training delivered?<br><b>[SELECT ALL THAT APPLY]</b><br>A. At the business/company<br>B. In a school<br>C. Training venue<br>V. Other, specify _____  |
| D. Depending on business need   | A. Technical skills<br>B. Socioemotional skills (e.g., interpersonal skills, team work, work ethic)<br>C. Management skills<br>D. Business values and company's goals/objectives<br>V. Other, specify _____   | <b>VII.6</b><br>Where is the training delivered?<br><b>[SELECT ALL THAT APPLY]</b><br>A. At the business/company<br>B. In a school<br>C. Training venue<br>V. Other, specify _____  |
|   |   | <b>VII.7</b><br>How long does a training usually last?<br>1. Less than 1 day<br>2. 2–6 days<br>3. 1 week<br>4. >1–4 weeks<br>5. >1–6 months<br>6. More than 6 months<br>8. DON'T KNOW   |

|                |  |   |
|----------------|--|---|
| <b>VII.8</b>   | Did this establishment initiate or was this establishment invited by a training institution or government institution to be involved in the formulation of curriculum or technical competence? | <p>A. Yes, with training institution</p> <p>B. Yes, with government</p> <p>C. Through employers' associations or chambers of commerce</p> <p>V. Yes, Other _____ → <b>COV 1</b></p> <p>D. No, it didn't</p>   |
| <b>VII.9</b>   | Why doesn't your business/company get involved in developing training curricula?   | <p>A. I didn't know we could</p> <p>B. It's too costly</p> <p>C. It doesn't generate change</p> <p>D. No request/not needed</p> <p>Y. DON'T KNOW</p> <p>→ <b>COV 1</b></p>  |
| <b>VII.10</b>  | Why don't you provide training to your workers?<br>[SELECT ALL THAT APPLY ]  | <p>A. They should be trained outside the job, before joining the business/company</p> <p>B. Don't have resources to train workers</p> <p>C. Business doesn't need more skilled workers/business needs don't justify training</p> <p>V. Other _____</p>  |
| <b>COV1</b>    | Interview result   | <p>1. Completed → <b>CP</b></p> <p>2. Partially completed</p> <p>3. Not completed</p>   |
| <b>COV2</b>    | Reason for partially completed/not completed   | <p>01. Respondent is unavailable</p> <p>02. Respondent is severely ill</p> <p>03. Respondent refuses, replaced with [business/company ID:]</p> <p>04. Not found, replaced with [business/company ID:]</p> <p>05. Located outside sampling area, replaced with [business/company ID:]</p> <p>06. Closed, replaced with [business/company ID:]</p> <p>07. Respondent is waiting for disposition/approval from HRD/owner/director, no further confirmation received</p> <p>08. Respondent must ask for approval from branch/headquarters office first, no further confirmation received</p> <p>09. Business/company merged with other business/company, its 2-digit KBLI changed</p> <p>10. Address found but name of business/company and 2-digit KBLI changed</p> <p>11. Business/company's 2-digit KBLI changed</p> <p>12. Business/company's name duplicate _____</p> <p>13. Address found but no staff presence _____</p> <p>95. Other _____ replaced with [business/company ID:]</p> |
| <b>COV2_ID</b> | Business/company ID of replacing business/company  | _____   |
| <b>COV3</b>    | Is [...] additional sample to meet sample shortcoming in some other district/city?   | YES   |
| <b>COV4</b>    | Shortcoming in which district/city?  | NO → <b>CP</b>  |
|                |  | _____ (CAPI POP UP ALL SAMPLE DISTRICTS/CITIES)   |

**SECTION CP. ENUMERATOR NOTES**

|  |   |
|--|---|
| <b>CP01.</b> WHAT LANGUAGE WAS USED DURING THE ENTIRE/MOST OF THE INTERVIEW?   | <p>00. INDONESIA 04. MADURA 08. GORONTALO<br/>           01. BETAWI 05. SASAK 09. BUGIS<br/>           02. SUNDA 06. MI/B/SRIN 10. MAKASAR<br/>           03. JAWA 07. MANADO 95. LAINNYA, _____</p> <p>1. YES, [ ] [ ] [ ] [ ] _____ (SELECTION CODE SIMILAR TO CP01)<br/>           3. NO</p> <p>A. _____ C. _____<br/>           B. _____ D. _____</p> <p>1. VERY GOOD 4. POOR<br/>           2. GOOD 5. VERY POOR<br/>           3. ADEQUATE</p> <p>1. VERY GOOD 4. POOR<br/>           2. GOOD 5. VERY POOR<br/>           3. ADEQUATE</p> |
| <b>CP02.</b> WERE ANY OTHER LANGUAGES USED?  | <p>1. YES, [ ] [ ] [ ] [ ] _____ (SELECTION CODE SIMILAR TO CP01)<br/>           3. NO</p>  |
| <b>CP03.</b> WHO (OTHER PERSON) OTHER THAN THE RESPONDENT WAS PRESENT DURING THE INTERVIEW?  | <p>A. _____ C. _____<br/>           B. _____ D. _____</p>   |
| <b>CP04.</b> HOW WOULD THE ENUMERATOR EVALUATE THE ACCURACY OF THE RESPONDENT'S ANSWERS?   | <p>1. VERY GOOD 4. POOR<br/>           2. GOOD 5. VERY POOR<br/>           3. ADEQUATE</p>  |
| <b>CP05.</b> HOW WOULD THE ENUMERATOR EVALUATE THE ENGAGEMENT OF THE RESPONDENT?   | <p>1. VERY GOOD 4. POOR<br/>           2. GOOD 5. VERY POOR<br/>           3. ADEQUATE</p>  |
| <b>CP06.</b> WHICH QUESTIONS MADE IT DIFFICULT, EMBARRASSING, OR CONFUSING FOR THE RESPONDENT TO ANSWER? (WRITE DOWN IN SECTION AND QUESTION NUMBER) |   |

|              |   |
|--------------|---|
| <b>NOTES</b> | <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> |
|--------------|---|

## Endnotes

<sup>1</sup> Rich recent discussions can be found in World Economic Forum, 2020 and World Bank, 2019c.

<sup>2</sup> 77 percent of employers stated that they have difficulty hiring high-skilled workers (managers, senior professionals), 67 percent have difficulty hiring semi-skilled workers (for example, non-production technicians, associate professionals, sales representatives), and 43 percent have difficulty hiring low-skilled workers (unskilled, nonproduction workers) (Gomez-Mera and Hollweg 2018).

<sup>3</sup> For a rich discussion in the current labor market dynamics, see World Bank (forthcoming).

<sup>4</sup> Skill categories used throughout the report are defined according to occupations at the 1-digit KBJI (Indonesian Standard Classification of Occupations): low-skilled jobs are elementary occupations (KBJI 9); semi-skilled jobs are 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 (KBJI 4 to 8); and high-skilled jobs are managers, professionals, technicians, and associate professionals (KBJI 1 to 3). For a four-way classification of skills that combines type of jobs with skill level see World Bank (forthcoming), Figure 2.7, Annex Figure 2.11.

<sup>5</sup> World Bank (forthcoming), Figure 2.7 shows that in terms of occupational employment, the biggest occupational shift is from skilled agricultural and fishery jobs (-18 percent, that is a semi-skilled blue-collar occupation) into elementary occupations (22 percent, that are low-skilled) and service and sales workers (27 percent, semi-skilled white-collar occupations).

<sup>6</sup> According to the World Bank Enterprise Survey 2015, only 8 percent of firms trained workers in 2015. Manufacturing firms offering training did so to 48 percent of their employees (Gomez-Mera and Hollweg 2018).

<sup>7</sup> For a detailed description of mismatches, see CEDEFOP (2018).

<sup>8</sup> Indicators cannot be interpreted in isolation because doing so may lead to an inaccurate assessment. For example, an occupation with a large number of vacancies or net employment growth may not necessarily have good job opportunities since, due to the nature of the industry or job, the occupation may also have a large number of layoffs and high turnover. This is the case, for instance, with plumbers, who are hired when construction starts on a new building and are let go when the building is completed.

<sup>9</sup> It is assumed that the changes in occupational demand can only be detected after a period of three to five years.

<sup>10</sup> See Rutkowski, de Paz, and Levine (2018) for a definition of LMOs.

<sup>11</sup> High-value-added services firms include medium and large firms engaged in information and communication (KBLI 58–63), finance and other business (KBLI 63–64, 68, 69–75, 77–82), transportation and warehousing (KBLI 49–53), and construction (KBLI 42 and 432). Low-value-added services firms include all firms in the creative industry, as defined in Presidential Regulation no. 77/2015, and in the tourism industry, as defined in Minister of Tourism Regulation no. 10/2018.

<sup>12</sup> The population size for manufacturing is 5,371, for low-value-added services is 1,595,250 and for high-value-added services is 84,607.

<sup>13</sup> The RSE is the standard error expressed as a fraction of the estimate.

<sup>14</sup> Table A1 in the Short-Term Occupational Prospects companion report, reports the RSEs for all indicators used in this technical report.

<sup>15</sup> 31 percent was calculated using the total weighted employment of the OEVS sample (9,288,368 workers) over the total weighted employees in 2018 Sakernas on the sampled provinces and subsec-

tors (25,550,803 workers). It was not possible to estimate an accurate level of employment using Sakernas 2019 because the database does not have a 5-digit KBLI code. However, assuming that subsectors grew evenly within the sampled provinces, the percentage coverage would be 30 percent.

<sup>16</sup> A full accounting of occupations requires the collection of narrowly defined occupations (at the 4-digit classification) in the population census. This survey will be based on a sample, not a population.

<sup>17</sup> Due to the COVID-19 outbreak, data collection in manufacturing firms could not be completed, creating a sample of electronic and automotive firms below the target size.

<sup>18</sup> Readers familiar with the results from other surveys can skip this section.

<sup>19</sup> Throughout the report, firms are divided into three economic groups and into sectors within these groups. Economic groups include low-value-added services, high-value-added services, and manufacturing. While high-value-added services and manufacturing firms are defined by their 2-digit KBLI code, low-value-added services firms are defined by their 5-digit KBLI code, as explained in footnote 11. Thus, some firms in the low-value-added services economic group may fall within the manufacturing sector. These low-value firms are called “creative economy manufacturing” (and labeled in graphs as “crecon manufacturing”) in order to distinguish them from firms in the manufacturing economic group.

<sup>20</sup> Taking into account the OEVS’s limited geographic coverage, the distribution of firms by size is aligned with the latest economic census. In 2016 the census reported that 92.1 percent of establishments in the country had fewer than 10 workers, most of them in wholesale and retail trade, accommodation and food services, and manufacturing subsectors (BPS 2017).

<sup>21</sup> See World Bank (forthcoming) for results on Indonesia. This finding is not unusual in the literature. The seminal work of Abowd, Kramarz and Margolis (1999) shows that firm fixed effects explain a substantial proportion of the wage differential. Enterprises that pay higher wages, controlling for person effects, are more productive and more profitable. They are also more capital intensive but are not more high-skilled labor intensive. We find that person effects explain about 90% of inter-industry wage differentials and about 75% of the firm-size wage effect while firm effects explain relatively little of either differential.

<sup>22</sup> Using data from Sakernas, August 2018 and 2019, World Bank (forthcoming) estimates that 1.6 million jobs were created in Indonesia. However, the numbers cannot be extrapolated to this survey, as the sample differs (only three economic groups, consisting of very disaggregated economic sub-sectors whose information/data are not available in Sakernas and selected regions.)

<sup>23</sup> These statistics cannot be compared exactly with other sources, as the questions are formulated in a different way. The analysis of Sakernas data only covers job contractions for the whole economy between August 2018 and 2019 for the following sectors: agriculture, financial activities, and mining. As explained throughout the document, a one-to-one comparison between Sakernas and the OEVS is not possible due to different sampling framework/design, as the OEVS does not cover all sectors or all regions. For indicators with greater variation across sectors or space, some differences may not be fully attributable to the nature of the survey or to potential problems during data collection.

<sup>24</sup> From a baseline employment of 1,976,549 (or 21.3 percent of all employees).

<sup>25</sup> Garments from textile, knitted, and embroidered products, edible palm oil.

<sup>26</sup> With more rounds of OEVS data collection, it might be possible to do longer-term analysis. However, the current data are sufficient to understand occupations in the short run (two to three years out).

<sup>27</sup> Total demand in each occupation can be calculated as the sum of the total number of workers employed in the occupation and the total number of vacancies available at the firm when the survey was carried out.

<sup>28</sup> Once the pilot survey is institutionalized and repeated on a regular basis, the validity of the assumption can be put to test.

<sup>29</sup> This refers to net terms.

<sup>30</sup> Net change in employment (number) is the change in employment during the last 12 months in an occupation.

<sup>31</sup> Net employment growth (percent) is the percentage change in employment during the last 12 months in an occupation.

<sup>32</sup> The indicator “total vacancies” is defined as the total number of job openings in an occupation that were available at the firm when the survey was carried out.

<sup>33</sup> The indicator “total firms that tried to hire” is the total number of firms that reported trying to hire workers during the last 12 months in an occupation, irrespective of success.

<sup>34</sup> The turnover rate is the percentage of employees moving in and out of jobs within the last year.

<sup>35</sup> CEDEFOP (2018). Explains the usual causes of these misalignments.

<sup>36</sup> Hard-to-fill occupations are those that have been opened for a long time. Long time is defined as when the average number of days opened for a certain occupation is more than 67 days, which is the value corresponding to the 75<sup>th</sup> percentile of the distribution of opened days for all occupations.

<sup>37</sup> The occupation is considered to be difficult to hire if more than half of firms responded that it is difficult to hire workers due to a lack of applicants or a lack of applicants with appropriate skills.

<sup>38</sup> Two other signals indicate a skills shortage: (a) occupations that have experienced rapid wage increases and (b) occupations that were filled with work-

ers whose skills are not a good match for the job. This survey is not able to measure these two other cases.

<sup>39</sup> The companion Short-Term Occupational Prospects Report contains a statistical bulletin presenting the score along with 10 carefully selected indicators of occupational demand for each surveyed occupation at different levels of specificity (1-, 2-, 3-, and 4-digit levels). That report also contains a methodological appendix explaining the conditionalities that determine the score for occupations at the 4-digit level.

<sup>40</sup> 14 of the 42 bright occupations are also in the COL 2018. See appendix E for the overlapping list.

<sup>41</sup> Great majority means that at least 75 percent of jobs require that minimum level of education.

<sup>42</sup> Cluster analysis is an exploratory data-analysis technique measuring distances for determining similarity or dissimilarity between observations based on a set of variables. For the group of bright occupations among them, the variables include total employment at the firm, wages, and education requirements. Robustness of the clustering was tested including sector of employment.

<sup>43</sup> Chuah, Loayza, and Schmillen (2018) provide examples from previous industrial revolutions to back up this statement, recognizing that all industrial revolutions have their own particularities.

<sup>44</sup> The structural transformation is now requiring individuals to acquire new skills more than once in a lifetime.

<sup>45</sup> In other countries, the national statistics office is responsible for data collection, and the LMO only conducts tailored surveys.

<sup>46</sup> The Current Population Survey is the rotating labor force survey of the United States. It is the main labor force survey used to monitor the unemployment rate and beyond.

<sup>47</sup> For the OES, see [www.bls.gov/oes/](http://www.bls.gov/oes/). The OES includes full-time and part-time workers, but it does not cover self-em-

ployed workers, owners and partners in unincorporated firms, household workers, or unpaid family workers.

<sup>48</sup> For the March 2020 questionnaire, see [https://www.bls.gov/respondents/oes/pdf/forms/uuuuuu\\_fillable.pdf](https://www.bls.gov/respondents/oes/pdf/forms/uuuuuu_fillable.pdf).

<sup>49</sup> Since estimates may not always be representative at the occupational level, the BLS publishes the mean and the relative standard error (RSE), a measure of the reliability or precision of the estimate. Industry-level estimates include up to the 6-digit North American Industry Classification System (NAICS) industrial groups, approximately 415 classifications.

<sup>50</sup> CareerOneStop is a portal sponsored by the US Department of Labor that integrates several trustworthy labor information tools and resources in one place for job seekers, students, workers, workforce intermediaries, and employers with the aim of enhancing job and business opportunities. See [www.careeronestop.org](http://www.careeronestop.org).

<sup>51</sup> The current JOLTS program began in 1999, and the first estimates were released in 2002. Before then, the BLS collected information on job openings and turnover through surveys on particular states or industries dependent on budget availability (Clark 2004). It does not cover proprietors and partners of unincorporated businesses, unpaid family workers, or employees on strike or on leave without pay, among others.

<sup>52</sup> For the questionnaire, see <https://www.bls.gov/jlt/jltc1.pdf>.

<sup>53</sup> For most updated BLS publications using JOLTS data, see <https://www.bls.gov/jlt/publications.htm>.

<sup>54</sup> For the ORS, see <https://www.bls.gov/opub/hom/ors/>. Civilian workers covered include those in private industry, state governments, and local governments and exclude workers in the federal government, the military, the agriculture sector, and private households and the self-employed. Since estimates may not always be representative at the occupational level, the BLS publishes the mean and the RSE, a measure of the reliability or precision of the estimate.

<sup>55</sup> For the ORS questionnaire, see <https://www.bls.gov/ors/information-for-survey-participants/collection-materials.htm>.

<sup>56</sup> For the response rate for OES and JOLTS, see <https://www.bls.gov/osmr/response-rates/home.htm#chart2a>.

<sup>57</sup> See <https://ec.europa.eu/eurostat>.

<sup>58</sup> Harmonized data for five countries for 1995 are available on request. For the list of all participant countries by SES round, see <https://ec.europa.eu/eurostat/documents/203647/771732/Datasets-availability-table.pdf/8b046263-8535-4161-8b7c-b1df47fbeb3c>.

<sup>59</sup> Some countries provide information on enterprises with fewer than 10 employees on a voluntary basis.

<sup>60</sup> A-Q activity categorization, which is between 1- and 2-digit Nomenclature of Economic Activities (NACE).

<sup>61</sup> For a complete list of variables, see [https://ec.europa.eu/eurostat/documents/203647/203707/SES\\_variables\\_list.xls/b287a6fc-19b2-493d-a3f2-4ee70d3439b1](https://ec.europa.eu/eurostat/documents/203647/203707/SES_variables_list.xls/b287a6fc-19b2-493d-a3f2-4ee70d3439b1).

<sup>62</sup> Starting wage refers to basic wages for new employees with no work experience. Basic wages exclude employer Central Provident Fund contributions, bonuses, overtime payments, commissions, allowances (for example, shift, food, housing, and transport), other monetary payments and payments-in-kind, while gross wages include these items. For a template of the questionnaire, see CPF Board (2019, 10).

<sup>63</sup> An infocomm professional is a “person engaged primarily in infocomm-related work, including infocomm data analytics, either in an IT or telecommunication equipment and/or services provider, or user organisation (such as in a bank).”

<sup>64</sup> For questionnaires for the three modules, see the annex in UBOS (2018).

<sup>65</sup> Throughout the report, firms are divided into three economic groups and into sectors within these groups. Economic groups include low-value-added services, high-value-added services, and manufacturing. While high-value-added services and manufacturing firms are defined by

their 2-digit KBLI code, low-value-added services firms are defined by their 5-digit KBLI code, as explained in footnote 11. Thus, some firms in the low-value-added services economic group may fall within the manufacturing sector. These low-value firms are called “creative economy manufacturing” (and labeled in graphs as “cr econ manufacturing”) in order to distinguish them from firms in the manufacturing economic group.

<sup>66</sup> Taking into account the OEVS’s limited geographic coverage, the distribution of firms by size is aligned with the latest economic census. In 2016 the census reported that 92.1 percent of establishments in the country had fewer than 10 workers, most of them in wholesale and retail trade, accommodation and food services, and manufacturing subsectors (BPS 2017).

<sup>67</sup> The type of firm can be considered a proxy for business formality: public enterprises, limited liability enterprises, limited partnerships, general partnerships, cooperatives and pension funds, foundations, special permit licenses, and foreign companies are all required to have a legal basis and can be considered formal; in contrast, individual or household enterprises do not necessarily have a legal basis and can be considered informal.

<sup>68</sup> Household enterprises are private businesses that are not legally incorporated. There is usually no separation between the personal wealth of the owner and the wealth of the firm. Thus, any risk or liability falls on the owner or household.

<sup>69</sup> See World Bank (forthcoming)

<sup>70</sup> According to Sakernas data, 38.5 percent of all workers are women. At the same time, women constitute less than 5 percent of workers in the transportation and construction sectors and almost half in accommodation and food services, wholesale and retail trade, and manufacturing (World Bank calculations from BPS 2019).

<sup>71</sup> In 2015, 43 percent of workers in the manufacturing sector had a secondary education, while 43 percent had less education (World Bank, forthcoming).

<sup>72</sup> See note 3 for a definition of skill levels.

# References

- Abowd, John M., and Francis Kramarz. 1999. "The Analysis of Labor Markets Using Matched Employer-Employee Data." *Handbook of Labor Economics* 3 (Part B): 2629–710.
- Abowd, J.M., Kramarz, F. and Margolis, D.N., 1999. "High wage workers and high wage firms." *Econometrica*, 67(2), pp.251-333.
- Acemoglu, Daron, and Pascual Restrepo. 2020. "Unpacking Skill Bias: Automation and New Tasks." *AEA Papers and Proceedings* 110 (May): 356–61.
- ADB (Asian Development Bank). 2019. "The evolution of Indonesia's participation in Global Value Chains." Manila, Philippines.
- Artuc, Erhan, Paulo Bastos, and Bob Rijkers. 2018. "Robots, Tasks, and Trade." Policy Research Working Paper 8674, World Bank, Washington, DC.
- BPS (Badan Pusat Statistik). 2017. "Result of Establishment Listing Economic Census, 2017." BPS, Jakarta.
- BPS (Badan Pusat Statistik). 2019. "Labor Force Situation in Indonesia, August 2019." BPS, Jakarta.
- Brambilla, I., Dix Carneiro, R., Lederman, D., Porto, G. 2011. "Skills, Exports, and the Wages of Seven Million Latin American Workers." NBER working paper 15996.
- CEDEFOP (European Centre for the Development of Vocational Training). 2018. "Insights into Skills Shortages and Skills Mismatches: Learning from CEDEFOP's European Skills and Jobs Survey." *Thermi, Greece: CEDEFOP*.
- Chuah, Lay Lian, Norman V. Loayza, and Achim D. Schmillen. 2018. "The Future of Work: Race with—Not Against—the Machine." Research & Policy Brief from the World Bank Malaysia Hub 16 (August), World Bank, Washington, DC.
- Clark. 2004. "The Job Openings and Labor Turnover Survey: what initial data show." U.S. Department of Labor, Bureau of Labor Statistics 127(11).
- CPF (Central Provident Fund) Board. 2019. "Occupational Wage Survey (OWS), June 2019: Guide on How to Fill in and Submit the Survey Forms." CPF, Singapore. [https://www.cpf.gov.sg/assets/employers/Documents/OWS\\_2019\\_Booklet.pdf](https://www.cpf.gov.sg/assets/employers/Documents/OWS_2019_Booklet.pdf).
- Dicarlo, E., Lo Bello, S., Monroy-Taborda, S., Oviedo, A., Sanchez Puerta, M., Santos, I. 2016. "The Skill Content of Occupations across Low and Middle Income Countries: Evidence from Harmonized Data." IZA Discussion Papers No 10224.
- Gomez-Mera, Laura, and Claire H. Hollweg. 2018. "Firm Performance and Constraints in Indonesia." World Bank, Washington, DC.
- IMDA (Infocomm Media Development Authority). 2019. "Annual Survey on Infocomm Media Manpower." IMDA, Singapore.
- McNulty, Erin, and Alice Yu. 2019. "Evaluation of a Sample Design Based on Predicted Occupational Frame Data." Bureau of Labor Statistics, Washington, DC.
- Ministry of Manpower. 2018. "Survey Coverage and Methodology: Occupational Wage Survey, 2018." Ministry of Manpower, Singapore. [https://stats.mom.gov.sg/iMAS\\_Tables1/Wages/Wages\\_2018/Coverage\\_and\\_Methodology\\_of\\_OWS\\_2018.pdf](https://stats.mom.gov.sg/iMAS_Tables1/Wages/Wages_2018/Coverage_and_Methodology_of_OWS_2018.pdf)
- Ministry of Manpower. 2019. "Annual Report: 2019 Job Vacancies." Ministry of Manpower, Singapore. <https://stats.mom.gov.sg/Pages/Job-Vacancies-2019.aspx>.
- Rutkowski, Jan, Carmen de Paz, and Victoria Levine. 2018. "Labor Market Observatories: Critical Success Factors." Job Notes 4, World Bank, Washington, DC.
- Sorensen, Kjartan, and Jean-Michel Mas. 2016. "A Roadmap for the Development of Labor Market Information Systems." Washington, DC: Workforce Connections.
- Taylor, Timothy. 2016. "Automation and Job Loss: Leontief in 1982." *Conversable Economist* (blog), August 22. <https://conversableeconomist.blogspot.com/2016/08/automation-and-job-loss-leontief-in-1982.html?m=1>
- UBOS (Uganda Bureau of Statistics). 2018. *Manpower Survey Uganda (MAPU) 2016/2017 Report*. Kampala: UBOS. [https://www.ubos.org/wp-content/uploads/publications/08\\_20182018\\_Uganda\\_Manpower\\_Survey\\_Report.pdf](https://www.ubos.org/wp-content/uploads/publications/08_20182018_Uganda_Manpower_Survey_Report.pdf).
- World Bank. 2016. *World Development Report 2016: Digital Dividends*. Washington, DC: World Bank.
- World Bank. 2019a. *Aspiring Indonesia—Expanding the Middle Class*. Washington, DC: World Bank.
- World Bank. 2019b. *Economic Quarterly Reports: Investing in People*. World Bank, Washington, DC.
- World Bank. 2019c. *World Development Report 2019: The Changing Nature of Work*. Washington, DC: World Bank.
- World Bank. 2020. *Toward a World-Class Labor Market Information System for Indonesia An Assessment of the System Managed by the Indonesian Ministry of Manpower*. Washington, DC: World Bank
- World Bank and CMEA. 2020. *Indonesia's Critical Occupation List 2018. Social Protection & Jobs Global Practice*. World Bank. <http://documents.worldbank.org/curated/en/763611585857010121/Indonesias-Critical-Occupations-List-2018-Technical-Report>
- World Bank. Forthcoming. "Pathways to Middle-Class Jobs in Indonesia." Washington, DC: World Bank.
- World Economic Forum. 2020. "The Future of Jobs Report 2020." Geneva.



