INDO TASK

Indonesia's Occupational Tasks and Skills

From occupational employment demand to tasks and skills requirements

2020

WORLD BANK GROUP

Kementerian PPN/ Bappenas

Australian Government

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Contents

Acknowledgements

This technical report was prepared by a World Bank team led by Josefina Posadas (Senior Economist and Task Team Leader) and comprising (in alphabetical order): Hamidah Alatas (Research Analyst and World Bank Consultant) and Julia Granata (Labor Economist and World Bank Consultant). Abror Tregar Pradana (Research Analyst and World Bank Consultant) and Petra Wiyakti Bodrogini (Education Specialist) provided excellent support at different points of the data collection and analysis process. SurveyMETER did an outstanding job in collecting the data. The team thanks Wendy Cunningham for her contribution during the initial stages in defining the activity and Ignacio Apella, Victoria Levin, Harry Moroz, and Achim Schmillen for the useful discussions and comments.

The team is grateful for the leadership of Bappenas throughout the course of the assignment. In particular, it would like to thank Dr. Pungky Sumadi (Deputy of Population and Labor) and Ms. Mahatmi Parwitasari Saronto (Director of Labor and Employment) for their support and guidance.The work was conducted under the general guidance of Satu Kahkonen (Country Director for Indonesia) and Yasser El-Gammal (Practice Manager for Social Protection and Jobs, East Asia and Pacific Region). The report was made possible by a grant from the Partnership for Knowledge-based Poverty Reduction (PKPR) from the Australian Government - Department of Foreign Affairs and Trade (DFAT).

The report team also thanks Corinne Bernaldez and Rizky Fitriany for providing excellent administrative support. Reyes Work designed the report and infographics.

The findings, interpretations, and conclusions expressed in this document are those of the authors and do not necessarily reflect the views of the executive directors of the World Bank, the governments they represent, or the counterparts with whom they consulted or engaged during the study process.

Abbreviations

4IR	Fourth Industrial Revolution
ALL	Adult Literacy and Life Skills Survey
Bappenas	Ministry of Development Planning
CMEA	Coordinating Ministry for Economic Affairs
COL	Indonesia's Critical occupation list
ETS	Educational Testing Service
Indotask	Indonesia's Occupational Tasks and Skills
IOEO	Indonesia's Occupational Employment Outlook
KBJI-2014	Indonesian Standard Classification of Occupations (Klasifikasi Baku Jabatan Indonesia 2014)
LMIS	Labor market information system
O*NET	Occupational Information Network
OECD	Organisation for Economic Co-operation and Development
OEVS	Occupational Employment and Vacancy Survey
OVO	Indonesia's Online Vacancy Outlook
PIAAC	Programme for the International Assessment of Adult Competencies
STEP	Survey Toward Employability and Productivity
TVET	Technical and Vocational Education and training

Executive Summary

Indonesia's Occupational Tasks and Skills (Indotask) pilot is a timely effort to meet the data needs for workforce development policy and skills monitoring. Technological change and other megatrends are influencing the optimal allocation of skills to tasks in the labor market. The Government of Indonesia is determined to develop an advanced labor market information system to provide reliable and timely information needed for making sound policy decisions and informing key labor market actors. The COVID-19 pandemic and crisis have accelerated the need for labor market monitoring that puts occupations' dynamics, skills, and tasks at the center.

Indotask is the first attempt to collect detailed occupational data on tasks and skills in Indonesia. The online instrument adapts two modules of the U.S. Occupational Information Network (O*NET), a globally recognized and comprehensive database describing almost a thousand occupations in the United States. The pilot included 51 occupations that were identified as in high demand and/or strategic for Indonesia's economy in the *Critical Occupation List 2018*[1] and in *Indonesia's Occupational Employment Outlook (IOEO) 2020.*[2] This report aims to explain the applied methodology and its caveats for data interpretation, showcase potential applications of the data, discuss the reliability of the estimates, and present lessons learned. An accompanying report, *Indonesia's Occupational Tasks and Skills Profiles,* presents a detailed description of each of the surveyed occupations using Indotask data.

O*NET was chosen as the instrument to be replicated in Indonesia because of its comprehensiveness and flexibility and its large number of applications among varied end-users. First and foremost, O*NET probably has the largest number of users and applications of any database in the world, used by academia, policy makers, and other end-users. Second, O*NET represents one of the oldest attempts to provide a comprehensive description of occupations. As such, it has been evolving over time, applying and experimenting different methodologies, with lessons learned that Indonesia can benefit from. Third, since the questionnaires for the different components can be delivered online and are usually administered in batches, covering about 100 occupations a year, O*NET provides flexibility to deploy them selectively. Therefore, the cost of running the survey is relatively low, at least compared with other methodologies, and its flexibility

allows Indonesia to focus on the occupational attributes that are most pressing and to develop capacity progressively over time without overburdening its embryonic system.

The skills module was chosen for replication since skills information is used by multiple audiences and has been assessed as a critical input to develop the Indonesian skills system. This module complements nicely the efforts to describe skills through real-time data gathered from online job postings. While real- time data have many advantages—low cost, high frequency, granularity—they can fall short in countries with high levels of informality like Indonesia. There is no sound evidence about how findings from formal job postings can be generalized to describe informal jobs, and there is no simple way of disentangling whether a job posting corresponds to a formal or informal position. O*NET methodology can be selectively deployed to occupations with high levels of informality to assess the skills needed and, in this way, can complement the findings from real-time data.

What makes O*NET unique is its collection of information on tasks and work activities. The vast majority of the scientific evidence on the impact of technological change on labor (and skills) demand has been relying on O*NET data comprising skills, tasks, and work activities. This evidence mostly focuses on high-income countries, and even when it focuses on low-income countries it still relies on O*NET, forcing researchers to make the critical assumption that the technology used for producing output (or production function) is the same as in the United States. However, this is a strong and controversial assumption. Internationally comparable firm data, like that derived from the World Bank Enterprise Surveys, shows that the input mix and the returns of firms vary considerably across countries. Hence, having country-specific information equivalent to O*NET will allow researchers and others to monitor and project the impact of technological change on production inputs, as well as the policy responses to manage it.

When subject to data quality tests, the most used variables of the skills module perform well, suggesting that Indonesia should continue with this effort. The data were subject to the same battery of tests that O*NET runs. For example, for the skills module, two key variables were collected measuring the importance and level of use of each of the 35 skills assessed by O*NET. While the level variable turned out to be too noisy to pass the strict thresholds of O*NET, the importance variable successfully passed them. The different background of raters did not seem to affect the quality of their responses. Hence, Indonesia could scale up the collection of those variables that passed the data quality checks, continue piloting those that did not, and add to the pilot additional O*NET modules.

Granular data on tasks can be used to inform research, curricula development, and technology adoption. While task statements were not subject to the same battery of tests as O*NET performs, the results are found relevant for policy design and to maintain the national occupation classification. The task data show that workers in high-skilled occupations are more likely to engage in a varied number of tasks that are more abstract in nature, while workers in low-skilled occupations focus on fewer and more repetitive tasks. Workers in semi-skilled occupations fall between these two, with a mix of tasks.

Among the selected list of 51 occupations inspected in this pilot, medium-level qualifications continue to be important. High-skilled occupations largely require bachelor's degrees and above, while semi-skilled occupations mostly require technical and vocational education and training (TVET). The more skilled the occupation is, the more it values prospective employees with certifications, apprenticeships, and prior experience. Prospective employees at semi- and high-skilled occupations are expected to have a related certification and/or apprenticeship. For low-skilled occupations, by contrast, while certifications do not seem to be relevant, apprenticeships are important.

Basic skills acquired during the formative years, which are the building blocks of other skills, are the top-rated skills in level of importance. The top three skills, in level of importance, are speaking, reading comprehension, and active listening. These results call for Indonesia to keep improving its basic and TVET education systems, a need that is

most pressing at present. The analysis of Indotask data and other sources suggests that firms in Indonesia—or at least firms in the selected sectors and regions of the sampling framework—are not yet demanding the skills needed for technology adoption. Since Indotask focuses on examining occupations in high demand in selected key sectors,[3] it is still possible that overall technology investments are propelled by the dynamics of stable occupations (that is, by occupations that might be growing but for which there are no shortages because the supply is responding to the demand) or by occupations in high demand in other sectors of the economy.

Most importantly, the comparison of Indotask and O*NET skills data reveals substantial differences in the use of skills for comparable occupations. While Indonesia ranks the importance of all skills higher than O*NET, once results are standardized to account for potential biases in scale perceptions the results show that only three skills out of the 35 remain relatively more important for Indonesia than for the United States (these three are equipment maintenance, equipment selection, and installation). Social perceptiveness, critical thinking, system analysis, and complex problem-solving are all relatively more important for the United States than for Indonesia. The largest differences appear in semi-skilled occupations. At the level of occupational group, the largest (relative) difference in importance between Indonesia and the United States is found in skills needed by service and sales workers and clerical support workers. At the level of occupation, the largest relative differences between the two countries are found in equipment selection and equipment maintenance skills for managers; equipment selection skills for service and sales workers; and equipment maintenance skills for clerical support workers.

It is recommended that Indonesia use a pilot and scale-up approach for Indotask. Indonesia can adopt and scale up those variables that were successfully collected (even if further improvements are introduced), repeat the pilot for those that need adjustment, and pilot new modules. Taking into account the following lessons from this first attempt, Indonesia could:

1. Field a few more modules of O*NET. The modules to prioritize are those related to work activities and work context, which are widely used to monitor the impact of the Fourth Industrial Revolution (4IR) on labor markets and that closely complement the ones in this pilot.

2. Collect modules in batches to prevent overwhelming respondents, considering the length and comprehensiveness of the questionnaires.

3. Continue with the online survey methodology but consider introducing face-to-face interviews for occupations for which respondents are difficult to find or lack digital literacy or technology.

4. Continue interviewing the same raters, since respondents learn over time.

5. Expand the volume of respondents, especially experts, to capture country- and sector-wide occupational differences. In the pilot, respondents were selected from the Occupational Employment and Vacancy Survey (OEVS) sample, representative of selected regions and subsectors of the economy. In addition, increase the proportion of female respondents to eliminate potential gender biases.

6. Continue to monitor occupations selected for this pilot and expand the list to other occupations in high demand.

7. Expand the list of tasks by incorporating those from O*NET taxonomy.

8. Conduct focus group discussions to improve the design presentation of questions.

9. Explore potential changes that might be arising due to responses to the COVID-19 pandemic and crisis.

10. Carry out knowledge exchanges with O*NET.

Introduction

1.

The Government of Indonesia is determined to develop an advanced labor market information system (LMIS) to provide reliable and timely information for developing the workforce to meet its current and future labor demand. Advanced online labor market information platforms deliver reliable, timely, comprehensive, and meaningful information to a wide audience. They usually include detailed information on the demand for skills, occupational employment and prospects, wage trends, regional labor markets, and more. World Bank (2020b) assesses Indonesia's LMIS as being basic to intermediate, describes the key functions of an advanced LMIS, and presents a vision for Indonesia's system. World Bank (forthcoming (c)) describes the key data sources and features of workforce data and how to disseminate through those platforms to diverse audiences.

Indonesia's Occupational Tasks and Skills—or *Indotask* for short—is a timely effort to fill in the data needs for workforce development policy and monitoring. It is one of four current initiatives supported by the World Bank to build a comprehensive toolbox with relevant and timely data for workforce development (Box 1.1). The Indotask pilot is the first attempt at adjusting select modules of the U.S. Occupational Information Network (O*NET), a globally recognized occupational database, building on the sampling frame of *Indonesia's Occupational Employment Outlook (IOEO) 2020* as further described in section 2.

This report presents the methodology and the results of the Indotask pilot that adapts O*NET instruments measuring tasks and skills. Workforce development data comprise various sources and dimensions of what a successfully performed job entails. The U.S. Bureau of Labor Statistics (BLS) jointly with the Occupational Information Network—known as O*NET—constitute the most prominent example of the diversity of data sources used in this area. In particular, through its content model O*NET has pioneered what constitutes a comprehensive description of an occupation. This report describes a data collection pilot that aims to replicate—with adjustments to the Indonesian context—selected components of the O*NET model. More specifically, it retrieves data on tasks and skills for occupations in high demand, relying exclusively on an online questionnaire. The accompanying report, *Indonesia's Occupational Tasks and Skills Profiles,* presents a detailed description of each of the selected occupations using Indotask data.

Besides being a globally recognized database widely used by academics and policymakers, O*NET has a few features that make it attractive for replication in a middle-income country. First and foremost, O*NET is probably the database with the largest number of users and applications around the world, made use of in academia, in policy making, and by other end-users.[4] Second, O*NET is one of the oldest attempts to provide a comprehensive description of an occupation. As such, it has been evolving over time, applying and experimenting with different methodologies, with lessons learned that Indonesia can benefit from. Third, since the questionnaires for the different components can be delivered online and are usually administered in batches, covering about 100 occupations a year, O*NET provides flexibility to adapt the components selectively. Therefore, the cost of the survey is relatively low, at least compared with other methodologies, and its flexibility allows Indonesia to focus on the occupational attributes that are more pressing and to develop capacity progressively over time without overburdening their embryonic system.

The skills module was chosen for replication, since skills information is used by multiple audiences and assessed as a critical input to develop the Indonesian skills system. The module complements the efforts to describe skills through real-time data gathered from online job postings. While real-time data have many advantages—low cost, high frequency, granularity—they can fall short in countries with high levels of informality, like Indonesia. There is no sound evidence about how findings from formal job postings can be generalized to informal jobs, and there is no simple way of disentangling whether a job posting corresponds to a formal or informal position. O*NET methodology can be selectively deployed to assess occupations that are highly informal and in this way complement the findings from real-time data.

What makes O*NET unique is its collection of information on tasks and work activities. The vast majority of the scientific evidence on the impact of technological change on labor (and skills) demand has been relying on O*NET data, comprising skills, tasks, and

work activities. This evidence mostly focuses on high-income countries, but when it focuses on low-income countries it still relies on O*NET, forcing researchers to make the critical assumption that the methods for producing output (i.e., the production function) is the same as in the United States. However, this is a strong and controversial assumption. Internationally comparable firm data, like that from the World Bank Enterprise Surveys, show that the input mix and the returns of firms vary considerably across countries. Hence, having country-specific information equivalent to O*NET will allow researchers and policy makers to monitor and anticipate the impact of technological change on production inputs, as well as the policy responses to manage it.

Technological change is altering the allocation of workplace "tasks" between capital and labor. For some time, labor has not equated to workers' time or workers' qualifications. Instead, the relevant metric is the skills set that allows performance of a task for the current optimal combination with capital that the technology in place requires. Moreover, with the current accelerated pace of progress, more attention is directed to how quickly the skills set of the workforce can and should adapt to shifts in that optimal allocation of labor and capital triggered by technological change.

Researchers and policymakers in high-income countries have been relying on the "task approach" to examine the consequences of technological change on labor market outcomes, particularly on polarization, and on economic growth more broadly. The task approach assigns skills to tasks. Until recently, labor economists were grounding the analysis and policy design in a canonical production function with anthropomorphic labor characteristics, where capital substitutes fixed units of labor, ranging from none to all. In more sophisticated models labor was separated between high and low skill, but the substitutability with capital was always fixed. In reality, however, the boundary between "labor tasks" and "capital tasks" in production is permeable, dependent on the technology and country context. Acemoglu and Autor (2011) dismantled the canonical model and introduced the task approach, where output is the result of multiple job bits or workplace tasks; and tasks use skills and capital. Hence, in the task approach, skills are applied to tasks to produce output.

Technological change is not only altering the tasks needed to produce output, it also alters the allocation of tasks between "labor tasks" and "capital tasks." Capital typically takes over tasks previously performed by labor; mostly tasks that are repetitive and predictable so they can be coded and automated. In other cases, capital is used to enhance the performance of labor tasks. Simultaneously, workers perform novel tasks before they are even considered to be automated. Evidence worldwide has been finding that nonroutine or complex tasks—due to their nature—are unlikely to be automated.[5] These tasks demand other skills such as problem solving and adaptation.

Other megatrends through the economic channel also influence the optimal allocation between labor tasks and capital tasks. These megatrends include globalization—including trade of goods and services, offshoring and reshoring—migration, aging societies, and climate change. They affect market prices of

labor, capital and transport costs, which in turn influence the optimal allocation of skills to tasks. One often sees international firms that have more than one production plant, using different production processes across countries. Autor (2013) gives the example of Nissan Motor Company with a production line heavily robotized in Japan but not in India, where wages are low relatively to capital and where skills to supervise/complement automation might not be available.[6]

Hence, progress in the understanding of allocation processes—coupled with the underlying megatrends, the changes triggered by the COVID-19 pandemic, and the recently approved reforms in Indonesia—cry out for a sound monitoring of labor market changes, with skills and tasks measurement at the center. The COVID-19 crisis initially left more than 5 million Indonesians out of work. Fortunately, two-thirds of these workers could return to the workplace by August 2020 (five months after the domestic outbreak of the pandemic). By then, however, workers found themselves in a new environment, following social distancing and new hygiene protocols and relying much more on digital platforms and online communication.[7] Moreover, in October 2020, the Parliament of Indonesia approved the largest reform in the last 50 years, which amends more than 70 laws with the objective of creating jobs and increasing competitiveness. This large reform will also affect the organization of markets and the production process of firms, and in turn the task allocation and the demand for skills. Indonesia needs to be equipped to monitor the implications of these shocks in the demand for skills and in the labor market more broadly.

One of the most salient messages of this analysis is its confirmation that the production processes that underlie jobs differ between the United States and Indonesia. When comparing the tasks and the skills needed in a certain occupation in these two countries, differences arise. The list of tasks involved in an occupation varies, and so does the importance of skills needed in it. As further explained throughout the report, this strong result relies on assumptions regarding what is comparable across the methodologies. The results discussed in sections 3 and 4 may not be representative of the country. While the same shortcomings apply to O*NET data and methodology, the newness of the effort calls for caution.

Indotask managed to produce good quality data under difficult circumstances. The reliability of the data collected is assessed by comparing the results of Indotask to those of O*NET (section 5) and by applying the same battery of tests of O*NET (section 6). In short, this report concludes that for being a first attempt, the Indotask data perform reasonably well; some variables are therefore recommended for immediate use, while others are assessed as not ready. Most importantly, a few clear lessons surfaced through the data collection and analysis (section 7) that can be learned from to continue with Indotask, especially for those occupations for which online real-time data might be doubtful or simply not exist.

The reader must bear in mind a few caveats when going through the report and described results. First and foremost, this is the first time a survey like this has been attempted in Indonesia. To our knowledge, there are only two parallel efforts—for Vietnam and for Uruguay—to replicate O*NET outside the United States, and there is only limited documentation explaining the lessons of those processes. Besides the customary shortcomings due to the pilot nature of the effort, it is worth noting three points. First, respondents were not selected to represent all the workers in the occupations or all the schools where the associated field of studies are taught. While this is not the objective of O*NET either, it is worth noting it as a potential concern, as this work does not have the years of experience of O*NET to solidify the methodology. Second, the data were collected through a combination of phone survey introduction and online questionnaires during the COVID-19 pandemic, which has limited the envisioned efforts of the team to better assist enumerators and respondents to understand the instrument and to adjust it to potential cultural differences. Finally, it should be noted that while the team considered evaluating changes in skills needed as a result of the COVID-19 crisis, the instrument proved to be too long to assess that hypothesis in a reliable manner.

Box. 1.1

Indonesia's workforce development data within its labor market information system

As described in detail by World Bank (2020b), an advanced labor market information system (LMIS) is a comprehensive system that collects, coordinates, and analyzes data and disseminates information to diverse stakeholders. It comprises all data, analysis, and dissemination outlets managed by the government and by private citizens and organizations as well as the institutional arrangements and procedures that coordinate the collection, processing, storage, retrieval, and dissemination of data. Government agencies, statistical offices, education institutions, firms, and private and public job intermediaries are all part of the LMIS. Technology, collaborative partnerships, and institutional arrangements underpin an advanced LMIS.

The LMIS provides relevant and timely information and other services to help a wide variety of stakeholders make informed decisions affecting their own and Indonesia's future in order to reduce unemployment, boost overall productivity, manage and prevent risks related to labor markets, and maximize the impact of skills and labor market programs. It has four key functions:

1. To match job seekers with vacancies (through a job matching tool);
2. To help students, workers, and the unemployed develop successful careers (through career guidance services);
3. To guide users to available government programs and services to help them improve their labor market outcomes and/or manage risks (through an online one-stop-shop for active labor market programs); and
4. To provide up-to-date labor market intelligence to inform and guide users decisions (through a labor market intelligence hub).

Indotask is one of four initiatives underway, supported by the World Bank, to collect relevant labor market data to be used by the labor market information system and the labor market information hub function. Indotask aims to measure the tasks and the skills currently used in select occupations in high demand in Indonesia. Monitoring tasks and occupations is central to support the needs of industries as new technologies are adopted. The four initiatives are complementary techniques which together aim to provide a thorough and comprehensive understanding of Indonesia's skills supply and demand. The other three initiatives are these:

- **Indonesia's Occupational Employment Outlook (IOEO):** The design of the Occupational Employment and Vacancy Survey (OEVS) draws on international experience. It is a mixture of a structural employment survey and a vacancy survey that can produce short-term occupational prospects and, over time, feed long-term projections. The survey collects granular data on employment stock and flow for narrowly defined occupations with a level of precision not available in other survey instruments.
- **Indonesia's Critical Occupation List (COL):** Implemented in collaboration with the Coordinating Ministry of Economic Affairs (CMEA), the 2018 COL draws upon international best practices from the United Kingdom, Australia, and Malaysia. Internationally, COLs have been used to create targeted education and migration policies that address critical skills gaps. The COL identifies a list of occupations that each meets two criteria: (i) the occupation has a shortage; and (ii) it is strategic for the Indonesian economy. The COL contains 35 such occupations, which represent jobs from sectors such as manufacturing, telecommunications and IT, accommodation and food services, construction, ICT, and other professional and 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 yearly.
- **Indonesia's Online Vacancies Outlook:** This tool collects online data on job vacancies and skills demanded based on data available on up to 60 job boards and 740 employer sites in Indonesia. It will allow real-time data analysis and obtain a more granular description of the skills demanded for those occupations with online postings. This tool is designed to complement, and not replace, the other initiatives, since the more highly skilled and formal jobs are more likely to be found online.

All these initiatives, jointly with traditional survey data and administrative data, form a data toolbox for workforce development. Together they will help policymakers determine where investments should be made with regard to training program and incentives for apprenticeship programs, while the labor market information hub will inform job seekers and employers about skills and occupations on demand.

Methodology

This section describes the methodology used to estimate the demand for skills and the description of required tasks in select occupations. First, it summarizes the most prominent efforts around the world to measure skills and the reasons why O*NET was chosen as the best fit to complement the parallel efforts to comprehensively collect workforce development data. Second, it explains how the O*NET survey instrument and data collection process were adjusted to the Indonesian context. Third, it describes the process used to select the 51 occupations for this pilot. Finally, it includes a brief description of the characteristics of respondents.

2.

Skills and tasks measurement efforts

Around the world, a variety of efforts seek to measure skills and occupations, some focused on employers' demand and others focused on workers. The vast majority of these efforts are observed in high-income countries, but there are notable efforts in low- and middle-income countries too. In the category of surveys that aim to measure the skills of the workforce, two of the most salient are the OECD's Programme for the International Assessment of Adult Competencies (PIAAC), which covers the high-income countries, and the World Bank's Survey Toward Employability and Productivity (STEP), which cover low- and middle-income countries. Both surveys assess the skills that members of the workforce need to sustain a productive working life.[8] More specifically, these surveys measure three key information-processing skills—*literacy, numeracy, and problem solving*—which are deemed essential for increasing the chances of a productive and fulfilling working life. As further detailed in Appendix A, PIAAC delivers a test to the target population for a direct assessment of competencies, while STEP includes a direct assessment of reading proficiency and an indirect assessment of other competencies and behavioral skills.[9]

The STEP survey takes an additional step and measures the skills gaps perceived by employers. Since it is widely accepted that there are information failures and measurement errors when it comes to skills, the STEP survey includes a complementary module to assess the views of employers. Usually, the employers' surveys are much smaller in size, and sometimes their sampling is representative of select economic groups. Employers are asked about the main skills used in typical managerial and blue-collar positions in their firms. The STEP employer survey collects data on whether workers use the following skills: reading, writing, math, problem solving, speaking a foreign language, making presentations, interacting with co-workers, computer use, and punctuality needed for the job.[10]

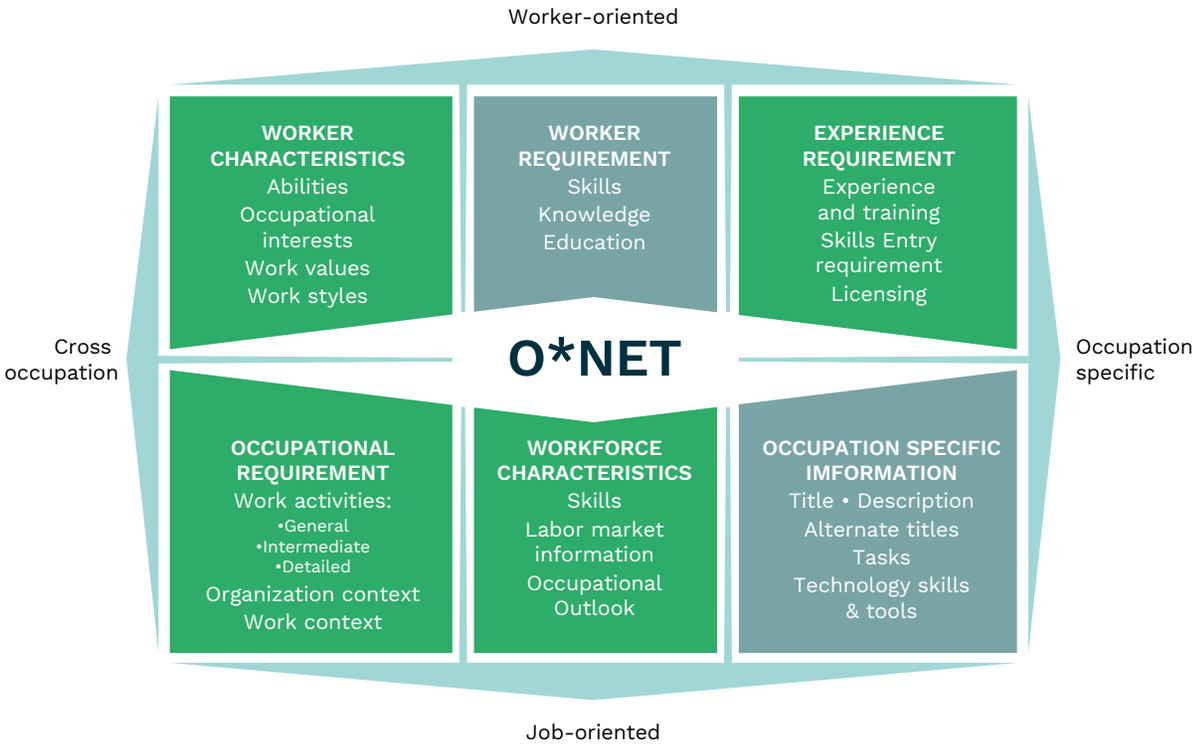
Although PIAAC and STEP surveys are very informative for understanding labor market dynamics and associated skills needs, some policymakers find that they are less useful for providing the general public with practical information for decision making. Both surveys have led to a rich number of academic papers and policy reports. Most prominent examples include recent efforts to measure the impact of the COVID-19 pandemic on labor markets through the amenability of jobs to working from home;[11] or the implications of the 4IR on labor markets and skills demand by flagship reports of the institutions that produce them.[12] However, none of these efforts have been adopted by countries for regular implementation, nor are they being used in these countries' labor market information platforms. The most likely reason for this might be that the skills information is not detailed enough to be used in qualification frameworks, development of curricula, or individual decisions on human capital investments, which are typical information services of these platforms.

O*NET is a very different endeavor. It is a database aiming to describe in detail the skills, capacities, and other workers requirements for almost a thousand occupations in the U.S. As such, O*NET is the primary source of occupational information in the United States. The information is consumed by several users including governments (at various levels), policymakers, researchers, students, workers, firms, trainers, and more. The O*NET data is subject to serious scrutiny and is disseminated in various formats, from raw data, to reports, to an online user-friendly interface with various search entries. Box 2.1 illustrates some of the uses of O*NET data.

The O*NET content model provides the conceptual framework. It organizes the data into six modules that are either job-oriented or worker-oriented at the occupational and cross-occupational levels (Figure 2.1; for a complete description of the O*NET content model, see Appendix B). The content model is comprehensive and flexible enough to be applied across jobs, sectors, and industries. Each of the six modules constitutes a big endeavor on its own. Data within each module come from a variety of data sources, including specific questionnaires designed for the O*NET program as well as existing data in the U.S. labor market information system.[13] Appendix B summarizes the different requirements and characteristics retrieved in each O*NET module and highlights in light blue the modules that are piloted by Indotask.[14]

Fig. 2.1

O*NET Content Model



Source: O*NET https://www.onetcenter.org/content.html

Box. 2.1

Uses of the O*NET database

The O*NET database is widely consulted by many users. Its Resource Center alone has 2,750,000 visitors a month. The following are just some illustrative examples of how end-users make the most out of the database.

Policymakers: O*NET common language used for occupational and skills description facilitates the development of career and workforce development policies in the United States. Examples of users and use include (i) the U.S. Department of Labor and several state agencies, which use the database to explore skills requirements and conduct skills gap analyses of occupations in high-demand today and in the future; (ii) the Social Security Administration, which develops disability determination procedures using data on cognitive descriptors, tasks, technology skills, and tools.

Career counselors, job seekers, students and workers undergoing career transitions: O*NET has three career exploration tools: the Ability Profiler, the Interest Profiler, and the Work Importance Locator. These self-assessment tools match users with the occupations they relate to most closely in terms of interests, skills, experience, and work values. The tools are embedded in several websites sponsored by the Department of Labor, such as O*NET OnLine, CareerOneStop, and MyNextMove. Occupational matches are linked to profiles based on the O*NET database and to vast information on training, job search, and local resources. Users can then create an informed career plan towards the selected occupation. These tools also cater to different audiences, such as veterans and Spanish-speaking workers. Moreover, state- and city-specific platforms also rely on O*NET data.

Researchers: The comprehensive database allows one to conduct innumerable research projects. Some relevant examples include the impact of automation and technological adoption on U.S. employment polarization and skills demand (Acemoglu and Autor, 2011; Autor, 2013; Frey and Osborne, 2013) and, more recently, the impact of COVID-19 and the amenability of jobs to be performed from home (Dingel and Neiman, 2020).

Educational institutions: Educational institutions use the O*NET database for program planning and development and educational curricula development. For example, career educators in the Seattle, Washington, public schools reorganize courses of study and course content in the Health and Human Services Pathway program based on O*NET occupational information. They are also considering crediting courses across pathways by examining common abilities, skills, and work contexts across different courses.

Private companies: Private firms use the database for human resources planning, improving hiring practices and reducing turnover, and writing job descriptions.

Source: O*NET https://www.onetcenter.org/paw.html and DoL (2018).

Indotask is an adaptation of two modules of O*NET

The main reason for choosing O*NET is that it collects data on tasks and could fill the gaps in skills measurement that real-time big data most likely would leave given the high levels of informality in the country. Informality in Indonesia reaches three-quarters of the workers,[15] raising concerns over the validity of data generated from online job postings to describe those jobs. As of today, there is no sound evidence to prove or disprove that real-time data can accurately describe informal jobs. Most likely, the data would be valid for some occupations with low incidence of informality but not for all. Because O*NET can be focused on those occupations that are more likely to be informal, it offers a complementary—and affordable—data source to online job vacancy analysis. O*NET is unique in measuring the tasks and work activities of occupations. Moreover, knowing the task content of jobs in Indonesia as compared to high-income countries aids in understanding the distance in terms of technology adoption and job opportunities.

This pilot explores adjusting two modules of the O*NET content model to the Indonesian context: Worker Requirements and Occupation-Specific Information.[16] These are the two modules related to tasks and skills, providing direct links to measuring skills on demand through the task approach and generating information that can be used by policymakers for workforce development policy and monitoring, by employers for human resource policy, and by education experts for education and training design (see Box 2.1 for examples of O*NET data use in the U.S.). The pilot instrument was developed as a proof of concept to be scaled up by the Government of Indonesia.

More specifically, the Indotask instrument comprises four modules that cover basic information on respondents, tasks, and skills. These are:

- **Module I, which borrows the skills component from the O*NET Worker Requirement module.** The skills questionnaire is qualitative in nature and asks respondents to rate the importance and relevance of 35 skills for a certain occupation.[17] These 35 skills could be acquired on the job—in the same occupation or not—or through formal or informal education. For O*NET, the skills are the procedures or ways of working given the acquired knowledge. The 35 skills are hence divided into two categories: basic skills and cross-functional skills.[18] Basic skills, such as reading, are those that facilitate the acquisition of new knowledge, and cross-functional skills,

such as problem solving, facilitate performing various activities across jobs. Respondents to the skills questionnaire rate the skills using two scales: the importance scale, which goes from 1 (*not important)* to 5 *(extremely important);* and the level of relevance scale, which goes from 1 *(basic)* to 7 *(sophisticated)* and is often simply referred as "level," both in this document and by O*NET. Section 4 of this report describes the main results from this module.

- **Module II, which emulates the tasks component from the O*NET Occupation-Specific Information module and examines which tasks are completed in each occupation.** For O*NET, a task is the smallest unit of activity with a meaningful outcome. The task questionnaire is unique to each occupation surveyed: it lists all tasks commonly required at the specific occupation and requests respondents to rate each of them according to their relevancy (*yes/no),* frequency *(1, once a year; 7, hourly)* and importance *(1, not important; 5, extremely important).* Depending on respondents' ratings, a task can be considered *Core—critical to the occupation—or Supplemental*—less relevant. While O*NET has its own taxonomy for task statements, which is updated using online data,[19] Indotask pulls out task statements from the manual of the Indonesian Standard Classification of Occupations (Klasifikasi Baku Jabatan Indonesia, or KBJI). In addition, it asks respondents to add any relevant tasks not included on the list. This approach is preferred to requesting respondents to create a task inventory, as it limits the burden on respondents. The list of unique tasks from KBJI was preferred to the list of tasks from O*NET, because the objective of the exercise is precisely to understand how jobs are done in Indonesia. Section 5 examines the similarities between O*NET and Indotask.

- **Module III, which borrows the Education and Training questionnaire from the O*NET Worker Requirement module.** It retrieves general opinions of workers and experts about the qualifications needed to perform the job.

- **Module IV, which collects demographic information on respondents.** This part of the questionnaire is designed to the specific circumstances of Indotask, as there are few if any occupational analysts in Indonesia to widely consult on the topic, as O*NET does.

While Indotask aimed to follow O*NET process as much as possible, a few departures were introduced to adjust to the local context and the COVID-19 social distancing constraints. First, some of the planned preparatory work aimed at understanding the adjustments needed for Indonesia had to be cancelled. Surveys like Indotask and STEP usually carry out focus groups to assess potential differences in the scale perceptions, in understanding of skills definitions, and in other issues that would result in adjustments of the instrument. This work was cancelled, however. Instead, the skills module integrated learning from another pilot.[20] Specifically, the skills module added to the questionnaire a plain-language statement for each of the 35 skills to avoid multiple interpretations that could result in measurement errors. Second, the sample of respondents has a different size and mix between incumbent workers and occupational experts, as further explained in the following subsection.

The survey was carried out using phone calls and an on-line form. It was fielded between July 2 and September 3, 2020, when Indonesia was under partial lock-down due to COVID-19 prevention measures.[21] All respondents received a phone-call with a brief introduction to the survey and an invitation to participate. Enumerators were trained to quickly introduce the survey objective and provide key inputs for correct answers. Those who agreed received the survey link through e-mail or WhatsApp. This is comparable to O*NET, where workers and experts can either complete the survey online or complete a hard-copy version and mail it back. Given the COVID-19 pandemic, only the online version was implemented, which may have biased responses toward higher-skilled workers with a better off socio-economic background (i.e., with access to the internet and computers or smartphones). Also, incumbent workers were suggested by the OEVS respondent, who most likely continued to be employed at the time of the survey.[22] Unlike other phone surveys, for this one several follow-up calls were needed. On average, respondents were contacted 3.3 times, with a third of the sample being contacted only one time to pass the link and a third of the sample being contacted more than 4 times.

Indotask prioritized focusing on occupations in high demand

Indotask collected detailed information on skills and tasks performed in 51 highly demanded occupations. The selection of occupations relied on ongoing analyses that use Indonesia's Skills Monitoring Toolkit data sources (Table 2.1). Because of the pilot nature of the effort, it was decided that the number of occupations to be surveyed had to be large enough to have some variety across them, but not too large since this constitutes one of first three first attempts to implement the O*NET outside the United States.[23] O*NET evaluates 100 occupations in each cycle, so it was decided that 50 was a fair target for the two-fold objective.[24] Secondly, it was decided that occupations with shortages and those in high demand would be examined first. Hence, occupations were draw from the *Indonesia Occupational Employment Outlook 2020* (World Bank and Bappenas, forthcoming; World Bank, forthcoming (b)) and the Critical Occupation List 2018 (World Bank and CMEA, 2020). Given that respondents would be drawn from the OEVS sample, the first criteria for inclusion was that the OEVS data needed to have employment information on at least 15 respondents for a given occupation as further described in the next sub-section.

39 (out of 42) "bright" occupations and 23 (out of 35) "critical" occupations were selected for the Indotask sample. The second criteria for an occupation to be selected was to be classified as *bright* according to the short-term occupational prospects score in the Indonesia's Occupational Employment Outlook 2020. These are occupations with high employment demand and that have either high employment growth or skills shortages as well as good hiring opportunities (measured by large number of vacancies or firms hiring). These characteristics are deemed as good predictors of short-term future job prospects. Most of the 42 bright occupations identified had high-quality features: largely observed in higher-productivity firms and larger firms, requiring higher education levels, and paying higher wages than the average occupation. Two bright occupations were excluded given their similarity to other occupations and one was excluded due to its small sample.[25] The third criteria for inclusion was to be in the Critical Occupations List (COL) 2018.[26] The 2018 Critical Occupation List (COL) identified 35 occupations that are in shortage and are strategic for the Indonesian economy. Out of the 35 COL occupations, 16 were not included due to either low OEVS sample or to their being too similar to others already included.

The on-line vacancy data were then used to narrow the list of selected occupations. First, given that one of the objectives of Indotask is to complement occupations that cannot be necessarily well depicted with real-time data, it was important to have some overlap between the two data sources to evaluate the results coming from both sources.[27] Second, it helped to prioritize occupations that had either high volume of job posts—indicating high demand—or that may have had a low

Tab. 2.1

Indotask information sources for selection of occupations

Toolkit	Criteria	Data sources
Indonesia Occupational Employment Outlook 2020	*Bright* occupations are those with a 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	OEVS 2020
2018 Critical Occupations List	*Critical* occupations are those in short supply and strategic for the country	Sakernas 2014-2017 Bottom-up sources
Online Vacancy Outlook (forthcoming)	Occupations with high-vacancy posts (indicating high demand) as well as occupations with low-vacancy posts (since evidence shows that posts are skill-biased)	Web-scraped online job posts (1st quarter 2020)

Indotask collected data for 51 occupations in high-demand in Indonesia

29 High-skilled

18 Semi-skilled

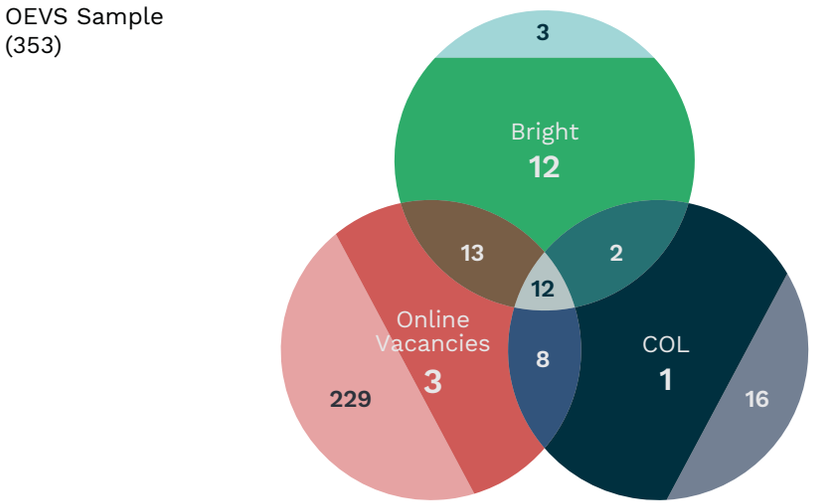
4 Low-skilled

volume of posts due to on-line tendency to be biased toward higher skilled jobs. All occupations that fell within the top 50 demanded (and were part of the OEVS sample) were included, adding only three occupations that were not bright or critical. A final criterion for inclusion was that there should be a mix of occupations in terms of their skills level (1-digit occupational code). Figure 2.2 shows the overlap between the different sources used for the selection of the occupations.

The result was a list of 51 occupations in high-demand in Indonesia; mostly a mix of high- and semi-skilled ones. About half of the occupations included in the sample are high-skilled, and almost another half are semi-skilled (Table 2.2). The few low-skilled occupations relate to supporting the improved consumption standards of many Indonesians. The 51 selected occupations are relevant for skills profiling (as done in the *Indonesia's Occupational Tasks and Skills Profiles)*, since they indicate where the population should place investments in education and for which skills the government needs to ensure there is enough supply of quality training and education.

Fig. 2.2

Venn diagram showing overlap of occupations according to definition of high demand



Source: World Bank and CMEA (2020), World Bank and Bappenas (forthcoming) and World Bank (forthcoming (b)).
Notes: Areas shaded in color represent occupations included in Indotask while those shaded in grey represent those not included. COL=Critical Occupation List. The 2018 COL occupations use KBJI version 2002, whereas OEVS and the online vacancy data use version 2014. This posed a significant challenge since there are many differences between the two versions. A manually developed crosswalk matched the COL 2018 occupations to a 2014 KBJI. Since there is no one-to-one correspondence between the two versions, the total COL occupations in this graph add up to 39 instead of 35.

Tab. 2.2

List of Indotask occupations, with associated information sources

Skill level	KBJI 2014	Occupations	IOEO 2020	COL 2018	OVO 2020
High	1219	Business services and administration managers not elsewhere classified	Flagged	Yes*	Top 50
	1221	Sales and marketing managers	Flagged	Yes	Top 50
	1323	Construction managers	Flagged	Yes	Top 50
	1324	Supply, distribution, and related managers	Steady	Yes	Top 50
	1346	Financial and insurance services branch managers	Bright	No	Top 50
	2141	Industrial and production engineers	Bright	Yes*	Top 50
	2142	Civil engineers	Bright	Yes	Top 50
	2144	Mechanical engineers	Flagged	No	Top 50
	2149	Engineering professionals not elsewhere classified	Bright	No	Top 50
	2161	Building architects	Bright	No	Top 100
	2166	Graphic and multimedia designers	Bright	Yes	Top 50
	2263	Environmental and occupational health and hygiene professionals	Bright	Yes*	Top 100
	2413	Financial analysts	Bright	Yes*	Top 50
	2431	Advertising and marketing professionals	Bright	No	Top 50
	2512	Software developers	Bright	Yes*	Top 50
	2642	Journalists	Bright	No	Top 100
	3111	Chemical and physical science technicians	Flagged	Yes*	Top 150
	3112	Civil engineering technicians	Bright	Yes	Top 150
	3115	Mechanical engineering technicians	Flagged	Yes	Top 100
	3118	Draughts persons	Flagged	Yes	Top 100
	3122	Manufacturing supervisors	Bright	No	N/a
	3123	Construction supervisors	Bright	No	N/a
	3131	Power production plant operators	Bright	Yes*	N/a
	3257	Environmental and occupational health inspectors and associates	Bright	Yes	N/a
	3322	Commercial sales representatives	Bright	Yes*	Top 50
	3323	Buyers	Flagged	Yes	Top 50
	3331	Clearing and forwarding agents	Bright	No	Top 150
	3341	Office supervisors	Bright	No	N/a
	3513	Computer network and systems technicians	Bright	No	N/a

Skill level	KBJI 2014	Occupations	IOEO 2020	COL 2018	OVO 2020
Semi	4110	General office clerks	Bright	No	Top 50
	4120	Secretaries (general)	Bright	No	Top 50
	4132	Data entry clerks	Bright	No	Top 100
	4214	Debt-collectors and related workers	Flagged	No	Top 50
	4222	Contact center information clerks	Bright	No	N/a
	4416	Personnel clerks	Bright	No	N/a
	5151	Cleaning and housekeeping supervisors in offices, hotels and other	Bright	No	N/a
	5243	Door to door salespersons	Bright	No	N/a
	5244	Contact center salespersons	Bright	No	Top 50
	5249	Sales workers not elsewhere classified	Bright	No	Top 100
	7233	Agricultural and industrial machinery mechanics and repairers	Bright	Yes*	Top 150
	7318	Handicraft workers in textile, leather, and related materials	Flagged	Yes	N/a
	7412	Electrical mechanics and fitters	Steady	No	Top 150
	8131	Chemical products plant and machine operators	Bright	Yes*	Top 150
	8141	Rubber products machine operators	Bright	No	N/a
	8211	Mechanical machinery assemblers	Bright	No	N/a
	8322	Car, taxi, and van drivers	Bright	No	Top 50
	8344	Lifting truck operators	Bright	Yes*	Top 100
Low	9214	Garden and horticultural laborer	Bright	Yes*	Top 150
	9329	Manufacturing laborer not elsewhere classified	Bright	No	N/a
	9334	Shelf fillers	Bright	No	N/a
	9621	Messengers, package deliverers and luggage porters	Bright	No	Top 150

Notes: IOEO = Indonesia's Occupational Employment Outlook; COL = Critical Occupation List; OVO = Online Vacancies Outlook. The IOEO 2020 column shows the Prospect Score for each of the occupations. Stable occupations are those where the labor demand and the supply are aligned. Flagged occupations are those with insufficient data to make an accurate assessment. In the COL 2018 column: COL occupations used KBJI version 2002 whereas this pilot and the OEVS used version 2014. This posed a significant challenge, since there are many differences between the two versions. A manually developed crosswalk matched the COL 2018 occupations to a 2014 KBJI. 'Yes' stands for an exact match, 'Yes*' stands for 'similar or close occupational title', and 'No' stands for no match. OVO 2020 column includes whether occupation was within top 50, 100, and 150 according to the total number of online job posts collected during the first quarter of 2020. N/a stands for no appearance on the database.

Indotask respondents included incumbent workers and occupation experts

Indotask deviates slightly from O*NET by asking incumbent workers and experts about all piloted modules. In O*NET nomenclature, *incumbent workers* (or workers, or just incumbents) are those currently working at the surveyed occupation. *Occupation experts* (or experts) are either trainers or more experienced workers who have supervisory responsibilities. While for this pilot all questions were asked of both groups, O*NET uses respondents more selectively (Table 2.3). Given the detail and comprehensiveness of the program, and to avoid burden on respondents, O*NET uses experts for occupations for which workers are difficult to find, or employment is low, or firm sampling is inefficient. It also uses *occupational analysts* for questions containing more abstract concepts (i.e., abilities and skills). However, a study comparing skills rating across a large sample of occupations in the United States found minimal differences between ratings provided by incumbent workers and those by occupational analysts.[28] Similarly, section 6 of this report shows that this pilot did not find differences between workers and experts.

This pilot targeted having at least 15 respondents or raters per occupation, split into 10 incumbent workers and 5 occupation experts.[29] Respondents were not randomly selected, because neither were they so selected in O*NET. It would be impossible to randomly select workers within an occupation, in any case, as there is no roster or census of workers with occupational information in Indonesia. The sample of incumbent workers came from the OEVS, a firm-level survey, carried out earlier in the year, that collected detailed information on occupations at nearly four thousand firms.[30] While those firms were randomly selected to be representative of selected economic groups and regions in Indonesia, incumbent workers in these firms were suggested by the OEVS respondent—who most likely was the owner, CEO or HR manager, depending on the size of the firm.[31] While some occupation experts were HR managers of OEVS firms, most were identified by contacting both formal (senior secondary vocational schools and polytechnics) and informal training institutions and asking them to request their trainers to respond the survey. In total, 24 institutions from Jakarta, Yogyakarta, Bandung, Lampung, and Semarang provided contact information on experts. Although some respondents were HR man-

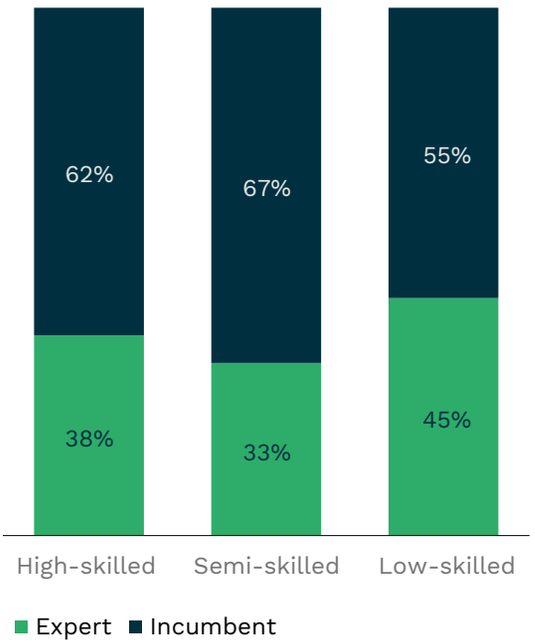
Tab. 2.3 O*NET's preferred choice respondents

O*NET respondents	O*NET selection criteria	O*NET preferred respondents by components
Incumbent workers (e.g., workers)	Currently working in an occupation	Knowledge, Tasks, Generalized Work Activities, Work Context
Occupation experts (e.g., supervisor, trainers, experienced worker)	At least 5 years of work experience in the field At least 1 year of supervisory experience	
Occupational analysts (e.g., HR Managers)	At least 2 years of work experience 2 years of graduate education in either Human Resources, Industrial/Organizational Psychology, Vocational Psychology, or Industrial Relations * Completion of courses in both job analysis (or something comparable) and research methods (or something comparable)	Skills and Abilities

Source: Fleisher and Tsacoumis (2012); Rivkin, Lewis, and Cox (2001).

Fig. 2.3

Split between incumbent workers and expert respondents, by occupational skill level



Source: World Bank, based on Indotask data.
Note: Unweighted share of experts and incumbents by occupation skill-level category from 944 respondents in 51 occupations.

agers and could be considered occupational analysts according to O*NET criteria (in Table 2.3), for the purpose of this analysis they are considered experts since none of them had graduate education.

Indotask successfully gathered skills, tasks, and other workers requirements information for 51 occupations in Indonesia based on interviews with 944 respondents. On average, for each occupation there were 19 respondents; only 13 occupations had fewer than 15 respondents, but all had more than 10 (Table C1 in Appendix C). A higher proportion of respondents were incumbent workers (597 or 63%).[32] Low-skilled occupations were represented by a slightly higher proportion of experts (45%) than high- and semi-skilled occupations. This is most likely due to the difficulties of reaching out through phone and delivering a web-mail survey to workers in these occupations.

Most respondents are highly educated men. Half of respondents have a bachelor's degree or more, while only 4 percent of respondents have lower secondary education or less (Figure 2.4). As expected, experts are more educated than incumbent workers. A majority of the respondents are men (73 percent),[33] and for only four occupations is the proportion of women respondents higher than that of men, namely: contact center salespersons, data entry clerks, journalists, and secretaries (general). Moreover, semi-skilled occupations are more likely to have input from women respondents compared to low- and high-skilled jobs.

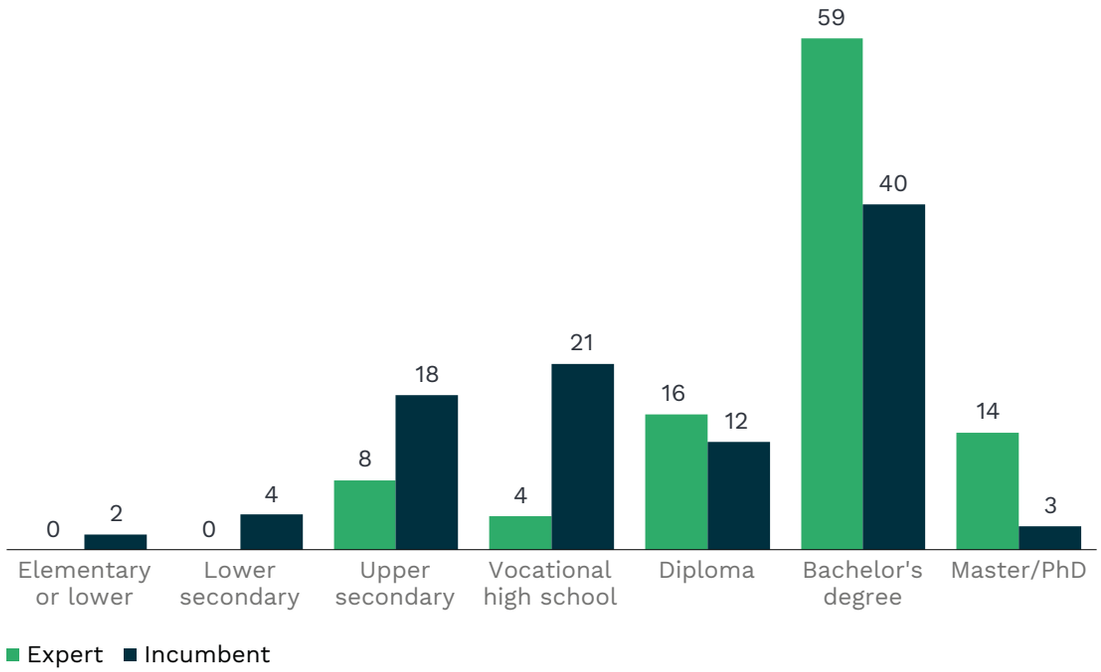
Incumbent workers are generally experienced workers or supervisors. On average, respondents who are currently working as incumbent workers have eight years of experience in their respective occupation, while experts have seven years of experience. Expert experience includes performing work, supervising workers, and conducting training or teaching educational courses. Close to three-quarters of experts are currently working in the job on which they are providing input. However, a non-trivial proportion (28%) of experts have no work experience in the occupation they are evaluating, a fact that describes 45 percent of experts evaluating low-skilled occupations, but only 27 percent of those evaluating high-skilled jobs. Section 6 examines whether work experience could be a source of biases in the results and rejects that hypothesis.

Depending on the analysis in question, different weights are chosen for Indotask data. Each respondent reported on 35 skills categories, resulting in 1,785 occupation-skills cells, and on various tasks as well, which leads to at least 2,091 occupation-tasks cells to analyze. Each cell estimate is weighted by the number of respondents per occupation to avoid biases in occupations with higher number of respondents.[34] When the level of analysis is the occupation, no further weights are applied. When rankings and generalizations about the occupations in high demand are presented, employment weights are added using employment from Sakernas (2017), the last available dataset with occupations at the 4-digit KBJI.

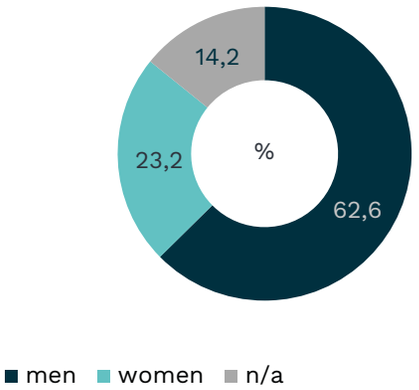
Fig. 2.4

Respondents' type of experience, highest level of education, and gender

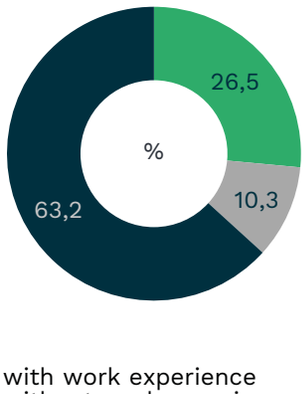
a Respondents' education, by expert vs. incumbent (percent)



b Distribution of respondents, by gender



c Distribution of respondents, by work experience



Source: World bank, based on Indotask data.
Notes: Panel (a): Unweighted number of respondents by their highest level of education completed and respondent type (expert or incumbent) from 944 respondents in 51 occupations data of Indotask. Panel (b): Unweighted share of respondents by sex of respondent. Panel (c): Unweighted share of respondents by type and work experience.

Tasks

3.

The national occupational classification provides the foundations for developing the task module of Indotask. The pilot requested respondents to rate how relevant the task statements included in the KBJI manual are to each occupation. The objective of this exercise is twofold: to provide information on how up-to-date the manual is, and to assess whether a task is still relevant or becoming obsolete or what are the new tasks that an occupation involves. Tasks statements are quite unique to each occupation. For the 51 occupations, the pilot collected information on 394 unique tasks statements from the KBJI manual (without counting free-text respondent-introduced tasks). The total number of task statements describing each occupation varies widely: the occupation with the fewest statements has three tasks

(sales workers not elsewhere classified) and the one with the most has 14 (handicraft worker in textile, leather, and related materials). The list of tasks for each occupation is presented in the Indotask Occupation Profile joint report. The total number of tasks in Indotask is smaller than in the U.S. Occupational Information Network (O*NET), probably as a result of having a larger number of job titles, but it shouldn't be discarded that it could be due to Indonesia having simpler production processes relative to the United States. Respondents were also given a chance to add missing task statements they believed relevant to perform the work related to the occupation. In total, the survey collected 393 unique additional tasks. However, these are not analyzed in this chapter since not all respondents within the occupation rated them. Instead, they should be analyzed and considered for addition in further rounds of the pilot.

The main weakness of the Indotask task module is its potential lack of representativeness of all job titles within an occupation, leaving room to miss tasks or to rate them as not relevant. If there are wide variations in tasks across job titles within an occupation, it is possible that incumbent workers carrying a certain job title may not know about the tasks carried out under another job in the same occupation. If this were the case, these incumbent workers might rate a task as not relevant if not performed at their own job, or they might overlook adding (new) tasks that are carried out in other jobs. These weaknesses stem from the O*NET methodology. However, they could be accentuated for Indotask, since the number of occupations in the manual of the Indonesian Standard Classification of Occupations (Klasifikasi Baku Jabatan Indonesia or KBJI) is smaller than the number of job titles in the U.S. dictionary of occupational titles.

Since task statements are somewhat unique to each occupation, they were standardized into task groupings for the analysis. For simplicity, tasks groupings were borrowed from the O*NET Generalized Work Activities component. That component on activities contains 41 categories of activities that are commonly performed in many different jobs. Each of the 394 tasks statements was assigned to a work activity category, hereafter referred to as a "generalized task."[35] O*NET further groups the 41 work activities into nine groups, hereafter referred to as "tasks groups." Appendix D shows the crosswalk from task to generalized task, and to task group. Table 3.1 shows the total number of task statements assigned to each of the task groups.

Tab. 3.1

Classification of tasks in tasks groups and generalized tasks

Task group	Number of generalized tasks	Number of task statements
Administering	3	17
Communicating and Interacting	8	49
Coordinating, Developing, Managing, and Advising	5	36
Identify and Evaluating Job-Relevant Information	3	35
Information and Data Processing	4	57
Looking for and Receiving Job-Related Information	2	11
Performing Complex and Technical Activities	5	62
Performing Physical and Manual Work Activities	4	65
Reasoning and Decision Making	6	62

Source: World bank, based on O*NET and Indotask data.
Notes: Based on 394 unique tasks in Indotask, each of which was grouped manually into the generalized task and the task group categories. Task group and the generalized task group were drawn from O*NET work activity module.

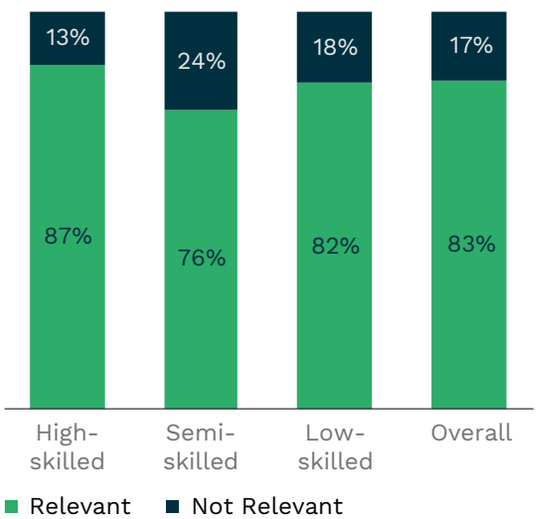
76%

of tasks are found to be relevant in semi-skilled occupations; a proportion that is lower than that observed for all Indotask occupations

Overall, the majority of tasks in Indonesia's 2014 KBJI manual continue to be relevant to the corresponding occupation. O*NET classifies a task as relevant if at least two thirds of respondents say so. When applying the same rule to Indotask, 83 percent (327 out of 394) of the tasks are deemed relevant. Relevancy tends to be lower among tasks in semi-skilled occupations (93 tasks out of 123, or 76% are assessed as relevant). For example, among semi-skilled occupations, handicraft workers in textile, leather and related materials have the highest number of outdated tasks, as only 1 out of the 14 tasks in this specific occupation is classified as relevant according to the O*NET rule. This result could be a signal of rapid technological change in the occupation. This type of analysis could help identify tasks that need to be updated in the KBJI manual. However, to carry out the updating, respondents will need to be knowledgeable about what tasks all the different job titles within the occupation perform. Experts may be helpful in providing information for the umbrella view of the occupation, while incumbents may provide specific job-information on whether the task is becoming obsolete, since they are doing the day-to-day job. For the latter, it is critical to have incumbents spread across various job titles and/or with enough experience in multiple jobs.

Fig. 3.1

Relevance of tasks by occupational skill level



Source: World Bank, based on Indotask data.
Notes: Unweighted percentage of tasks that are deemed relevant for the occupation. A task is categorized as relevant if 67% or more of respondents rate it as relevant.

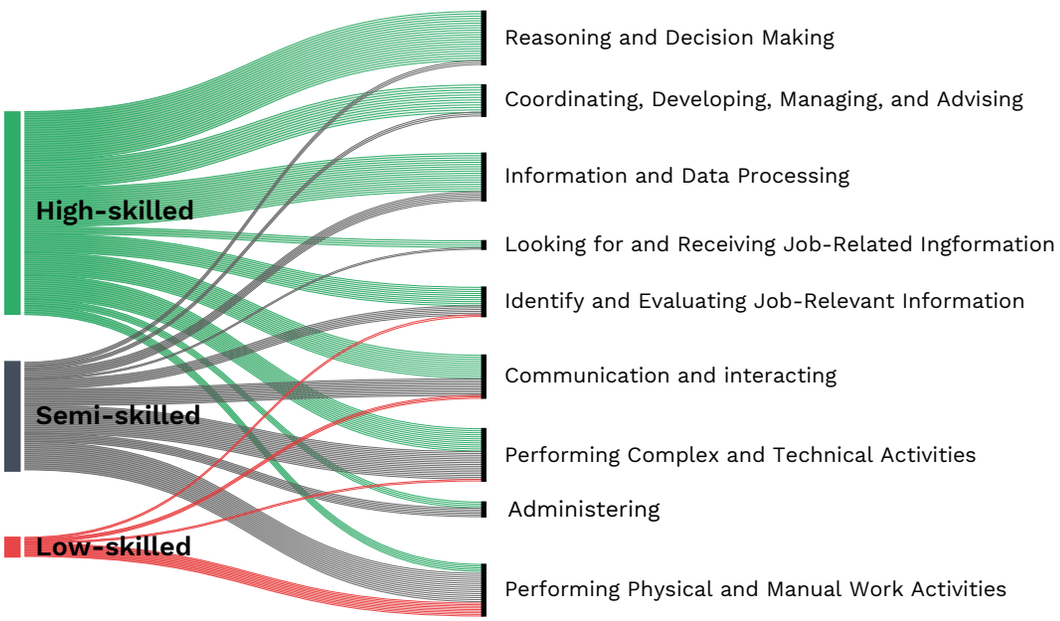
Most relevant tasks are assessed as core. A task is defined as core—according to O*NET rule—if they are critical to the occupation, measured by (i) having at least two-thirds of respondents assessing them as relevant; and (ii) having a mean importance rating of at least 3.0.[36] Based on each task relevancy and importance score, the great majority of tasks, 322 out of 394 tasks (83%), were found to be core to the occupation irrespective of the occupation's skill level (Figure 3.1).

As expected, the type of tasks occupations perform is highly related to their skill level. High-skilled occupations are more likely to engage in tasks that are more abstract in nature, such as reasoning and decision making (24%), information and data processing (19%), and coordinating, developing, managing, and advising (14%). Low-skilled occupations perform tasks that are more material in nature, such as performing physical and manual work activities (71%). Occupations in between these two levels, the semi-skilled, tend to perform a mix of both concrete and abstract tasks: over half of their tasks are divided between performing complex and technical activities (24%) and performing physical and manual work activities (27%), but at the same time they involve abstract tasks such as communicating and interacting (14%). See Figure 3.2 for a visual association between occupations by skill level and the nature of tasks.

Low-skilled occupations are more likely to engage in repetitive tasks. Of all the tasks listed in the low-skilled occupations, 75 percent are done repeatedly at least once a day, while this is true for only a quarter of tasks in high-skilled occupations. One of the exceptions is for gardeners, for whom more than half of the tasks need to be done only once a week or less often. Among high-skilled occupations, an exception to the general finding is draught persons, for whom 88 percent of tasks are carried out daily or more often. Like low-skilled occupations, most semi-skilled occupations involve tasks that need to be done once a day, as well as complex tasks of low repetition, like Performing Complex and Technical Activities. Figure 3.3 shows the distribution of tasks according to how repetitive they are, by type of occupation.

Fig. 3.2

Task grouping, by occupational skill level

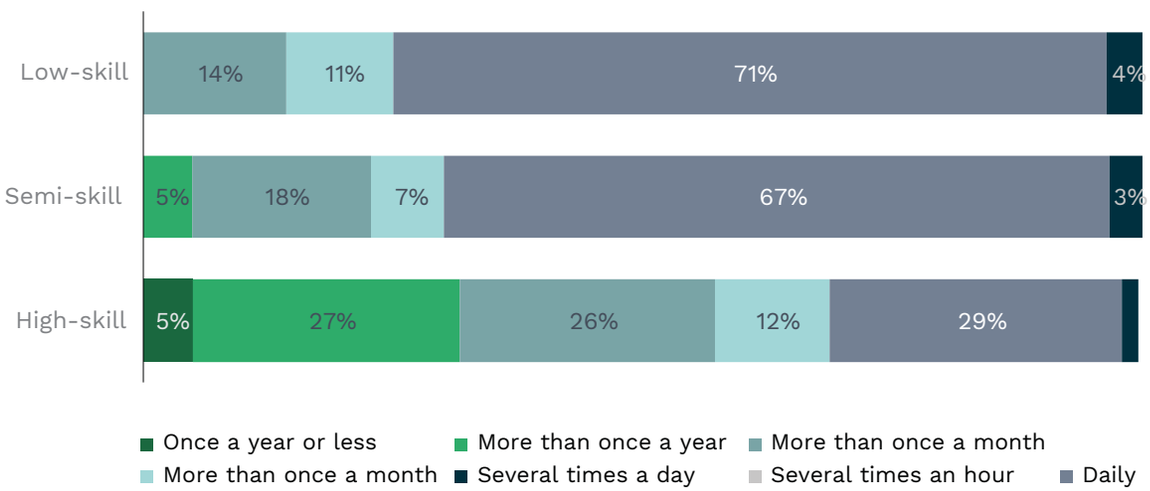


Source: World Bank, based on Indotask data.
Notes: The width of the nodes and links represent the number of unique tasks assigned to a task grouping as indicated in Table 3.1. Table D2 in Appendix D shows the total tasks assigned to each task group for each occupation.

However, it should be noticed that "low frequency" may not necessarily mean "not relevant." Take, for example, the case of the occupation construction managers, for whom the task "preparing tenders and contract bids" is deemed to be core even if performed more than once a year but not as often as monthly (see *Indotask Occupational Tasks and Skills* report). This is a reasonable finding, since lack of success in this task wouldn't allow one to carry out the others. However, if this survey is repeated it would be good to evaluate, in focus groups, what raters understand by relevance and frequency. For example, for civil engineers, the top seven tasks are all of low frequency. When this is the case for an occupation, it could be (i) because a large number of the occupation's tasks are specialized for each job title, and incumbent workers in the sample are not evaluating all tasks well, or (ii) because it is an occupation with many tasks and those of high frequency are deemed as less central (which is likely not the case with civil engineers, for which there are only nine reported tasks), or (iii) because there is a lack of understanding about the relevancy scale among raters (see *Indotask Occupational Tasks and Skills).*

When generalized tasks are ranked, a significant variation is found among them. Based on the tasks' importance ratings, the generalized task "estimating the quantifiable characteristics of products, events, or information" is deemed to be the most important among the surveyed occupations, while staffing organizational units appears to be the least important generalized task (Figure 3.4). While the difference between the most and least important tasks is significant, the difference between importance scores for many generalized tasks is small in size, being less than 1 scale point. Most of the time, a task needs to be ranked four positions below or above another task to find a significance difference in their level of importance.

Fig. 3.3 Distribution of task frequency, by occupational skill level

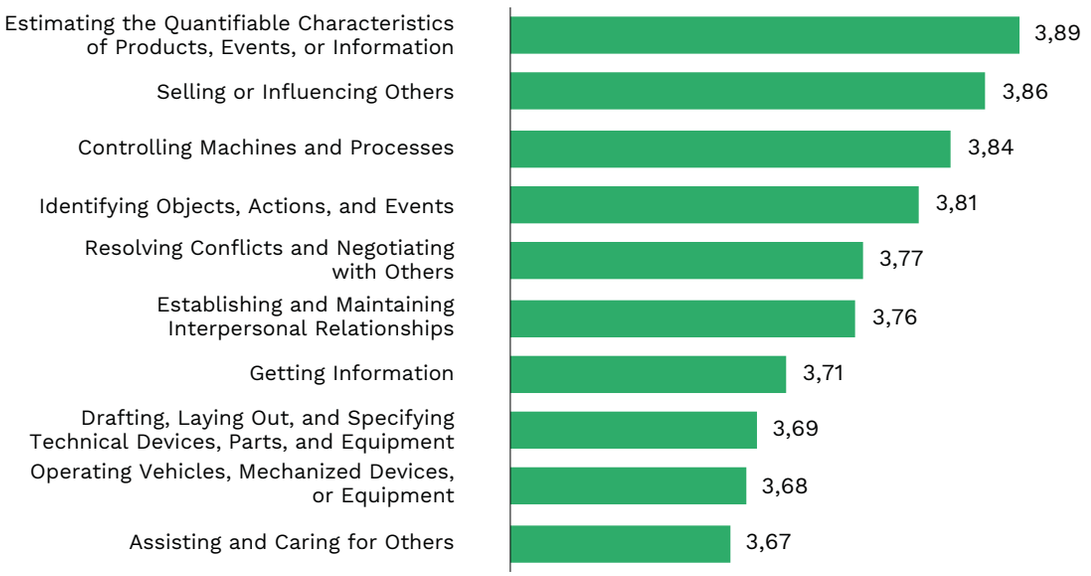


Source: World Bank, based on Indotask data.
Notes: Unweighted distribution of most answered frequency for each 394 tasks by occupation skill-category. Most answered frequency per task is weighted by number of respondents per occupation.

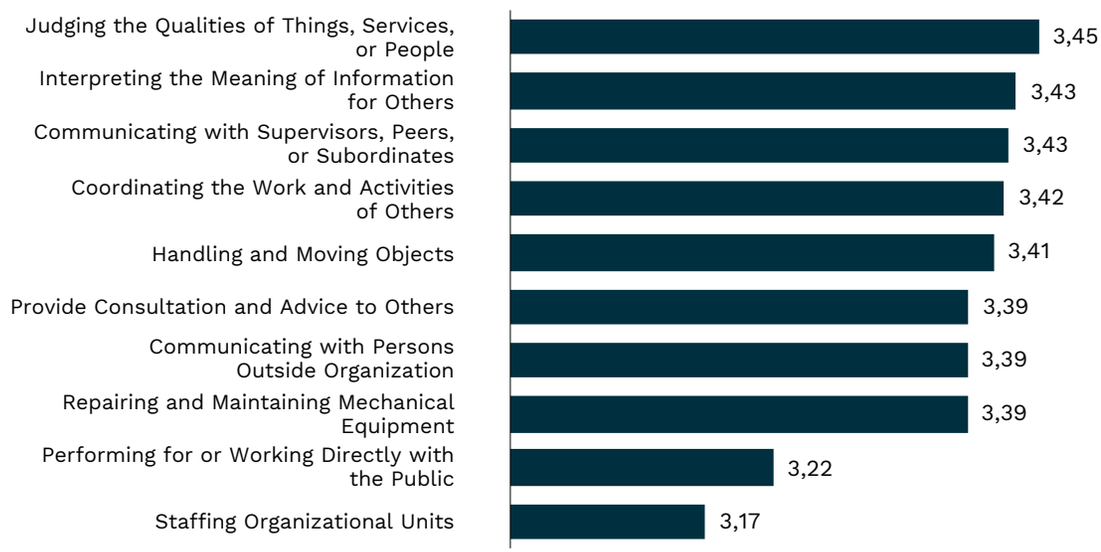
Fig. 3.4

Top-10 and bottom-10 generalized tasks according to mean level of importance

a Top 10 generalized tasks



b Bottom 10 generalized tasks



Source: World Bank, based on Indotask data.
Notes: The importance score for each occupation-task cell is weighted by the number of respondents in each occupation. Scores are aggregated across occupations using employment weights from Sakernas (2017).

High-skilled occupations perform tasks that are more **abstract** in nature, such as:

reasoning and decision making	Information and data processing	coordinating, developing, managing, and advising
24%	19%	14%

while low-skilled occupations perform tasks that are more **concrete**.

Education, experience, and skills requirements

A large proportion of the occupations in the sample are managerial and professional occupations that, according to common knowledge, require high-level qualifications and high-level skills. This section provides metrics to confirm whether this widespread common knowledge is correct and highlights the cases that constitute exceptions. It first describes the requirements in terms of education, training, and experience, and later examines the skills in demand. The results

on education and experience are weighted at the level of the occupation based on the number of respondents to avoid potential biases from having more respondents in high-skilled occupations. Other more aggregated estimates are simple averages across occupations. The results on skills are weighted by the number of respondents at the occupation-skill cell level. Simple averages are used when further aggregated across occupations or across skills, except for rankings where employment weights are used. The exact details can be found in the notes below each table or figure.

The professionalization of Indonesia reaches at most half of the high-demand occupations

While professional occupations in high-demand are likely to require higher qualification levels, technical and vocational education and training (TVET) qualifications are still in high demand. Among the sample of highly demanded occupations in Indonesia, those that are high-skilled largely require bachelor's degrees and above, and those that are semi-skilled mostly require TVET—in particular, vocational high school degrees are highly required. However, such requirements are not as strictly the rule as is generally thought. Exceptions to the rule include Commercial sales representatives, Engineering professionals, and supply, distribution, and related managers, all of which are high-skilled occupations but only require a senior high school degree. At the same time, semi-skilled occupations like human resource clerical and data entry clerks require a bachelor's degree. Hence, results suggest that medium-level education qualifications continue to be important among occupations in high demand in Indonesia.

Both experts and workers give a high value to certifications and apprenticeships in both semi- and high-skilled occupations. Prospective employees are expected to have a related certification and/or apprenticeship when starting the job. For 96 percent of occupations in these categories, having a related certification or apprenticeship was rated as important, very important, or extremely important for the job (Figure 4.1). Moreover, most experts report that workers need both certification and apprenticeship for the job (65%) and, as expected, the importance given to them is greater for high-skilled occupations. Occupations that require a bachelor's degree are more likely to also require an occupational certification than occupations requiring a senior high school degree (20 percentage-point difference; see Appendix E). As above, there are exceptions to this general finding; for example, among high-skilled occupations, more than a quarter of respondents among building architects report that having both certifications is not important for prospective employees.

The more skilled the occupation is, the more likely it is to value prior experience. However, there are high-skilled occupations hiring workers without any relevant work history. While most low-skilled occupations in the sample do not need much prior experience, most semi-skilled occupations require more than six months and most high-skilled ones require more than a year. Still, experience requirements vary considerably across high-skilled occupations: 40 percent of respondents in managerial occupations expressed that the desirable level of experience is more than two years while 15 percent of those in technicians and associate professionals occupations did so. Financial analyst, power production plant operators, and financial and insurance services managers are three cases that had more than 16 percent of their respondents claiming that these occupations need more than six years of experience, suggesting that at least some of the jobs in these occupations require long working trajectories. Finally, there is a positive correlation between education and experience requirements, indicating that raters do not see experience as a substitute of education.

Lack of experience before working is not necessarily compensated by training while employed. Two types of training questions were asked: Questions about on-site-training, which refers to organized in-class sessions of training provided by employers; and questions about on-the job (OTJ) training, which refers to a period when the new worker serves as a learner or trainee on the job under instruction or supervision of a more experienced worker. Required work experience correlates positively and significantly with both on-site training period and on-the-job training length, even after it is conditioned on having the same education. The majority of raters report that some on-site training is needed. Raters report that longer training is more likely needed for high-skilled occupations than for semi-skilled and low-skilled ones. For example, a quarter of high-skilled occupations report that three-to-six months of on-site training is required when hiring workers. Instead, short on-site training is required by some raters reporting on low-skilled occupations, with around 75 percent of them asking for less than three months of on-site training. An exception is garden and horticultural laborers, a low-skilled occupation, as half of respondents believe a newly hired worker needs at least three months of training.

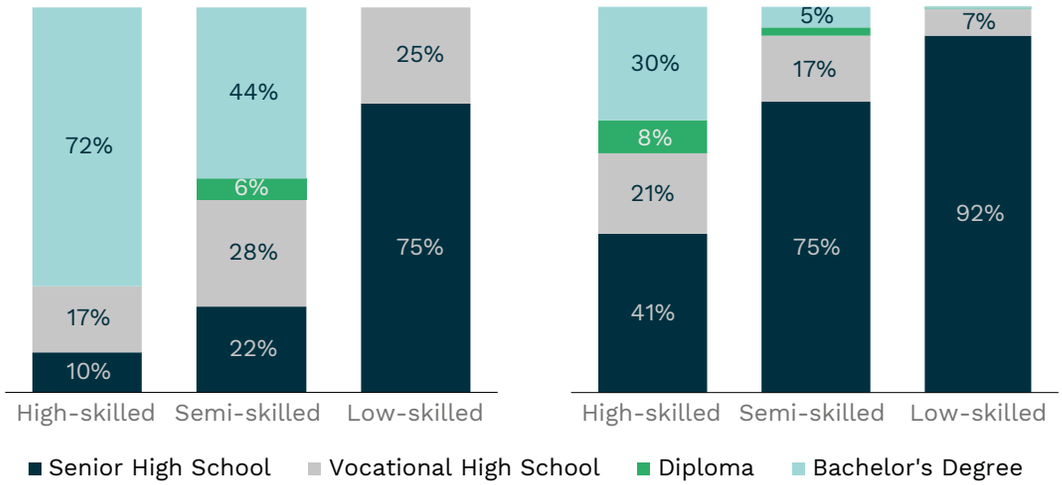
Fig. 4.1

Distribution of most required education and importance of certification and apprenticeship, by occupational skill level

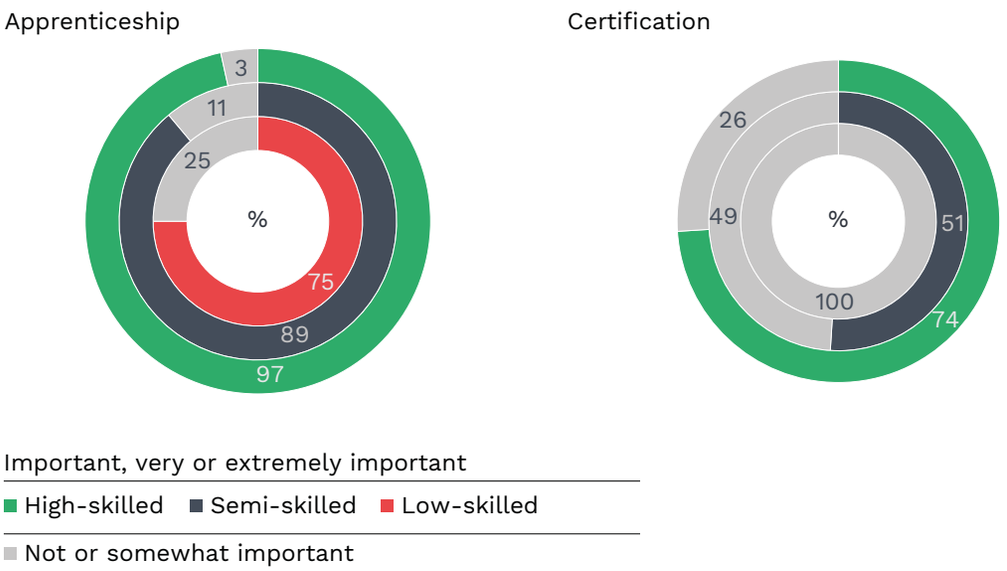
-High-skilled occupations tend to demand workers with higher education and certifications or/and apprenticeships-

a Distribution of the most frequently required education level by occupational skill level

b Distribution of employees' education level, by occupational skill level



c Distribution of importance given to certification and apprenticeship, by occupational skill level

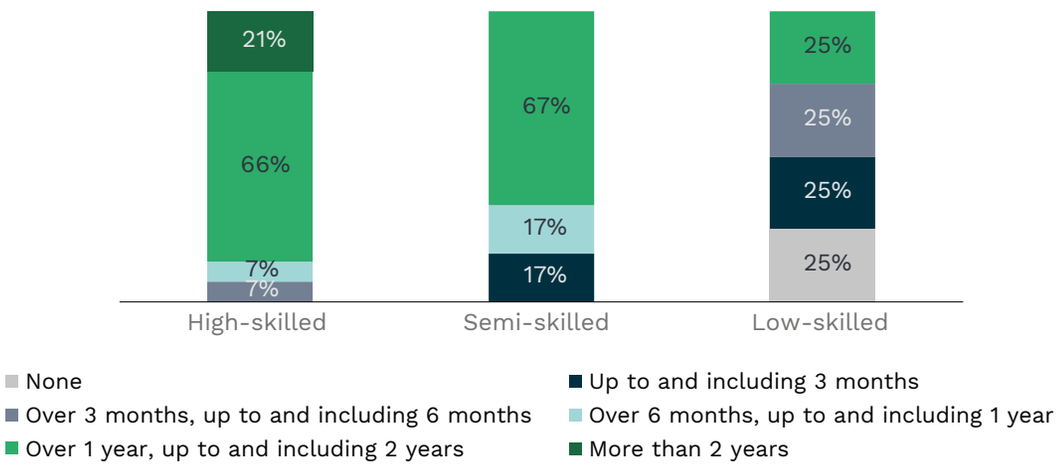


Source: Authors based on Indotask.
Notes: Panel (a) is the unweighted distribution of the most required level of education needed in each occupation by occupation skill-level group. The highest-frequency education requirement of each occupation is weighted by the number of respondents in each occupation. Panel (b) is the distribution of education attainment of employed workers by occupation skill-level group (Sakernas, 2017). Panel (c) is the proportion of occupation that consider important apprenticeships/certification by occupation skill-level group. For each occupation, apprenticeship/certification is considered important if the weighted average of the score is 3 or higher. Weights are based on the number of respondents per occupation.

Fig. 4.2

Distribution of the most frequently required level of work experience, by occupational skill level

-Apprenticeships and internship programs for youth could be a way to kick off a career.-

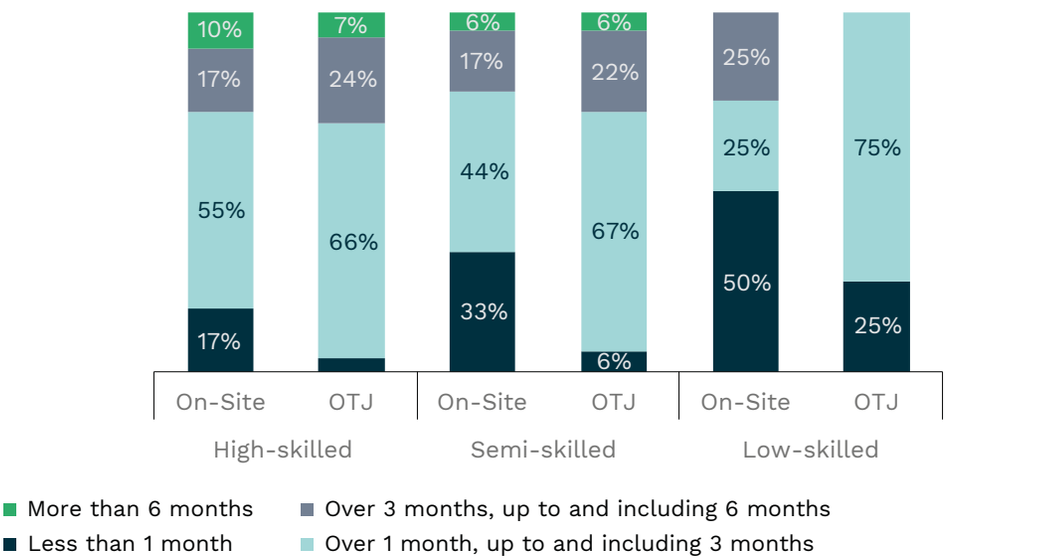


Source: World Bank, based on Indotask.
Notes: Unweighted distribution of most required working experience needed by occupation skill level. The most required working experience is the (number of respondents per occupation) weighted by mode by occupation. Estimates based on 944 respondents for 51 occupations listed in Table 2.2.

Fig. 4.3

Distribution of length of (most frequent) training offered by employers, by occupational skill level, for on-site and on-the-job training arrangements

-The vast majority of employers provide some form of on-site training for new workers, the exception being a few low skill occupations.-



Source: World Bank calculations, based on Indotask data.
Notes: OTJ stands for on-the-job. Unweighted distribution of most an3swered length of training required (on-site or OTJ) by occupational skill level. The most likely length of training for each occupation is weighted by the number of respondents. Estimates based on 944 respondents for the 51 occupations listed in Table 2.2.

the top 3 most important skills are basic skills learned during the formative years: **speaking, reading comprehension, and active listening**

Basic skills are the most important for high demand occupations

The ability of companies to harness the growth potential of new technologies might be hindered by skills shortages. Worldwide, 55 percent of global companies state that skills gaps in local labor markets are the most important barrier for adoption of new technologies.[37] For the World Economic Forum (WEF), only 61 percent of interviewed global companies in Indonesia report they find workers with the required skills to fill their vacancies, compared with 71 percent in China, 69 percent in Singapore, 65 percent in Malaysia, and 54 percent in Thailand.[38] The IOEO 2020 finds that 22 percent of employers tried to hire workers and found it difficult to do so due to lack of skills or few applicants.

Basic skills are the ones most required in Indonesia among the occupations in high demand. Figure 4.4 shows the most in-demand skills among the most demanded occupations in Indonesia (see Table F1 and F2 in Appendix F for skills categorization). The two most in-demand skills are speaking and reading comprehension, closely followed by active listening. This means that three out of five of the top skills (in terms of importance) are basic skills that are usually learned during the formative years. Coordination and monitoring are also assessed to be among the most important skills and with the highest ranking of application to the job (in reference to the indicator of level of requirement).

While some of the skills receive the highest ratings in the expected occupations, in other cases the data seems to be helping to uncover less obvious needs. In general, the occupations that require the most of these skills are what anyone would expect. For example, journalist raters give great importance and level of application to active listening and writing skills; sales and marketing managers raters do the same for speaking and negotiation skills; and mechanical engineer technicians do the same for equipment maintenance skills. However, other occupations can be less obvious in this regard. Judgement and decision-making skill is rated as the most important among raters for graphic and multimedia designers occupation; reading comprehension receives the higher rating among building architects; and critical thinking is rated the highest among environmental and occupational health specialists. Table 4.1 shows some of the most prominent examples, while Table F3 in Appendix F shows the top three occupations that ranked the highest for each skill, and Tables F4 shows the ranking of occupations for all 35 skills.

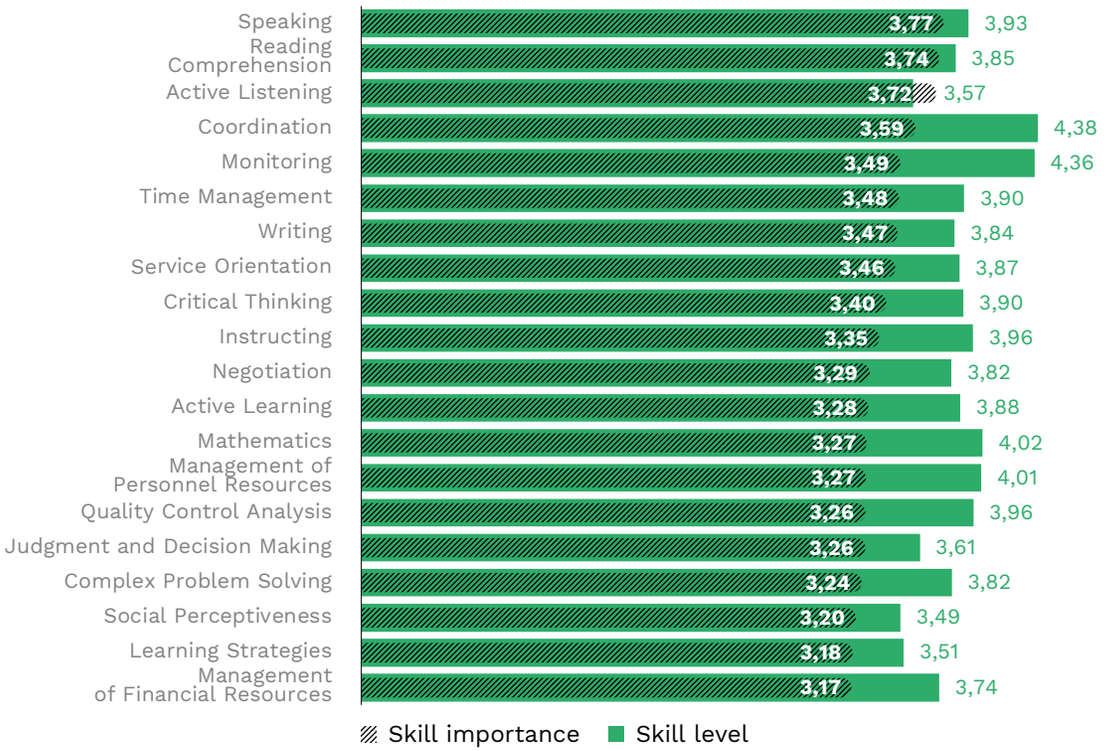
Interestingly, the skills usually assessed as critical for technology adoption and readiness for the 4IR are also among those rated as least important. It has been argued that oftentimes occupations in high demand (and selected for this study) are employed in growing sectors, adopting new technologies. If that were the case, it would be expected that the skills observed in this Indotask sample include those needed to succeed with new technologies. It is logical to believe that skills such as programming, technology design, and science are more in demand when adopting new technologies. However, these skills are not the most required in the Indotask sample of occupations. This result could suggest that, current efforts to adopt technology and adapt to new production practices are still not widespread, or that are only observed in occupations that are classified as stable in the IOEO 2020 (World Bank and Bappenas, forthcoming) or in other sectors not included in the sampling frame of Indotask.[39]

Fig. 4.4

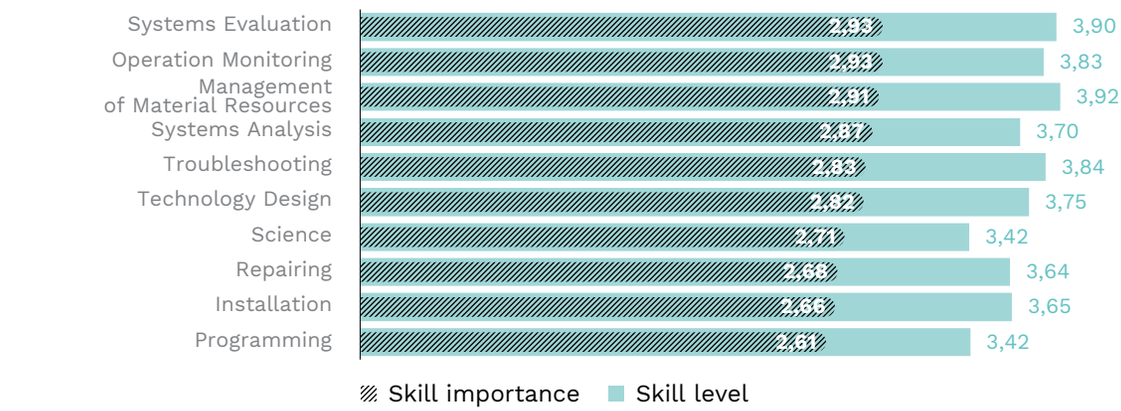
Top 20 most and least demanded skills among most demanded occupations, with skill level and importance rating

-Basic skills are in high demand and skills associated with technology adoption are not needed yet.-

a Most in-demand skills



b Least in-demand skills



Source: World Bank, based on Indotask.
Notes: Each respondent was asked to assign a score of importance (from 1 for not important to 5 for extremely important) and a score of level (from 1 for lowest to 7 for highest level) for each skill in their occupation. Scores are weighted by number of respondents for each of the 1,785 occupation-skill cells. Scores are aggregated across occupations using Sakernas (2017) employment level as weights.

An alternative explanation is that only global firms—which are underrepresented in the Indotask sample—are adopting new technologies, and hence they don't stand out in the aggregated results. The most prominent parallel effort to measure skills demand for Indonesia comes from the World Economic Forum (WEF). However, the methodologies and selected firms for interviewing vary substantially.[40] WEF interviews global firms around the world, while only 6.3 percent of employees working in Indotask occupations are employed in foreign-owned firms. Hence, it is not possible to have an apples-to-apples comparison. However, if one were to assume that the difference is most likely driven by the different samples of interviewed firms (and not by the differences in methodologies),[41] one could note that for the WEF technology use, monitoring and control, as well as technology design and programming skills, are expected to be in high demand in the next five years. All of these skills are needed for successful adoption of new technologies, but none of them is identified as in high demand by this pilot exercise, because they are not skills contained in the O*NET list as such. For the skills that are in both classifications, there are also differences in the rankings. For example, active learning and learning strategies is ranked as the second most important skill for the WEF (and supposedly for global firms), while that skill ranks much lower—in 15th place—for this exercise.

Tab. 4.1

Occupations with the highest skill importance score for each of the 20 most in-demand skills

Skill	Occupation with highest importance score
Speaking	Contact center information clerks
Reading comprehension	Journalists
Active listening	Journalists
Coordination	Contact center information clerks
Monitoring	Construction managers
Time management	Environmental and occupational health and hygiene professionals
Writing	Journalists
Service orientation	Financial and insurance services managers
Critical thinking	Journalists
Instructing	Civil engineering technicians
Negotiation	Construction managers
Active learning	Software developers
Mathematics	Construction managers
Management of personnel resources	Financial and insurance services managers
Quality control analysis	Engineering professionals not elsewhere classified
Judgment and decision making	Construction managers
Complex problem solving	Mechanical engineering technicians
Social perceptiveness	Financial and insurance services managers
Learning strategies	Graphic and multimedia designers
Management of financial resources	Construction managers

Source: authors based on Indotask.
Notes: Scores are weighted by number of respondents for each of the 1,785 occupation-skill cells. Scores are aggregated across occupations using Sakernas (2017) employment level as weights. Occupation with higher score then were selected from each skill.

Tab. 4.2

Occupations with the highest skill importance score for each of the 10 least in-demand skills

Skill	Occupation with highest importance score
Programming	Software developers
Installation	Mechanical engineering technicians
Repairing	Software developers
Science	Construction managers
Technology Design	Graphic and multimedia designers
Troubleshooting	Software developers
Systems Analysis	Software developers
Management of Material Resources	Mechanical engineering technicians
Operation Monitoring	Mechanical machinery assemblers
Systems Evaluation	Construction managers

Source: World Bank, based on Indotask.
Notes: The occupation for each of the 35 skills is determined using importance score from 51 occupation-skill cells. The score for each of the 1,785 occupation-skill cells is the weighted average by number of respondents. The occupation with highest score is selected for each skill.

Consistent with the previous metrics, high-skilled occupations assign more importance to skills, regardless of skill group. Independently of the skill category, high-skilled occupations assign more importance and use to skills than semi- and low-skilled occupations (Figure 4.5). High importance is always given to basic skills for both content and process, compared to other skill categories. While the average differences in the skills scores for both indexes seem small at first glance, these differences across occupation type are statistically significant.

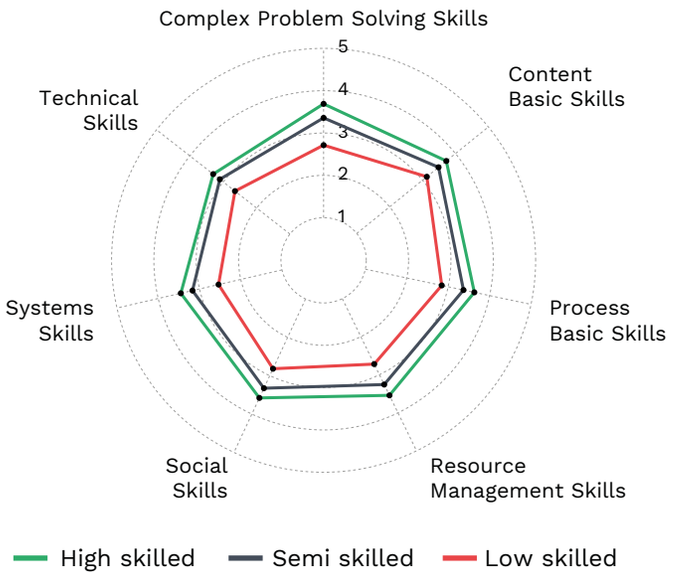
However, compared to semi- and low-skilled occupations, high-skilled occupations require more complex problem-solving skills and resource management skills. Semi- and high-skilled occupations share the same level of importance for some skill categories, especially for basic skills. The largest difference in skill requirement between high- and low-skilled occupations is precisely in complex problem solving and system skills. Complex problem solving, judgment and decision making, systems analysis, and systems evaluation are skills in this group with largest difference requirement.

Conversely, basic skills and a few technical skills are the most important among low-skilled occupations. For example, equipment maintenance is ranked in seventh place for low-skilled occupations and in the 20th position for all occupations in the sample.

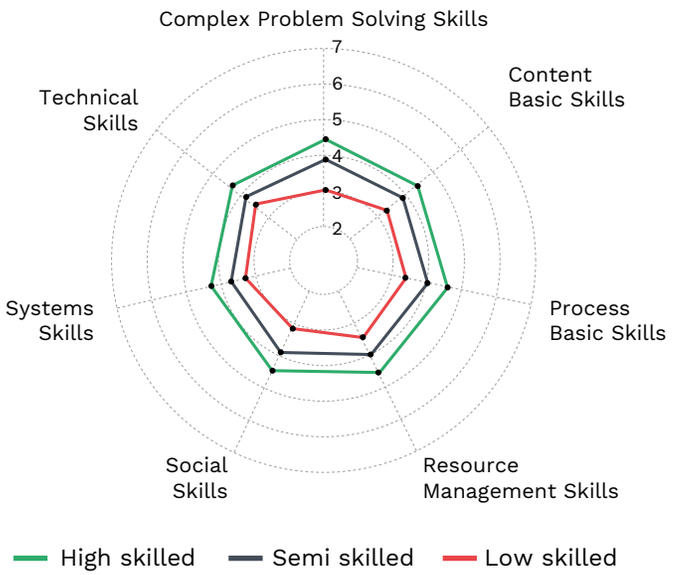
Fig. 4.5

High-skilled occupations assign more importance to skills in all skill groups, and relative even more importance to complex problem-solving skills and resource management skills

a Skill importance (aggregated by skill group), by occupation skill category



b Skill use level (aggregated by skills group), by occupation skill category



Source: World Bank, based on Indotask data.
Notes: Each respondent was asked to give a 1-5 score of importance (from not important to extremely important) and 1-7 score of level (from lowest to highest level) for each skill in their occupation. The score for each skills group is the employment-weighted mean of skill importance and skill level score. The mean occupation-skill score is weighted by the number of respondents to occupation.

Comparison with the U.S. Occupational Information Network

This section compares results coming out of the skills module from Indotask with those of the U.S. Occupational Information Network (O*NET). For the rest of this section, it is assumed that the variations in the methodologies between O*NET's and Indotask's skills module are not driving the differences in the results obtained. Given that for each of the countries the tasks module uses a different taxonomy, a clean comparison cannot be made for occupational tasks (see section 3 for methodological details). Section 6 discusses in more detail the reliability of the Indotask data and raises the potential concerns in terms of methodological weaknesses, while section 7 proposes recommendations to address them and strengthen the methodology.

In Indonesia, more importance and higher use are assigned to each and every one of the 35 skills than in the United States. Figure 5.1 shows the average differences for skills groups, and Figure G1 in Appendix G shows a similar figure showcasing the differences for each of the 35 skills in the O*NET taxonomy. Simple mean comparisons between Indotask and O*NET show that respondents in Indonesia rate all skills higher, with the largest differences seen for technical and resource management skills. Among them, the skills with the highest mean difference are installation (a difference of 1.83), equipment maintenance (1.74), equipment selection (1.71), technology design (1.34), and repairing (1.34). When it comes to comparing the intensity of use of the skills (i.e., the level variable), the differences between Indotask and O*NET are even higher, ranging from 0.36 to 3.79 (mean difference) in the ranking scale given to incumbents and experts. At the same time, it should be noted the variance in these ratings is in general much higher in Indotask, so this second comparison should be read with care.

equipment maintenance
equipment selection
and installation

are the **3** skills relatively more important for Indonesia than for the **United States.**

However, once the results are standardized to deflate from potential differences in scale perception, the results are reversed. One possibility for the consistently higher level of ratings for Indotask is that the perception of a scale varies between Indonesia and the U.S. for cultural reasons. To account for this possibility, a comparison can be made in relative terms. Skills' relative importance is calculated by standardizing at the skill-occupation cell level and then comparing.[42] After the standardization, we observe that only three skills out of the 35 remain relatively more important for Indonesia than for the United States, namely: equipment maintenance, equipment selection, and installation. By contrast, social perceptiveness, critical thinking, persuasion, and judgement and decision making were all relatively more important in the United States than in Indonesia. Given that only three skills are found to be relatively more important in Indonesia, when skills are aggregated at the group level the balance is inclined in favor of the United States, as shown in Figure 5.1 (right-hand panels). The difference for each of the 35 skills can be found in Figure G2 in Appendix G.

When comparing skills for occupations, the largest differences appear in semi-skilled occupations. At the level of skills group, the importance given to skills for the occupations of clerical support workers and service and sales workers exhibits the highest relative difference between Indonesia and the United States. At the level of skill, the largest relative difference between the two countries is found in equipment selection and equipment maintenance skills for managers (2.4 and 2.3 mean difference, respectively), equipment selection for professionals, and equipment maintenance for clerical support workers (2.17 and 2.12 mean difference, respectively). This holds true when standardized. The ranking is followed by other technical skills in semi-skilled occupations and a few high-skilled ones (see Table G1 in Appendix G for absolute differences and Table G2 for standardized differences).

Interestingly, in spite of the higher importance given to skills in Indonesia relative to the United States, the qualification requirements seem to be equal in terms of both formal education and training. Figure 5.2 shows the distribution of occupations in terms of the requirements in Indonesia and the United States. Almost half (43%) of the occupations have the same formal education requirements in both countries. Interestingly, for about 41 percent of the occupations in the sample, Indonesia requires higher education qualifications. All low-skilled occupations among the selected 51 occupations in Indotask have similar education requirements as the low-skilled occupations in O*NET, while most semi-skilled occupations (67%) need higher education requirements in Indotask than they do in O*NET. Among semi-skilled occupations, only mechanical machinery assemblers have education requirements that are lower in Indotask compared to O*NET. Similarly, respondents in Indonesia put higher importance on apprenticeships and job-related certifications than respondents in O*NET do. This is especially true for semi-skilled occupations, where the importance of having an apprenticeship is twice as high among Indotask respondents.

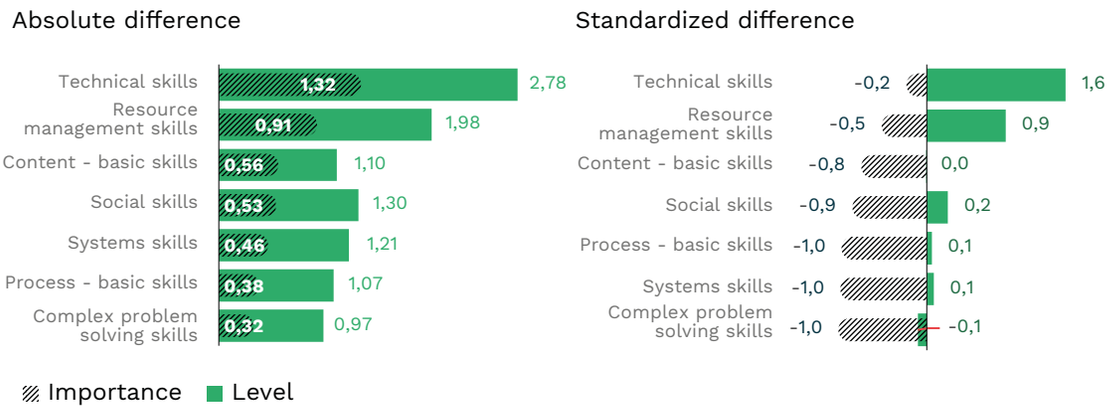
Overall, respondents in Indonesia assign more importance to all skills, and much more importance to technical skills, than respondents in the United States. In addition, Indonesia uses more of all skills, and the differences seem large enough to sustain the result in spite of potential concerns about the measurement raised in the next section. Semi-skilled occupations show the largest gaps in their demand for technical skills. However, these conclusions need to be taken with caution, as the reliability of Indotask survey responses is greater than that in O*NET. In particular, the largest differences in reliability are found in those occupations that are flagged in the next section.

Fig. 5.1

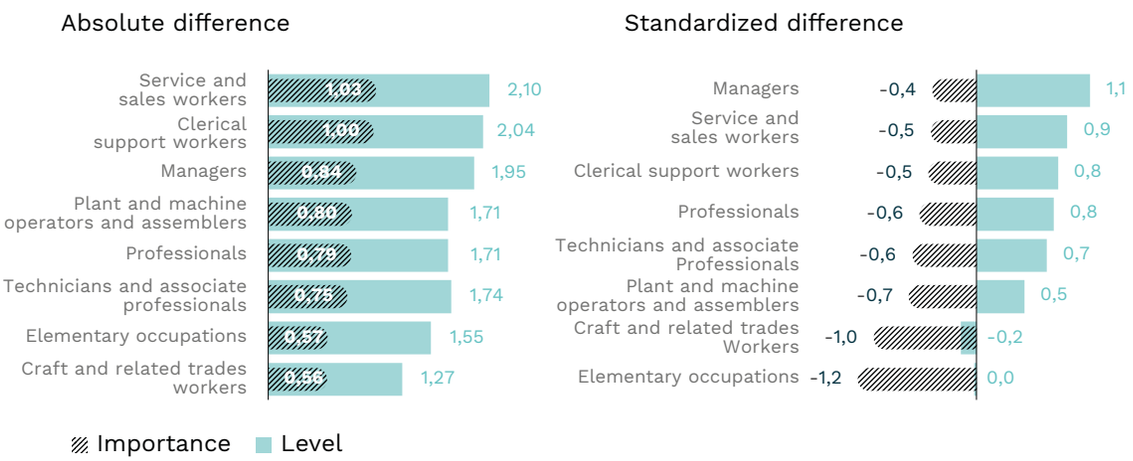
Average mean difference in importance and level of skills between Indotask and O*NET, by skill group and occupation group

-The demand and use of skills is higher in Indonesia than in the United States, independently of the occupation or skill type.

a Absolute and standardized difference, by skill group



a Absolute and standardized difference, by occupation group

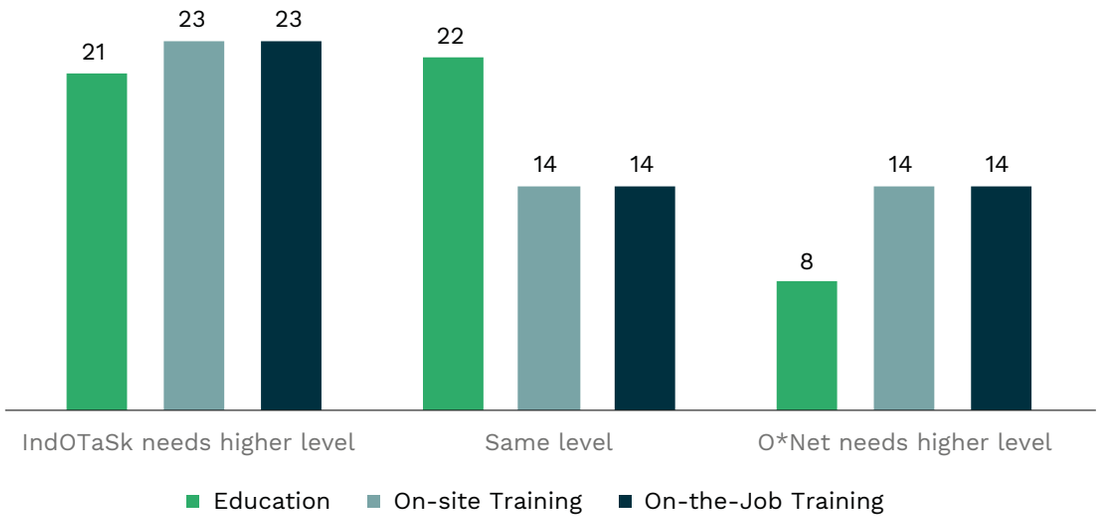


Source: World Bank, based on Indotask and O*NET.
Note: The mean differences were constructed by subtracting O*NET score from Indotask score for each of the 35 skills (panel a) or each occupation (panel b). Indotask score in occupation-skill cell is calculated by weighted mean score using number of respondents as weights. The standardized scores are calculated by subtracting the mean from occupation-skill and then dividing the difference by the standard deviation.

Fig. 5.2

Number of occupations for which education and training requirements are the same, higher, or lower in Indotask than in O*NET

-For 40 percent or more of the occupations in high demand, the qualification and training requirements are higher in Indonesia.-



Source: World bank, based on Indotask and O*NET.
Note: Number of occupations with most common required level education in said occupation is different for O*NET and Indotask.

Reliability

6.

The U.S. Occupational Information Network (O*NET) Program carries out regular reports with the objectives of assessing the reliability of the data produced and exploring improvements. More than a hundred reports have been published by O*NET on several topics that show the continuous efforts applied over several decades to create this comprehensive database of occupations and their characteristics.[43] Building on that O*NET knowledge, this section examines the soundness of this Indotask pilot skills exercise. The description of the selection of indicators used by O*NET—and replicated in this section—to assess potential biases by different groups of raters (e.g. incumbents and analysts, men and women) can be found in Tsacoumis and Van Iddekinge (2006).

Following the O*NET practice, three indicators are computed to put the data to a test. First, a criterion for recommended suppression is applied with the objective of eliminating the skills that either show limited agreement among raters, have level ratings that suggests they are not relevant for the occupation, or for which interpretation of the data is difficult. Three additional indicators are used to measure inter-rater agreement and reliability. Inter-rater agreement refers to the consistency of answers across respondents for each rating group (i.e., for each of the 35 skills); while inter-rater reliability assesses consistency in the order of importance and level for each occupation or across occupations. Poor agreement may suggest that there is confusion about the skills constructs, potentially due to either the nature of the construct definition or the rater training. Next, the definition of each of the four indicators is introduced.

Indicator 1: Suppression-recommended criteria

The suppression-recommended criteria flag skills

- **(1a) that are not relevant to an occupation,** when more than a quarter of respondents rated the importance of a skill as not important;

- **(1b) with too little agreement in importance ratings across raters for a particular skill-occupation,** when the standard error of the mean (SEM) importance score is higher than 0.51;[44] and

- **(1c) with too little agreement in level ratings across raters for a particular skill-occupation,** when the standard error of the mean (SEM) of the level score is greater than 0.51.

Following O*NET practice, 0.51 is selected as the importance threshold since an SEM greater than 0.51 corresponds to having upper and lower bounds of the confidence interval larger than one scale point away from the observed mean.

An acceptable proportion of skills was flagged as "recommended to suppress" for a particular occupation. Overall, close to 10 percent of the ratings (185 out of 1,785 skill-occupation ratings)[45] were assessed as recommended to suppress for the occupation. The proportion of ratings resulting in recommended-to-suppress is comparable to those obtained by O*NET. For example, the average percentage of skill-occupation ratings flagged as not relevant across 19 cycles of O*NET reports is 13.40 percent, with a standard deviation of 3.84 percent. In Indonesia, most of the recommended-to-suppress flags were found for management of personnel resources (24%), management of financial resources (22%), programming (20%), and repairing (20%) skills. See Table 6.1 (column 1b). However, it should be noted that this indicator does not capture whether the results make sense. Through observation of the data, some counter-intuitive results were found. For example, a large proportion of garden and horticultural laborer respondents said that programming skill is important (67% of experts, 60% incumbents, 64% overall).

The data passed the test for the agreement on the importance of skills, but it underperforms for the agreement on the level of skills. That is, no skills-occupation rating was flagged for having an SEM importance score higher than 0.51 (hence none are reported in Table 6.1), but for 161 skill-occupation ratings (or about 10 percent of the remaining sample, 161 out of 1,619) the standard deviation of the mean ratings on the level of skill-occupation was above the selected threshold (see Table 6.1, column 1c). While this proportion flagged is substantially higher than in O*NET, the levels are still found acceptable. For example, for the last cycle review of O*NET (ONet 2020) only one skill-occupation cell was found to have insufficient level agreement (equivalent to 0.03% of the total).

Overall, 90 percent of the skill-observation cells passed the recommended suppression test. While the Indotask data passed the tests for agreement on relevance and importance, they stand substantially below standards for the level agreement. As a result,

Tab. 6.1

Number of recommended suppression flags

while 14.4 percent of skill-occupations cells fail the recommended suppression criteria for O*NET, almost twice as many fail for Indotask.

Skills	Number of times skills are found not relevant (1a)	Lack of agreement		
		Importance rating (1b)	Level rating (1c)	Selected associated occupations
Management of Personnel Resources	0	0	12	Civil engineers; Graphic and multimedia designers
Management of Financial Resources	0	0	11	Graphic and multimedia designers; Software developers
Programming	0	0	11	Supply, distribution and related managers; Civil engineers
Repairing	0	0	10	Construction managers; Civil engineers
Installation	0	0	9	Building architects; Journalists
Operation monitoring	0	0	9	Civil engineers; Building architects
Management of Material Resources	0	0	8	Graphic and multimedia designers; Journalists
Technology design	0	0	8	Software developers; Civil engineering technicians
Troubleshooting	0	0	8	Civil engineers; Journalists
Judgment and Decision Making	0	0	7	Software developers; Journalists
Active learning	0	0	6	Software developers; Draughtspersons
Active listening	0	0	6	Software developers; Draughtspersons
Persuasion	0	0	6	Civil engineering technicians; Draughtspersons
Science	0	0	6	Software developers; Journalists
Service orientation	0	0	6	Civil engineering technicians; Draughtspersons
Systems analysis	0	0	6	Journalists; Draughtspersons
Learning strategies	0	0	5	Software developers; Draughtspersons
Negotiation	0	0	5	Journalists; Draughtspersons

Skills	Number of times skills are found not relevant (1a)	Lack of agreement		
		Importance rating (1b)	Level rating (1c)	Selected associated occupations
Operation and Control	0	0	5	Software developers; Journalists
Operations analysis	0	0	5	Civil engineers; Software developers
Complex problem solving	0	0	4	Civil engineers; Software developers
Equipment maintenance	0	0	4	Civil engineers; Financial analysts
Mathematics	0	0	4	Software developers; Draughtspersons
Reading comprehension	0	0	4	Software developers; Power production plant operators
Time management	0	0	4	Journalists; Commercial sales representatives
Equipment selection	0	0	3	Draughtspersons; Commercial sales representatives
Quality control analysis	0	0	3	Software developers; Mechanical machinery assemblers
Speaking	0	0	3	Software developers; Draughtspersons
Monitoring	0	0	2	Handicraft workers in textile, leather and related materials
Social perceptiveness	0	0	2	Software developers
Coordination	0	0	1	Commercial sales representatives
Systems evaluation	0	0	1	Messengers, package deliverers and luggage porters
Writing	0	0	1	Draughtspersons
Critical thinking	0	0	0	-
Instructing	0	0	0	-
Total	**0**	**0**	**185**	

Source: World Bank, based on Indotask and O*NET.
Note: Column 2 (1a) is calculated by looking at how many times we found occupations which at least quarter of its respondents rated the skill as not important. Column 3 (1b) is calculated by looking at how many times we found an occupation with SEM for skill importance > 0.51 in each skill. Column 4 (1c) is calculated by looking at how many times we found an occupation with SEM for skill level > 0.51 in each skill. The data are from Indotask, with 944 respondents from 51 selected occupations, the SEM and ratings were calculated using weights from the number of respondents per occupation.

Tab. 6.2

Inter-rater agreement for importance and level ratings

	Indotask	O*NET
Importance - Median of SD	0.96	0.35
Importance - Median of SEM	0.24	0.13
Level - Median of SD	1.49	0.46
Level - Median of SEM	0.37	0.16

Source: World Bank, based on Indotask. *Notes*: The numbers were obtained by calculating the median of standard deviation (SD) and standard error (SEM) of each occupation-skill for importance rating which takes value of 1-5 and level rating which takes value of 1-7.

Indicator 2: Inter-rater agreement

The inter-rater agreement index seeks to assess the extent to which respondents provide the same rating regarding the importance or level of a skill required to perform within a particular occupation. The simplest way of capturing the agreement is through the standard deviation (SD) of ratings across respondents for each skill-occupation cell, and the standard error of the mean (SEM) of the same ratings. The larger the SD and SEM are, the more divergent the answers of raters will be and the less reliable the results.

As with the first indicator, for this sample the importance rating performs well while the level rating falls short of standards. The proposed measure is the SD of ratings across occupational analysts for a given skill-occupation cell and the SEM of these ratings. The median SD and median SEM are 0.95 and 0.23, respectively, for the importance rating across skill-occupation cells, and 1.47 and 0.37, respectively, for the level rating. Overall, the results indicate that the ratings made by the occupational analysts were quite consistent for importance scales, but agreement is weak concerning the level scales. Overall, the inter-rater agreement scales are higher compared to O*NET (see Table H1 in Appendix H for the inter-rater agreement indicator for each occupation).

Indicator 3: Inter-rater reliability across skills

The strictest measure of reliability results from comparing the rankings themselves provided by raters. The intraclass (or inter-rater) correlation coefficients (ICC) can hence be used to assess consistency of ratings across skill-occupation cells. It indicates the degree of similarity in the rank ordering and relative distance between the skills on a particular scale within an occupation. As a rule of thumb, reliable data is associated with an ICC of 0.80 and above. An estimate between 0.5 and 0.8 is considered moderately reliable.

The reliability of Indotask data is moderate according to intraclass correlation measure. The estimated median of intraclass correlation coefficient (ICC) is 0.78 for importance ratings and 0.51 for level ratings.[46] As before, the importance variable performs better than the level one. Table 6.3 shows how many occupations show poor, moderate, and good ICCs, with more occupations exhibiting ICCs above 0.8 for the importance rating. The complete list of ICCs for each occupation is listed in Table H2 in Appendix H.[47]

These values of Indotask are considerably below those of O*NET. Over the 20 cycles of data collection, the average of ICCs is 0.98 for both importance and level variables. And none of the ICCs of O*NET fall below 0.90. The differences in the results can be due to several factors. First, O*NET respondents are analysts of industrial organizations, also trained by O*NET. Second, several analysts are used by O*NET to report on more than one occupation, and over more than one cycle, which increases the performance of the indicators and allows learning-by-doing. Third, O*NET raters are interviewed in person while Indotask was conducted for the first time via webmail during the COVID-19 pandemic.

Tab. 6.3

Number of occupations by reliability results for importance and level ratings

	Importance	Level
Poor reliability	8	23
Moderate reliability	23	24
Good reliability	20	1

Source: authors based on Indotask.
Notes: The table above displays the number of occupations based on their ICC score grouping for importance and level ratings. Good reliability data is associated with ICC of 0.80 and above, moderate reliability is if the ICC is 0.5-0.80, and poor reliability is associated with ICC of 0.50 or below

No biases are observed from background differences among raters

As discussed in section 2, there are differences among respondents' in their backgrounds that raise a concern about biases in responses. As shown earlier in Figures 2.2 and 2.3, the split between incumbent workers and experts, between experts with and without work experience, and between male and female respondents is not balanced. Users of the data could be concerned that each of these respondents has different perceptions about the skills and tasks importance and use, as they engage differently at the job. To check such concerns, we apply the same battery of tests (indicator 2 and indicator 3 above) to each of these groups and compare them. Overall, there are some differences in the results depending on respondents' background.

Similar to O*NET, for Indotask there are no significant differences in the reporting of experts and incumbents. Tsacoumis and Van Iddekinge (2006) compared the difference in skills ratings between analysts (included as experts in Indotask) and incumbents and found that, except for higher mean importance by incumbents, which one cannot conclude indicates a rating error, there were minimal differences between the two types of respondents. As a result, the authors recommended to O*NET that the selection of respondents should rely on theoretical and practical considerations (e.g., costs). Today, O*NET relies on trained analysts to fill in the skills module. As explained in section 2, expert respondents for Indotask are HR managers or instructors from TVET schools. These persons have a very different profile from the O*NET analysts, who are professionally trained in industrial/organization psychology. Still, Indotask findings suggest that there is no statistical difference in the reliability of these two groups of respondents (see Table H3 in Appendix H, which shows the mean SEM and mean SD for experts and incumbents separately by occupation). An additional concern is that almost one-third of Indotask experts do not have experience on the job and may bias the ratings according to the importance of the skills in the course content rather than that of the job. However, Indotask results show no differences in two of the three reliability tests between experts with and without on the job experience.

Overall, there are no significant differences in the reporting between men and women, and between experts with and without experience for the importance variable. Tables H3 in Appendix H show the SEM, the median of the SD, and the ICC aggregated by occupations. The results are summarized by calculating the medians in Table 6.4. The differences in the variations in responses between experts and incumbents are small and not significant; and the rankings tend to be preserved as the ICC for these two groups is similar. The analysis for men and women, and for experts with and without experience is a bit noisier, but still the dif-

ferences in the indicators are not significant. Only the differences in the median SEM between experts with and without work experience are found to be significant. However, since the experts without experience are a small proportion of the overall respondents, the bias is likely small in magnitude. In future versions of Indotask, more attention needs to be given to the mix of respondents, and qualitative work should be carried out to understand what could be driving these differences in ratings.

Tab. 6.4

Inter-rater agreement and ICC for importance ratings, by group of respondents

	Experts vs Incumbents			Gender of respondent			Experts with and without work experience		
	Experts	**Incumbent**	**p-value**	**Women**	**Men**	**p-value**	**Experienced**	**Inexperienced**	**p-value**
Median of SD	0.957	0.956	0.089	0.894	0.941	0.477	0.707	0.894	0.420
Median of SEM	0.374	0.288	5.180	0.408	0.274	4.807	0.500	0.408	0.031(**)
ICC	0.563	0.633	0.147	0.360	0.678	7.612	0.476	0.000	4.162

Source: World Bank, based on Indotask.
Notes: The numbers were obtained by calculating the ICC, median of standard deviation (SD) and standard error of the mean (SEM) of each occupation-skill. The number above is calculated using Indotask data of 944 respondents from 51 high-demanded occupations with number of respondent per each occupation as the weight. The Pearson's chi-squared test is used to tests the null hypothesis that the samples were drawn from populations with the same median.

Recommendations for scale-up and use

7.

It is recommended that Indonesia continue running Indotask on a pilot basis to incorporate the lessons learned from the first phase. Based on the analysis comping up from the first attempt to collect data similar to O*NET in Indonesia and the parallel ongoing efforts to analyze online job postings, it is concluded that this effort adds value to monitoring the demand of skills. First, the results are fairly reliable. While the results do not perform as well as those of O*NET, they pass most of the tests to which O*NET subjects its data. Second, the initial analysis of online job postings suggests there could be biases from generalizing the findings of the data to the whole economy, as online vacancies are geographically concentrated in large urban centers and do not cover all occupations in high demand. For example, power production plant operators is an occupation identified as both critical and bright, but it had no job postings during quarter 1 and hence no information on the skills needed for that job.

The following adjustments are recommended for the next Indotask pilot:

1. **Field other modules of O*NET.** The second round would benefit from expanding the instrument to incorporate (at least) data on work activities (under the occupational requirement model of O*NET content model) and work context (the recommended modules to add are highlighted in green in Appendix B). The suggested modules are those that are mostly used by academics monitoring the impact of the 4IR and that closely complement those retrieved in this first effort of Indotask. These modules are also targeted to the same respondents (analysts and incumbent workers) to Indotask, which would facilitate the process.

2. **Do not attempt to collect all the modules in one go.** Each of the modules has proved to be relatively long, and reliability indicators for the data are not yet performing as well as in O*NET. To avoid burdening workers with long questionnaires, especially taking into account that the next round of Indotask will happen while respondents are fully back to the workplace, it is recommended to send modules in batches. The enumerator can explain the approach to the respondent when the first phone contact is done and Indotask is introduced to the rater. In that way, it is expected to maintain or even reduce the variability in answers across raters described in section 6.

3. **Continue with online surveys supported by phone, but consider introducing face-to-face interviews for low-skilled occupations.** Indotask included four low-skilled occupations. These proved to be difficult to find raters for, both in terms of incumbent workers and experts—although the challenges varied with occupations. For example, for agricultural laborers, it was difficult to find workers with digital skills to complete the web questionnaire, but experts were found because vocational schools teach agriculture. For shelf fillers and messengers and package deliverers it was extremely difficult to find experts. These are activities that are usually taught at the workplace or simply through learning-by-doing. Hence, some low-skilled occupations will be more likely to complete if the survey is delivered face-to-face. In a couple of consultations during the collection process, some concerns were voiced about the suitability of web delivery of the instrument. While this is the same procedure that O*NET applies, the concern is appropriate for a middle-income country. Given that the scalability of Indotask depends on keeping its cost low, if those concerns continue during the dissemination phase a few F2F interviews could be piloted to corroborate that the web survey is well suited.

4. **Continue interviewing the same raters.** One of the lessons from O*NET is that raters learn over time. O*NET analysists are also trained by O*NET to answer the questions. Inter-class correlation estimates can be computed across rounds for a fixed rater, and then use to understand potential biases coming from a certain rater. Since the questionnaire was new in Indonesia and somehow different from other surveys, there is a value in exploring how much learning there could be over time in Indotask.

5. **Expand the number of respondents, especially experts with work experience, and include female raters.** One of the concerns in middle-income countries is that the productions processes, and hence the tasks and the skills needed for output, vary substantially across geographic regions and jobs (or job titles). Respondents in Indotask were selected from OEVS firms, which cover selected economic subgroups and regions. For example, accountants contacted in Indotask work in 11 economic subsectors (see Table 2.1 of World Bank, and Bappenas forthcoming), and if the duties of accountants are different when working in other economic activities, Indotask would fail to capture them through incumbent workers and only get them when interviewing experts. The same concern applies to the geographic dimension. Finally, 73 percent of raters of Indotask are men, whereas we observed only 62 percent of employment were men, based on data from the labor force survey. This points to the fact that male respondents were proposed by supervisors to participate in the survey and could carry any (implicit) gender bias on what is needed for that occupation. To include more female raters, simple strategies could be put in place, such as instructing enumerators to

ask HR CEOs to first suggest a man and woman to participate in Indotask.

6. **Select occupations already interviewed to compare progress and expand the list to other occupations in high demand.** O*NET repeats the analysis of occupations regularly, in batches of a hundred occupations. It is suggested that Indotask follow the same approach. And to evaluate progress in the implementation, given that it is recommended to continue in a pilot phase for at least one more round, some of the occupations of this first round could be included in the second pilot phase. The selection of occupations to be repeated could be influenced by the low reliability performance observed in the first phase (as described in section 6 and Appendix H).

7. **Expand the list of tasks by incorporating those from O*NET.** The current list of tasks is drawn from the KBJI manual. However, the list of tasks from O*NET is much larger, not only because the production processes might be different between the United States and Indonesia but also because O*NET covers a larger number of job titles. Raters are offered to add other tasks to the list, but they are hardly used. Given that Indotask raters might not have clarity to identify tasks on their own, the menu of options for tasks could be expanded, leveraging those of O*NET. This exercise could facilitate a comparison of production processes between O*NET and Indotask.

8. **Conduct focus group discussions to improve the design presentation of questions related to tasks and skills level of relevance.** One clear and disappointing result of the Indotask pilot is the low performance of the level-of-relevance variable. This was observed for both tasks and skills modules. Getting this variable right could be important to understand the production processes in different countries, and also to inform training. If a skill is needed but not found to be highly relevant, it becomes less of priority when imparting training. Unfortunately, the quantitative analysis does not go a long way in eliciting the potential causes of this failure. Hence, it is suggested to conduct F2F focus groups to try to disentangle the potential causes of this shortcoming. It should be noted that Indotask planned to carry out focus group discussions in preparation for the instrument, but this had to be cancelled due to COVID-19 contention measures.

9. **Explore potential changes that might be arising due to responses to the COVID-19 pandemic and crisis.** As widely acknowledged by academics, policymakers, and the overall society, the COVID-19 pandemic is leaving a permanent footprint on the way we live and the way we work. One of the objectives Indotask considered answering was measuring to what extent the pandemic was changing the demand for skills. However, the complexity of the new instrument and fielding the survey early on during the quarantine period in Indonesia did not allow us to properly investigate this hypothesis. The team therefore assumes that the results of this first pilot of Indotask reflect the pre-crisis status quo. Repeating Indotask over time, with a sampling framework that allows comparisons, could help to explore answers and complement the ongoing work with online job vacancy data.

10. **Carry out knowledge exchanges with O*NET.** Given that Indonesia is one of the first countries to attempt to replicate O*NET, it would be important to gather opinions and experience from the developers of the data. O*NET has been improving its database over several decades. To our knowledge, there are only two other ongoing initiatives—in Vietnam and Uruguay—which should also be explored, as they could render interesting lessons as the results begin to be shared, hopefully in the near future.

Results are assessed to be reliable but should be used with caution and under certain caveats. Users of pilot Indotask data need to bear in mind the following:

1. **Be mindful of generalizing the results nationwide.** While Indotask is not different from O*NET in terms of relying on select experts from specific jobs and geographic regions, Indotask is still a fresh effort. On the one hand, this may be an extreme caution since results from O*NET are not only generalized to the United States but also used worldwide. On the other hand, the increased use of O*NET, especially in low- and middle-income settings, is raising awareness about the potential short-

falls of its data, including those discussed above. Hence, users of Indotask are asked to exert caution when generalizing the results of Indotask to Indonesia.

2. **Use with confidence variables that measure importance, but exert caution when using variables on level of relevance.** The battery of tests applied to Indotask to assess the reliability of the data has shown that the variables of importance of skills and tasks for a certain occupation work well, while those for the level of relevance are weaker. While all results are reported in the Statistical Profile report of Indotask, users need to exert caution if applying the latter variables.

3. **Comparisons of results with other country efforts are a good intellectual exercise, but methodologies vary enough to hitherto to discard that the differences may result from different production processes.** Section 5 compared the results of Indotask with those of O*NET, assuming the differences in the methodologies are not driving the differences. The same comparison exercise could be extended to Vietnam and Uruguay when the results become available. The comparison is useful as it confirms the suspicion of many academics and policymakers that the productions processes vary substantially between developed and developing countries. This conclusion has important implications in answering two of the most frequently asked questions of today: How is the 4IR changing jobs? And, Which are the jobs of the future? Most attempts to answer these questions rely on O*NET, but now they could incorporate Indotask. Repeating InDOTask and getting the level variable right will help in those efforts as they contribute to measuring the gradient of change.

In the medium term, once the Indotask pilot and the other workforce development data efforts are consolidated it will be useful to compare the results from Indotask with those of IOVO (forthcoming (b)) to reinforce each other. An important substitute for, and complement to, Indotask is online vacancy data. As discussed above, the World Bank is also initiating an exploration of real-time big data, collecting job vacancies and required skills at the occupational level, in Indonesia. Following the good practice of O*NET, which uses online data to complement components of the model, Indonesia should do the same. At the same time, since resources—both financial and human—are scarce in Indonesia, it is recommended to further explore the substitutability of the data. Finally, both data sources should be taken into account when developing skills taxonomies to be used in other segments of the labor market information system, as discussed in World Bank (forthcoming (b) and (c)).

Most importantly, it is recommended to invest in the dissemination of the results and to cater their presentation to different audiences. The results of Indotask should be integrated with those coming from other data sources and used in the career guidance and labor market dashboard services of the labor market information platform and beyond. The *Tasks and Skills Profiles* report that accompanies this technical report provides some of the information that is considered useful for end users and that can be integrated in the online platform.

From an institutional perspective, it is important that this activity be integrated within a Labor Market Observatory. Indonesia does not have a formal labor market observatory (LMO). However, the Government of Indonesia acknowledges that it is urgent to fill that gap, and the Ministry of Development Planning (Bappenas) envisions this function to be housed in the Ministry of Manpower. As the LMO institutionalizes, independently on how the future rounds of Indotask are implemented, the LMO needs to have solid knowledge of the methodology, results, and shortcomings and to devise plans for the use of the data. Moreover, the LMO should strategically plan how and when to expand the survey given the progress observed and planned for other data sources. Of course, these expanded efforts of the LMO need to be appropriately funded. While there are no sound analyses of the returns of similar government investments, recent academic papers show that improvements in the allocation of occupations across workers account for large shares of long-term growth in the United States (Hsieh et al., 2019).

Last but not least, the key to the success of similar efforts in other countries is carrying out continuous improvements. Improvements should be driven by the lessons of implementing Indotask and disseminating its results. For example, it is recommended to conduct focus group discussions with users to improve the design of the instrument and its dissemination. But improvements should also respond to the changes in the overall labor market information system (including what other data sources are being developed and used), the needs of the government for policymaking, and the overall progress of the economy. Today, more than ever before, to maximize the potential of the workforce it is critical that the relevant information be provided to the public and that the government monitor the fast pace of change in the labor market.

Appendix

Appendix A.
Adult skills surveys around the world

Survey	Lead agency	Number of countries collected	Skills domains measured	Link
Programme for the International Assessment of Adult Competencies (PIAAC)	OECD	40 OECD and partner countries	• Literacy • Numeracy • Problem solving • Other: Gathers information and data on how adults use their skills at home, at work, and in the wider community.	https://www.oecd.org/skills/piaac/
STEP Skills Measurement Program	World Bank	17 low- and middle-income countries	Two surveys: *Household-based survey*: • Direct assessment of reading proficiency and self-reported assessment of reading, writing, and numeracy skills used in daily life and at work • Self-reported information on personality, behavior, and time and risk preferences • Job-relevant skills used on the job Employer-based survey: • Structure of the labor force • Cognitive skills • Behavior and personality traits • Job-relevant skills used and needed • Provision of training and compensation by employers • Level of satisfaction with education and skills training available in the labor force	https://microdata.worldbank.org/index.php/catalog/step/about
Literacy Assessment and Monitoring Programme (LAMP)	UNESCO	5 Pilot countries	• Literacy (prose and document) • Numeracy • Reading components (recognition of letters and numbers, word recognition, print vocabulary, sentence processing and passage fluency)	http://uis.unesco.org/sites/default/files/documents/the-next-generation-of-literacy-statistics-implementing-the-literacy-assessment-and-monitoring-programme-lamp-en_0.pdf
International Adult Literacy Survey (IALS)	OECD	22 OECD countries	• Literacy (prose and document) • Quantitative literacy • Carried out between 1994 and 1998	https://nces.ed.gov/surveys/ials/ https://nces.ed.gov/surveys/ials/results98.asp
Adult Literacy and Life Skills Survey (ALL)	OECD	11 OECD countries	• Literacy (prose and document) • Numeracy • Problem Solving • Carried out between 2003 and 2008	https://nces.ed.gov/surveys/all/ https://nces.ed.gov/pubs2005/2005117.pdf

Appendix B
O*NET content model

Module	Area	Definition	Subcategories	Individual characteristics	Source
Worker characteristics	Abilities	Enduring attributes of the individual that influence performance.	• Cognitive • Psychomotor • Physical • Sensory	52 individual abilities	Analyst
	Occupational interests	Preferences for work environments.	• Realistic • Investigative • Artistic • Social • Enterprising • Conventional	NA	Analyst
	Work values	Global aspects of work composed of specific needs that are important to a person's satisfaction.	• Achievement • Working conditions • Recognition • Relationships • Support • Independence	NA	Analyst
	Work style	Personal characteristics that can affect how well someone performs a job.	• Achievement orientation • Social influence • Interpersonal orientation • Adjustment • Conscientiousness • Independence • Practical intelligence	16 styles	Incumbent Occupation Expert
Worker requirements	Skills	Developed capacities that facilitate learning or the more rapid acquisition of knowledge, or that facilitate performance of activities that occur across jobs.	• Basic • Social • Complex problem solving • Technical • Systems • Resource management	35 individual skills	Analyst
	Knowledge	Organized sets of principles and facts applying in general domains.	• Business and management • Manufacturing and production • Engineering and technology • Mathematics and science • Health services • Education and training • Arts and humanities • Law and public safety • Communications • Transportation	33 individual knowledge areas	Incumbent Occupation expert
	Education	Prior educational experience required to perform in a job.	• Required level of education • Job-related professional certification • Instructional program required • Education level in specific subjects	NA	Incumbent Occupation expert

Module	Area	Definition	Subcategories	Individual characteristics	Source
Experience Requirements	Experience and training	If someone were being hired to perform this job, how much of the following would be required?	• Related work experience • On-site or in-plant training • On-the-job training • Apprenticeship	NA	Incumbent Occupation expert
	Skills – entry requirement	Entry requirement for developed capacities that facilitate learning or the more rapid acquisition of knowledge, or that facilitate performance of activities that occur across jobs.	• Basic • Social • Complex problem solving • Technical • Systems • Resource management	46 individual skills	Analyst
	Licensing	Licenses, certificates, or registrations that are awarded to show that a job holder has gained certain skills.	• License, certificate, or registration required • Specific license or certificate required • Additional education and training • Organization and agency requirements	NA	Incumbent Occupation expert
Occupational requirements	Generalized work activities	Work activities that are common across a very large number of occupations.	• Information input • Mental processes • Work output • Interacting with others	41 work activities	Incumbent Occupation expert
	Intermediate work activities;	Work activities that are common across many occupations;	NA	NA	Analyst
	Detailed work activities	specific work activities that are performed across a small to moderate number of occupations within a job family.	NA	NA	Analyst
	Organizational context	Characteristics of the organization that influence how people do their work.	• Structural characteristics • Social processes	99 areas	Analyst
	Work context	Physical and social factors that influence the nature of work.	• Interpersonal relationships • Physical work conditions • Structural job characteristics	59 areas	Incumbent Occupation expert
Workforce characteristics	Labor Market Information	Current labor force characteristics of occupations	• Occupational statistics	NA	U.S. Bureau of Labor Statistics
	Occupational Outlook	Future labor force characteristics of occupations	• Occupational projections	NA	U.S. Bureau of Labor Statistics

Module	Area	Definition	Subcategories	Individual characteristics	Source
Occupation-specific information	Title	Primary title and code used to identify a single occupation in the O*NET-SOC taxonomy.	NA	NA	O*NET-SOC taxonomy
	Description	A statement of required or important duties performed by workers in an occupation in the O*NET-SOC taxonomy.	NA	NA	O*NET-SOC taxonomy
	Alternate titles	Alternate or "lay" titles include related job titles and occupational titles	NA	NA	-
	Tasks	Occupation-specific tasks	NA	NA	Incumbent Occupation Expert
	Technology skills	Information technology and software skills essential to the functions of an occupational role.	NA	NA	Job postings
	Tools	Machines, equipment, and tools essential to the performance of an occupational role.	NA	NA	-

Source: Moroz, Nguyen & Chu (2019), based on O*NET.

Notes: NA indicates Not Applicable. "–" indicates no known. Shaded in light grey are the sections that were adjusted to the current version of Indotask. Shaded in light green are the sections recommended to include in the next pilot; shaded in light yellow are those that could be incorporated in a third round.

Appendix C.
Sample characteristics

Table C1. Number of respondents per occupation, by respondent background

KBJI 2014	Occupations	Expert	Incumbent	Total
1219	Business services and administration managers not elsewhere classified	12	15	27
1221	Sales and marketing managers	8	13	21
1323	Construction managers	7	8	15
1324	Supply, distribution, and related managers	8	14	22
1346	Financial and insurance services managers	6	19	25
2141	Industrial and production engineers	8	14	22
2142	Civil engineers	4	9	13
2144	Mechanical engineers	5	14	19
2149	Engineering professionals not elsewhere classified	3	11	14
2161	Building architects	7	8	15
2166	Graphic and multimedia designers	8	9	17

KBJI 2014	Occupations	Expert	Incumbent	Total
2263	Environmental and occupational health and hygiene professionals	8	8	16
2413	Financial analysts	6	6	12
2431	Advertising and marketing professionals	6	17	23
2512	Software developers	5	6	11
2642	Journalists	14	0	14
3111	Chemical and physical science technicians	7	11	18
3112	Civil engineering technicians	6	9	15
3115	Mechanical engineering technicians	5	15	20
3118	Draughtspersons	5	8	13
3122	Manufacturing supervisors	7	15	22
3123	Construction supervisors	7	15	22
3131	Power production plant operators	5	6	11
3257	Environmental and occupational health inspectors and associates	5	11	16
3322	Commercial sales representatives	6	4	10
3323	Buyers	8	12	20
3331	Clearing and forwarding agents	3	12	15
3341	Office supervisors	7	17	24
3513	Computer network and systems technicians	10	14	24
4110	General office clerks	6	15	21
4120	Secretaries (general)	6	14	20
4132	Data entry clerks	12	13	25
4214	Debt-collectors and related workers	8	17	25
4222	Contact centre information clerks	5	9	14
4416	Human resource clerical	5	14	19
5151	Cleaners supervisors	4	14	18
5243	Traveling salesman	6	17	23
5244	Contact centre salespersons	8	9	17
5249	Sales workers not elsewhere classified	5	10	15
7233	Agricultural and industrial machinery mechanics and repairers	4	14	18
7318	Handicraft workers in textile, leather and related materials	3	11	14
7412	Electrical mechanics and fitters	6	8	14
8131	Chemical products plant and machine operators	5	13	18
8141	Rubber products machine operators	5	8	13
8211	Mechanical machinery assemblers	3	10	13
8322	Car, taxi and van drivers	13	17	30
8344	Lifting truck operators	7	15	22
9214	Garden and horticultural laborers	10	6	16
9329	Manufacturing laborers not elsewhere classified	15	15	30
9334	Shelf fillers	7	13	20
9621	Messengers, package deliverers and luggage porters	8	15	23

Source: Indotask.
Notes: Total number of observations is 944 for 51 selected occupations.

Appendix D.
Tasks crosswalk

Table D1. Task assignment to generalized tasks (crosswalk)

KBJI Code	Occupation	Tasks	Generalized task (O*NET Generalized Work Activity)	Task group (O*NET Generalized Work Activity Group)
1219	Business services and administration managers not elsewhere classified	Analyzing the issues and the various resource management initiatives that affect the organization; preparing reports and correspondence and submitting related documents	Analyzing Data or Information	Information and Data Processing
		Developing and managing budgets, controlling expenditure, and ensuring the efficient use of resources	Developing Objectives and Strategies	Reasoning and Decision Making
		Developing and managing the administrative and physical resources of an organization	Monitoring and Controlling Resources	Administering
		Developing and implementing administrative rules and guidelines that are used by all elements of the organization	Updating and Using Relevant Knowledge	Reasoning and Decision Making
		Leading, managing, and developing administrative staff to ensure smooth business operations and the provision of accurate and timely information	Organizing, Planning, and Prioritizing Work	Reasoning and Decision Making
		Overseeing the selection, training, and performance of staff	Guiding, Directing, and Motivating Subordinates	Coordinating, Developing, Managing, and Advising
		Planning and directing daily operations	Scheduling Work and Activities	Reasoning and Decision Making
		Providing administrative support, strategic and operational planning, research and advice to the top management on matters such as management of building facilities and administrative services	Coordinating the Work and Activities of Others	Coordinating, Developing, Managing, and Advising
		Providing information and support for the preparation of financial statements and budgets	Documenting/Recording Information	Performing Complex and Technical Activities
		Representing the company or organization in negotiations and conventions, seminars, public hearings, and forums	Communicating with Persons Outside Organization	Communicating and Interacting
1221	Sales and marketing managers	Determining the price list, discounts, and delivery terms, sales promotion budgets, sales methods, incentives, and special promotions	Estimating the Quantifiable Characteristics of Products, Events, or Information	Identify and Evaluating Job-Relevant Information
		Developing and managing budgets and controlling expenditure to ensure the efficient use of resources	Developing Objectives and Strategies	Reasoning and Decision Making
		Establishing and directing operational and administrative procedures related to sales and marketing activities	Updating and Using Relevant Knowledge	Reasoning and Decision Making
		Leading and managing the activities of sales and marketing staff	Guiding, Directing, and Motivating Subordinates	Coordinating, Developing, Managing, and Advising
		Overseeing the selection, training, and performance of staff	Monitoring and Controlling Resources	Administering

KBJI Code	Occupation	Tasks	Generalized task (O*NET Generalized Work Activity)	Task group (O*NET Generalized Work Activity Group)
		Planning and organizing special sales and marketing programs based on sales records and market conditions	Organizing, Planning, and Prioritizing Work	Reasoning and Decision Making
		Planning and directs the daily operations	Coordinating the Work and Activities of Others	Coordinating, Developing, Managing, and Advising
		Representing the company or organization at sales and marketing conventions, trade shows, and other forums	Communicating with Persons Outside Organization	Communicating and Interacting
1323	Construction managers	Arranging submission of the plan to local authorities	Performing for or Working Directly with the Public	Communicating and Interacting
		Arranging building inspections by relevant authorities	Inspecting Equipment, Structures, or Material	Identifying and Evaluating Job-Relevant Information
		Building under contract, or subcontracting specialized building services	Drafting, Laying Out, and Specifying Technical Devices, Parts, and Equipment	Performing Complex and Technical Activities
		Coordinating labor resources, procurement and delivery of materials, plant and equipment	Monitoring and Controlling Resources	Administering
		Ensuring compliance with building codes and standards of performance, quality, cost, and security	Monitoring Processes, Materials, or Surroundings	Looking for and Receiving Job-Related Information
		Establishing and managing budgets, controlling expenditure, and ensuring the efficient use of resources	Developing Objectives and Strategies	Reasoning and Decision Making
		Interpreting architectural drawings and specifications	Analyzing Data or Information	Information and Data Processing
		Negotiating with building owners, property developers, and subcontractors involved in the construction process to ensure projects are completed on time and within budget	Resolving Conflicts and Negotiating with Others	Communicating and Interacting
		Operating and implementing a coordinated work program in the field	Updating and Using Relevant Knowledge	Reasoning and Decision Making
		Overseeing the selection, training, and performance of staff and subcontractors	Guiding, Directing, and Motivating Subordinates	Coordinating, Developing, Managing, and Advising
		Preparing tenders and contract bids	Estimating the Quantifiable Characteristics of Products, Events, or Information	Identifying and Evaluating Job-Relevant Information
1324	Supply, distribution and related managers	Archiving and overseeing purchases, storage, and distribution	Monitoring and Controlling Resources	Administering
		Working as a liaison with other departments and customer related to the requirements of outbound goods and its transportation	Communicating with Persons Outside Organization	Communicating and Interacting
		Composing and directing operational and administrative procedures	Coordinating the Work and Activities of Others	Coordinating, Developing, Managing, and Advising
		Determining, implementing, and monitoring the strategy and policy, and planning the purchase, storage and distribution	Updating and Using Relevant Knowledge	Reasoning and Decision Making

KBJI Code	Occupation	Tasks	Generalized task (O*NET Generalized Work Activity)	Task group (O*NET Generalized Work Activity Group)
		Developing and managing budgets, controlling expenditure, and ensuring the efficient use of resources	Documenting/Recording Information	Performing Complex and Technical Activities
		Monitoring and assessing the storage and inventory systems to meet supply requirements and control stock levels	Estimating the Quantifiable Characteristics of Products, Events, or Information	Identify and Evaluating Job-Relevant Information
		Negotiating contracts with suppliers to meet the requirements of quality, cost, and delivery	Resolving Conflicts and Negotiating with Others	Communicating and Interacting
		Operating recording systems to track all movements of goods, and ensuring re-ordering and restocking at the optimal time	Operating Vehicles, Mechanized Devices, or Equipment	Performing Physical and Manual Work Activities
		Overseeing the selection, training, and performance of staff	Training and Teaching Others	Coordinating, Developing, Managing, and Advising
		Planning and directing daily operations	Scheduling Work and Activities	Reasoning and Decision Making
		Preparing and implementing a plan to maintain the required inventory levels at minimum cost	Scheduling Work and Activities	Reasoning and Decision Making
1346	Financial and insurance services managers	Approving or rejecting, or coordinating, lines of credit, housing loans, and personal loans	Making Decisions and Solving Problems	Reasoning and Decision Making
		Building and maintaining relationships with individual customers and businesses	Performing for or Working Directly with the Public	Communicating and Interacting
		Conducting financial investigations	Making Decisions and Solving Problems	Reasoning and Decision Making
		Examining, evaluating, and processing loan applications and insurance	Judging the Qualities of Things, Services, or People	Information and Data Processing
		Managing budgets, controlling expenditure, and ensuring the efficient use of resources	Monitoring and Controlling Resources	Administering
		Monitoring credit extension decision	Analyzing Data or Information	Information and Data Processing
		Overseeing the flow of cash and financial instruments, and preparing legislation and financial reports	Estimating the Quantifiable Characteristics of Products, Events, or Information	Identify and Evaluating Job-Relevant Information
		Overseeing the selection, training, and performance of staff	Training and Teaching Others	Coordinating, Developing, Managing, and Advising
		Planning, directing, and coordinating the activities of the staff at the branch	Scheduling Work and Activities	Reasoning and Decision Making
		Providing advice and assistance to customers about their financial needs and insurance-related matters and legal changes that might affect customers	Assisting and Caring for Others	Communicating and Interacting
		Coordinating cooperation with other branches of the company	Monitoring and Controlling Resources	Administering
2141	Industrial and production engineers	Analyzing the use of labor, facility layout, operational data, and production schedules and costs to determine the optimal equipment and labor efficiency	Analyzing Data or Information	Information and Data Processing

KBJI Code	Occupation	Tasks	Generalized task (O*NET Generalized Work Activity)	Task group (O*NET Generalized Work Activity Group)
		Acting as a liaison with the purchasing department of materials, storage and controls to ensure the supply flow	Communicating with Supervisors, Peers, or Subordinates	Communicating and Interacting
		Checking the plant to improve and maintain performance	Inspecting Equipment, Structures, or Material	Identify and Evaluating Job-Relevant Information
		Creating a work measurement programs and analyzing work samples of work to develop standards for the use of labor	Drafting, Laying Out, and Specifying Technical Devices, Parts, and Equipment	Performing Complex and Technical Activities
		Developing specifications for processing, and determining materials, equipment, piping, material flows, capacities and layout of plant and systems	Drafting, Laying Out, and Specifying Technical Devices, Parts, and Equipment	Performing Complex and Technical Activities
		Directing the maintenance of buildings and equipment, and coordinating requirements for new designs, surveys, and maintenance schedules	Monitoring Processes, Materials, or Surroundings	Looking for and Receiving Job-Related Information
		Establishing standards and policies for installation, modification, quality control, testing, inspection, and maintenance according to engineering principles and safety regulations	Developing Objectives and Strategies	Reasoning and Decision Making
		Organizing and managing the project workforce and delivery of materials, plant, and equipment	Coordinating the Work and Activities of Others	Coordinating, Developing, Managing, and Advising
		Providing advice on the management of production methods, techniques, and new equipment	Processing Information	Information and Data Processing
		Studying functional statements, organizational charts, and project information	Processing Information	Information and Data Processing
		Determine the functions and responsibilities of workers and work units and to identify areas of duplication	Identifying Objects, Actions, and Events	Identify and Evaluating Job-Relevant Information
2142	Civil engineers	Analyzing the behavior of soil and rock when placed under pressure by proposed structures and designing structural foundations	Analyzing Data or Information	Information and Data Processing
		Analyzing the stability of structures and testing the behavior and durability of materials used in their construction	Analyzing Data or Information	Information and Data Processing
		Conducting research and developing new theories or improved methods related to civil engineering	Updating and Using Relevant Knowledge	Reasoning and Decision Making
		Defining and establishing construction methods, materials and quality standards, and directing construction work	Drafting, Laying Out, and Specifying Technical Devices, Parts, and Equipment	Performing Complex and Technical Activities
		Developing control systems to ensure efficient functioning of structures as well as safety and environmental protection	Drafting, Laying Out, and Specifying Technical Devices, Parts, and Equipment	Performing Complex and Technical Activities
		Organizing and directing maintenance and repair of existing civil engineering structures	Organizing, Planning, and Prioritizing Work	Reasoning and Decision Making

KBJI Code	Occupation	Tasks	Generalized task (O*NET Generalized Work Activity)	Task group (O*NET Generalized Work Activity Group)
		Providing advice and designing structures such as bridges, dams, docks, roads, airports, railways, canals, pipelines, sewerage and flood control systems, and industrial and other large buildings	Processing Information	Information and Data Processing
2144	Mechanical engineers	Advising and designing the airframe, the bottom of the aircraft, and other equipment for aircraft as well as suspension systems, brakes, vehicle bodies and other components of land transport	Provide Consultation and Advice to Others	Coordinating, Developing, Managing, and Advising
		Ensuring that equipment, operation, and maintenance are in accordance with design specifications and safety standards	Inspecting Equipment, Structures, or Material	Identify and Evaluating Job-Relevant Information
		Establishing control standards and procedures to ensure efficient functioning and safety of machines, machinery, tools, motors, engines, industrial plant, equipment, or system	Developing Objectives and Strategies	Reasoning and Decision Making
		Providing advice for and designing the steam engine, internal combustion engine, and motor and non-electricity is used to drive a train locomotive, land transportation vehicle or aircraft, or to operate machinery or other industrial devices	Providing Consultation and Advice to Others	Coordinating, Developing, Managing, and Advising
		Providing advice for and designing machinery and tools for industry, mining, construction, agriculture, or other industrial purposes	Providing Consultation and Advice to Others	Coordinating, Developing, Managing, and Advising
		Providing advice for and designing non-power tools or products such as word processors, computers, precision instruments, cameras, and projectors	Provide Consultation and Advice to Others	Coordinating, Developing, Managing, and Advising
		Providing advice for and designing the hull, deck, upper and ship propulsion systems, mechanical machinery and equipment for the release, control and utilize energy heating systems, ventilation and cooling systems, steering equipment, pumps, and other mechanical equipment	Provide Consultation and Advice to Others	Coordinating, Developing, Managing, and Advising
2149	Engineering professionals not elsewhere classified	Applying engineering knowledge for the development and design of, and evaluating, biological and health systems and products, such as artificial organs, prostheses, and instrumentation	Updating and Using Relevant Knowledge	Reasoning and Decision Making
		Assessing damage and providing calculations for marine salvage operations	Inspecting Equipment, Structures, or Material	Identify and Evaluating Job-Relevant Information
		Designing and developing tools such as the core of nuclear reactors, radiation shielding, and associated instrumentation and control mechanisms	Drafting, Laying Out, and Specifying Technical Devices, Parts, and Equipment	Performing Complex and Technical Activities
		Designing and supervising the construction and operation of nuclear reactors and power plants and nuclear fuel processing and reclamation systems	Drafting, Laying Out, and Specifying Technical Devices, Parts, and Equipment	Performing Complex and Technical Activities
		Designing components of optical instruments such as lenses, microscopes, telescopes, lasers, optical disc systems, and other equipment that utilizes the properties of light	Drafting, Laying Out, and Specifying Technical Devices, Parts, and Equipment	Performing Complex and Technical Activities

KBJI Code	Occupation	Tasks	Generalized task (O*NET Generalized Work Activity)	Task group (O*NET Generalized Work Activity Group)
		Designing devices used in various medical procedures, imaging systems such as magnetic resonance imaging, and tools for automating insulin injections or controlling body functions	Developing Objectives and Strategies	Reasoning and Decision Making
		Designing, testing, and coordinating the development of explosives for weapons to meet military procurement specifications	Estimating the Quantifiable Characteristics of Products, Events, or Information	Identifying and Evaluating Job-Relevant Information
		Identifying potential hazards and introducing safety procedures and devices	Developing Objectives and Strategies	Reasoning and Decision Making
		Studying and advising on engineering aspects of certain industrial processes, such as those related to glass, ceramics, textiles, leather products, wood, and printing	Updating and Using Relevant Knowledge	Reasoning and Decision Making
2161	Building architects	Checking location and provides consulting, management to clients and other stakeholders to determine type, style and size of proposed buildings and alteration of buildings	Provide Consultation and Advice to Others	Coordinating, Developing, Managing, and Advising
		Developing theories and methods of new or improved architecture	Updating and Using Relevant Knowledge	Reasoning and Decision Making
		Identifying and finding the best solution to the problem of the function and quality of the interior of the building and creating the designs, drawings and plans necessary	Making Decisions and Solving Problems	Reasoning and Decision Making
		Maintaining technical relations and consultation with other relevant specialists	Communicating with Supervisors, Peers, or Subordinates	Communicating and Interacting
		Making the necessary contacts to ensure feasibility of projects regarding the appearance, cost, time, and compliance with regulations	Updating and Using Relevant Knowledge	Reasoning and Decision Making
		Monitoring the construction or rehabilitation work to ensure compliance with specifications and quality standards	Evaluating Information to Determine Compliance with Standards	Information and Data Processing
		Preparing project documentation, including sketches and scale drawings, and integrating structural elements, mechanical and aesthetic in the final design	Developing Objectives and Strategies	Reasoning and Decision Making
		Providing information about the design and the expected use of building materials	Processing Information	Information and Data Processing
		Writing specifications and contract documents for use by builders and calling tenders on behalf of clients	Documenting/Recording Information	Performing Complex and Technical Activities
2166	Graphic and multimedia designers	Conducting research and analyzing functional communication requirements	Analyzing Data or Information	Information and Data Processing
		Creating two-dimensional images and three-dimensional depictions of objects in motion or describing the process, using computer animation or modeling programs	Interacting With Computers	Performing Complex and Technical Activities
		Designing complex graphics and animation to satisfy functional requirements, aesthetic and creative design	Updating and Using Relevant Knowledge	Reasoning and Decision Making

KBJI Code	Occupation	Tasks	Generalized task (O*NET Generalized Work Activity)	Task group (O*NET Generalized Work Activity Group)
		Detailing and documenting the selected design for production	Documenting/Recording Information	Performing Complex and Technical Activities
		Determining the objectives and constraints of the design in consultation with clients and stakeholders	Developing Objectives and Strategies	Reasoning and Decision Making
		Formulating design concepts for the subject to be communicated	Updating and Using Relevant Knowledge	Reasoning and Decision Making
		Negotiating design solutions with clients, management, sales staff, and production	Resolving Conflicts and Negotiating with Others	Communicating and Interacting
		Preparing sketches, diagrams, illustrations, and layouts to communicate design concepts	Updating and Using Relevant Knowledge	Reasoning and Decision Making
		Selecting, specifying, or recommending functional and aesthetic materials and media for publication, delivery or display	Judging the Qualities of Things, Services, or People	Information and Data Processing
		Supervising or carrying out production in the chosen media	Controlling Machines and Processes	Performing Physical and Manual Work Activities
2263	Environmental and occupational health and hygiene professionals	Coordinating arrangements for rehabilitation, compensation, and time of return to work for workers who are injured	Coordinating the Work and Activities of Others	Coordinating, Developing, Managing, and Advising
		Developing, implementing, and monitoring programs to minimize workplace and environmental pollution involving chemical, physical, and biological hazards	Updating and Using Relevant Knowledge	Reasoning and Decision Making
		Developing, implementing and reviewing programs and policies to minimize the risk of potential environmental and occupational health and safety	Developing Objectives and Strategies	Reasoning and Decision Making
		Identifying, reporting, and documenting hazards, and assessing and controlling risks in the environment and workplace and advising on compliance with relevant laws and regulations	Documenting/Recording Information	Performing Complex and Technical Activities
		Implementing prevention programs and strategies for communicable diseases, food safety, waste water and sewage systems, domestic and recreational water quality, and contaminated and hazardous substances	Updating and Using Relevant Knowledge	Reasoning and Decision Making
		Preparing and implementing plans and strategies that are safe, economical, and suitable for the disposal of commercial, industrial, medical and household waste	Scheduling Work and Activities	Reasoning and Decision Making
		Promoting ergonomic principles within the workplace such as matching furniture, equipment, and work activities to the needs of employees	Coaching and Developing Others	Coordinating, Developing, Managing, and Advising
		Providing education, information, training and advice to people at all levels on hygiene and healthy working environment	Coaching and Developing Others	Coordinating, Developing, Managing, and Advising
		Recording and investigating injuries and equipment damage, and reporting safety	Inspecting Equipment, Structures, or Material	Identify and Evaluating Job-Relevant Information

KBJI Code	Occupation	Tasks	Generalized task (O*NET Generalized Work Activity)	Task group (O*NET Generalized Work Activity Group)
		Suggesting methods to prevent, eliminate, control, or reduce exposure of workers, students, the public and the environment to radiological and other hazards	Providing Consultation and Advice to Others	Coordinating, Developing, Managing, and Advising
2413	Financial analysts	Analyzing financial information to produce forecasts of business conditions, industry, and economy for use in making investment decisions	Analyzing Data or Information	Information and Data Processing
		Determining the price at which securities should be combined and offered to the public	Making Decisions and Solving Problems	Reasoning and Decision Making
		Developing an action plan based on the analysis of financial investments	Updating and Using Relevant Knowledge	Reasoning and Decision Making
		Evaluating and comparing the relative quality of various securities in a particular industry	Processing Information	Information and Data Processing
		Interpreting data affecting investment programs, such as prices, returns, stability, future trends in investment risks, and economic influences	Processing Information	Information and Data Processing
		Maintaining knowledge and following developments in the fields of industrial technology, business, finance, and economic theory	Updating and Using Relevant Knowledge	Reasoning and Decision Making
		Monitoring economic, industrial, and enterprise development through analysis of information obtained from financial publications and services, investment banking firms, government agencies, trade publications, company sources, and personal interviews	Getting Information	Looking for and Receiving Job-Related Information
		Presenting oral and written reports on general economic trends, individual companies, and entire industries	Interpreting the Meaning of Information for Others	Communicating and Interacting
		Recommending investment and investment period for the company, investment firm staff, or public investors	Providing Consultation and Advice to Others	Coordinating, Developing, Managing, and Advising
2431	Advertising and marketing professionals	Advising managers and clients on strategies and campaigns to reach target markets, creating consumer awareness and effectively promoting goods and services	Providing Consultation and Advice to Others	Coordinating, Developing, Managing, and Advising
		Analyzing data on patterns and consumer preferences	Analyzing Data or Information	Information and Data Processing
		Giving advice on all elements of marketing such as product mix, pricing, advertising and sales promotion, sales, and distribution channels	Providing Consultation and Advice to Others	Coordinating, Developing, Managing, and Advising
		Interpreting and predicting current and future consumer trends	Estimating the Quantifiable Characteristics of Products, Events, or Information	Identify and Evaluating Job-Relevant Information
		Planning, developing, and managing advertising policies and campaigns to support sales objectives	Organizing, Planning, and Prioritizing Work	Reasoning and Decision Making
		Researching potential demand and market characteristics for new goods and services and collecting and analyzing data and other statistical information	Judging the Qualities of Things, Services, or People	Information and Data Processing

KBJI Code	Occupation	Tasks	Generalized task (O*NET Generalized Work Activity)	Task group (O*NET Generalized Work Activity Group)
		Supervising and conducting market research to identify market opportunities for goods and services new and existing	Getting Information	Looking for and Receiving Job-Related Information
		Supporting business growth and development through the preparation and implementation of objectives, policies, and marketing programs	Processing Information	Information and Data Processing
		Writing advertising copy and media scripts, and arranging television and film production and media placement	Thinking Creatively	Reasoning and Decision Making
2512	Software developers	Assessing, developing, improving and documenting maintenance procedures for operating systems, communications environments, and applications software	Updating and Using Relevant Knowledge	Reasoning and Decision Making
		Consulting with customers concerning maintenance of software systems	Provide Consultation and Advice to Others	Coordinating, Developing, Managing, and Advising
		Consulting with engineering staff to evaluate interfaces between hardware and software	Provide Consultation and Advice to Others	Coordinating, Developing, Managing, and Advising
		Developing and directing software testing and validation procedures	Interacting With Computers	Performing Complex and Technical Activities
		Directing programming documentation and software development	Interacting With Computers	Performing Complex and Technical Activities
		Modifying existing software to correct errors, adapt it to new hardware or to upgrade interfaces and improve performance	Thinking Creatively	Reasoning and Decision Making
		Researching, analyzing, and evaluating requirements for software applications and operating systems	Analyzing Data or Information	Information and Data Processing
		Researching, designing, and developing computer software systems	Interacting With Computers	Performing Complex and Technical Activities
2642	Journalists	Collecting, reporting, and commenting on news and current issues for publication in newspapers and newsletters, or for broadcasting by radio, television, or webcast media	Processing Information	Information and Data Processing
		Collecting local news, national and international through interviews, investigation and observation, attending public events, seeking records, reviewing written work, attending film and stage performances	Processing Information	Information and Data Processing
		Connecting with production staff in checking final proof copies before printing	Communicating with Supervisors, Peers, or Subordinates	Communicating and Interacting
		Interviewing politicians and other public figures in a press conference and others, including the recording of individual interviews to media (radio, television or webcast)	Establishing and Maintaining Interpersonal Relationships	Communicating and Interacting
		Receiving, analyzing, and verifying news and other copy for accuracy	Getting Information	Looking for and Receiving Job-Related Information
		Researching and reporting on developments in specialized fields such as medicine, science, and technology	Analyzing Data or Information	Information and Data Processing

KBJI Code	Occupation	Tasks	Generalized task (O*NET Generalized Work Activity)	Task group (O*NET Generalized Work Activity Group)
		Selecting material for publication, checking style, grammar, accuracy, and legality of content and arranging any necessary revisions	Processing Information	Information and Data Processing
		Selecting, arranging, and preparing publicity material about business or other organizations through the press, television, radio, and other media	Getting Information	Looking for and Receiving Job-Related Information
		Writing editorials and commentary on current topics to stimulate public interest and express the views of the publication or broadcasting station	Interpreting the Meaning of Information for Others	Communicating and Interacting
		Writing a critical review of the literary work of art, music, and more based on knowledge, judgment and experience for newspapers, television, radio and other	Thinking Creatively	Reasoning and Decision Making
3111	Chemical and physical science technicians	Collecting and testing soil and water samples, recording observations and analyzing data in support of a geologist or geophysicist	Estimating the Quantifiable Characteristics of Products, Events, or Information	Identify and Evaluating Job-Relevant Information
		Collecting samples and preparing materials and equipment for experiments, testing and analysis	Analyzing Data or Information	Information and Data Processing
		Controlling the quality and quantity of laboratory supplies by testing samples and monitoring usage and preparing detailed estimates of quantities and costs of materials and labor required for the project, according to the specifications given	Inspecting Equipment, Structures, or Material	Identify and Evaluating Job-Relevant Information
		Organizing, operating, and maintaining the equipment and laboratory equipment, monitoring experiments, making observations, and calculating and recording results	Operating Vehicles, Mechanized Devices, or Equipment	Performing Physical and Manual Work Activities
		Perform routine laboratory tests and performing various functions of technical support to assist chemical and physical scientists in the research, development, analysis, and testing	Updating and Using Relevant Knowledge	Reasoning and Decision Making
		Preparing materials for experimentation such as freezing and slicing specimens and mixing chemicals	Updating and Using Relevant Knowledge	Reasoning and Decision Making
3112	Civil engineering technicians	Applying technical knowledge of building and the principles and practice of civil engineering to identify and solving problems that occur	Updating and Using Relevant Knowledge	Reasoning and Decision Making
		Arranging maintenance and repair	Controlling Machines and Processes	Performing Physical and Manual Work Activities
		Ensuring conformance to design specifications, laws, and relevant regulations, and maintaining the standard set of materials and work	Evaluating Information to Determine Compliance with Standards	Information and Data Processing
		Giving advice on the installation of fire detectors and sprinkler systems and the use of materials in construction of buildings and transportation facilities to reduce the risk of fire and extent of damage and danger in case of fire	Updating and Using Relevant Knowledge	Reasoning and Decision Making
		Helping prepare detailed estimates of quantities and costs of materials and labor required for the project, according to the specifications given	Analyzing Data or Information	Information and Data Processing

KBJI Code	Occupation	Tasks	Generalized task (O*NET Generalized Work Activity)	Task group (O*NET Generalized Work Activity Group)
		Inspecting buildings and structures during and after construction to ensure compliance with the law building, grading, zoning, and safety and approving plans, specifications and standards, as well as with other rules concerning the quality and safety of buildings	Inspecting Equipment, Structures, or Material	Identify and Evaluating Job-Relevant Information
		Inspecting industrial plants, hotels, cinemas, and other buildings and structures to detect fire hazards and advise on how to cope	Inspecting Equipment, Structures, or Material	Identify and Evaluating Job-Relevant Information
		Performing or assist field and laboratory testing of soil and construction materials	Judging the Qualities of Things, Services, or People	Information and Data Processing
		Providing technical assistance related to the construction of buildings and other structures, and with surveys or the preparation of survey reports	Updating and Using Relevant Knowledge	Reasoning and Decision Making
3115	Mechanical engineering technicians	Assembling and installing new and modified mechanical assemblies, components, equipment and engine controls, and hydraulic power systems	Operating Vehicles, Mechanized Devices, or Equipment	Performing Physical and Manual Work Activities
		Designing and preparing the layout of machines and installations, facilities, and mechanical components according to specifications given	Drafting, Laying Out, and Specifying Technical Devices, Parts, and Equipment	Performing Complex and Technical Activities
		Developing and monitoring the implementation of safety standards and procedures for marine survey work in relation to the hull, equipment, and cargo	Evaluating Information to Determine Compliance with Standards	Information and Data Processing
		Ensuring that the design of mechanical engineering and the work has been completed according to specifications, regulations, and contract provisions	Inspecting Equipment, Structures, or Material	Identify and Evaluating Job-Relevant Information
		Monitoring the technical aspects of the manufacture, use, maintenance, and repair of machines and installations, facilities, and mechanical components to ensure satisfactory performance and the appropriate specifications and regulations	Evaluating Information to Determine Compliance with Standards	Information and Data Processing
		Preparing detailed estimates of quantities and costs of materials and labor required for manufacture and installation according to the specifications given	Making Decisions and Solving Problems	Reasoning and Decision Making
		Providing technical assistance in research and development of machines and installations, infrastructure, and mechanical components, or testing prototypes	Making Decisions and Solving Problems	Reasoning and Decision Making
		Collecting and analyzing data to test mechanical systems, and assembling and installing mechanical assemblies in support of mechanical experts	Inspecting Equipment, Structures, or Material	Identify and Evaluating Job-Relevant Information
3118	Draughtspersons	Being computer-literate, developing tools to create, modify and generate hard-copy and digital representations of working drawings	Interacting With Computers	Performing Complex and Technical Activities
		Copying pictures and paintings to stone or metal plates for printing	Drafting, Laying Out, and Specifying Technical Devices, Parts, and Equipment	Performing Complex and Technical Activities

KBJI Code	Occupation	Tasks	Generalized task (O*NET Generalized Work Activity)	Task group (O*NET Generalized Work Activity Group)
		Making a detailed working diagram of machine tools and mechanical equipment, including dimensions, methods, and other technical information	Drafting, Laying Out, and Specifying Technical Devices, Parts, and Equipment	Performing Complex and Technical Activities
		Operating the digitizing table or similar equipment to transfer hard copy representation of working drawings, maps, and other curves to digital form	Operating Vehicles, Mechanized Devices, or Equipment	Performing Physical and Manual Work Activities
		Preparing and reviewing illustrations for reference works, brochures, and technical manuals with the assembly, installation, operation, maintenance, and repair of machinery and equipment and other goods	Drafting, Laying Out, and Specifying Technical Devices, Parts, and Equipment	Performing Complex and Technical Activities
		Preparing and reviewing the working drawings from sketches and specifications prepared by experts and designers for the manufacture, installation, and installation of machinery and equipment or for the construction, modification, maintenance, and repair of buildings, dams, bridges, roads and architectural projects and other civil engineering	Drafting, Laying Out, and Specifying Technical Devices, Parts, and Equipment	Performing Complex and Technical Activities
		Preparing wiring diagrams, circuit board assembly diagrams, and layout drawings used for manufacture, installation, and repair of electrical equipment in factories, power plants, and buildings	Drafting, Laying Out, and Specifying Technical Devices, Parts, and Equipment	Performing Complex and Technical Activities
		Setting the completed images to be reproduced for use as working drawings	Controlling Machines and Processes	Performing Physical and Manual Work Activities
3122	Manufacturing supervisors	Coordinating and supervising the activities of process control technicians, machine operators, assemblers, and other manufacturing laborers	Controlling Machines and Processes	Performing Physical and Manual Work Activities
		Ensuring the safety of workers	Guiding, Directing, and Motivating Subordinates	Coordinating, Developing, Managing, and Advising
		Identifying shortages of staff or components	Judging the Qualities of Things, Services, or People	Information and Data Processing
		Organizing and planning the daily work related to planning, budgeting, staff, and environment	Developing Objectives and Strategies	Reasoning and Decision Making
		Preparing cost estimates, records, and reports	Processing Information	Information and Data Processing
		Teaching and training new staff	Training and Teaching Others	Coordinating, Developing, Managing, and Advising
3123	Construction supervisors	Examining and inspecting the progress of work	Judging the Qualities of Things, Services, or People	Information and Data Processing
		Examining equipment and construction sites to ensure compliance with health and safety requirements	Inspecting Equipment, Structures, or Material	Identify and Evaluating Job-Relevant Information
		Organizing and coordinating the human and material resources needed to complete the job	Monitoring and Controlling Resources	Administering
		Reading specifications to determine construction requirements and planning procedures	Getting Information	Looking for and Receiving Job-Related Information
		Supervising construction sites and coordinating work with other construction projects	Organizing, Planning, and Prioritizing Work	Reasoning and Decision Making

KBJI Code	Occupation	Tasks	Generalized task (O*NET Generalized Work Activity)	Task group (O*NET Generalized Work Activity Group)
		Supervising the activities of construction workers, laborers, and other construction workers	Guiding, Directing, and Motivating Subordinates	Coordinating, Developing, Managing, and Advising
3131	Power production plant operators	Cleaning and maintaining equipment such as generators, boilers, turbines, pumps, and compressors to prevent failure or damage to equipment	Repairing and Maintaining Mechanical Equipment	Performing Complex and Technical Activities
		Completing and maintaining records and logs, reporting on the station, and communicating with other machine personnel to assess equipment operating status	Documenting/Recording Information	Performing Complex and Technical Activities
		Controlling start-up and shut-down of power plant equipment, controlling switching operations, regulating water levels and communicating with systems operators to regulate and coordinate transmission loads, frequency, and voltage channels	Controlling Machines and Processes	Performing Physical and Manual Work Activities
		Operating and controlling the system and power generation equipment, including boilers, turbines, generators, condensers, and reactors, in a hydro power plant, or heat-driven plant using coal, oil, natural gas, or nuclear, to generate and distribute electricity	Operating Vehicles, Mechanized Devices, or Equipment	Performing Physical and Manual Work Activities
		Operating, monitoring, and inspecting various types of engine power	Operating Vehicles, Mechanized Devices, or Equipment	Performing Physical and Manual Work Activities
		Reading graphs, meters and measuring devices at defined intervals; overcoming measurement problems and performing corrective actions as necessary	Documenting/Recording Information	Performing Complex and Technical Activities
3257	Environmental and occupational health inspectors and associates	Checking the company to ensure compliance with rules and regulations (etc.) on pollutant emissions and hazardous waste disposal	Evaluating Information to Determine Compliance with Standards	Information and Data Processing
		Checking the area of production, processing, transportation, handling, storage, and sale of products to ensure compliance with the rules, regulations, and other government standards	Inspecting Equipment, Structures, or Material	Identify and Evaluating Job-Relevant Information
		Estimating the number and cost of materials and the labor required for a project's improved health, safety and sanitation	Estimating the Quantifiable Characteristics of Products, Events, or Information	Identifying and Evaluating Job-Relevant Information
		Giving advice to employers and employees' representatives about the implementation of government regulations and other rules and regulations concerning safety and working environment	Interpreting the Meaning of Information for Others	Communicating and Interacting
		Initiating action to maintain or improve hygiene and prevent pollution of water, air, food, or soil	Thinking Creatively	Reasoning and Decision Making
		Inspecting the workplace and (through interviews, observation and others) obtaining information about practices and accidents to determine compliance with the rules and safety regulations	Evaluating Information to Determine Compliance with Standards	Information and Data Processing

KBJI Code	Occupation	Tasks	Generalized task (O*NET Generalized Work Activity)	Task group (O*NET Generalized Work Activity Group)
		Inspect workplaces to ensure that the working environment, machinery, and equipment according to government regulations, and other regulations and standards related to sanitation and / or health, safety and environment	Evaluating Information to Determine Compliance with Standards	Information and Data Processing
		Promote preventive measures and corrective actions such as disease control, limiting organisms and harmful substances in the air, hygienic food handling, waste disposal, and maintaining cleanliness of public places	Interpreting the Meaning of Information for Others	Communicating and Interacting
		Provide technical advice on issues and environmental sanitation	Judging the Qualities of Things, Services, or People	Information and Data Processing
		Providing advice to companies and the general public about the implementation of rules and regulations (etc.) about hygiene, sanitation, purity, and assessment of primary products, food, drugs, cosmetics and similar items	Interpreting the Meaning of Information for Others	Communicating and Interacting
3322	Commercial sales representatives	Acquiring and updating knowledge of market conditions and the goods and services offered by companies and competitors	Processing Information	Information and Data Processing
		Asking for orders and selling goods to retailers and to industrial, wholesale, and other buyers	Selling or Influencing Others	Communicating and Interacting
		Following up with clients to ensure satisfaction with products purchased	Assisting and Caring for Others	Communicating and Interacting
		Offering prices and credit terms, recording orders, and arranging deliveries	Selling or Influencing Others	Communicating and Interacting
		Providing information to prospective customers regarding the characteristics and function of the products and equipment sold, and demonstrating the use or quality	Selling or Influencing Others	Communicating and Interacting
		Reacting to reporting and relaying customer requirements to suppliers and manufacturers	Interpreting the Meaning of Information for Others	Communicating and Interacting
		Selling equipment, supplies, and related services to companies or individuals	Selling to or Influencing Others	Communicating and Interacting
3323	Buyers	Attending auction tenders, consulting with suppliers, and reviewing deals	Communicating with Persons Outside Organization	Communicating and Interacting
		Buying merchandise for resale by retail or wholesale firms	Selling to or Influencing Others	Communicating and Interacting
		Buying general and special equipment, materials, or business services for use or for further processing by the company	Judging the Qualities of Things, Services, or People	Information and Data Processing
		Determining or negotiating the terms and conditions of contracts, awarding contracts to suppliers or recommending contracts for the purchase of equipment, raw material products, services, and purchasing merchandise for resale	Estimating the Quantifiable Characteristics of Products, Events, or Information	Identify and Evaluating Job-Relevant Information
		Establishing delivery schedules, monitoring progress, and contacting clients and suppliers	Scheduling Work and Activities	Reasoning and Decision Making
		Interviewing suppliers and negotiating prices, discounts, credit terms, and transport arrangements	Resolving Conflicts and Negotiating with Others	Communicating and Interacting

KBJI Code	Occupation	Tasks	Generalized task (O*NET Generalized Work Activity)	Task group (O*NET Generalized Work Activity Group)
		Selecting items or products that best fit the requirements of the company	Judging the Qualities of Things, Services, or People	Information and Data Processing
		Studying market reports, trade magazines and sales promotion materials and visit trade shows, showrooms, factories and product design events	Getting Information	Looking for and Receiving Job-Related Information
		Obtaining information about requirements and stock and developing specifications of quantity and quality to be purchased, costs, delivery dates and other contract conditions	Processing Information	Information and Data Processing
		Overseeing the distribution of goods to outlets and maintaining adequate stock levels	Organizing, Planning, and Prioritizing Work	Reasoning and Decision Making
3331	Clearing and forwarding agents	Checking the documentation of imports / exports to determine the contents of the cargo, and classifying into groups of different fees or rates, using a tariff coding system	Processing Information	Information and Data Processing
		Customs clearing procedures for exports or imports	Updating and Using Relevant Knowledge	Reasoning and Decision Making
		Ensuring that insurance has been carried out	Evaluating Information to Determine Compliance with Standards	Information and Data Processing
		Ensuring that the licenses for exports / imports and other formalities have been obtained	Evaluating Information to Determine Compliance with Standards	Information and Data Processing
		Signing and settling the bill of charges	Making Decisions and Solving Problems	Reasoning and Decision Making
3341	Office supervisors	Addressing issues related to work and preparing and submitting progress and other reports	Making Decisions and Solving Problems	Reasoning and Decision Making
		Assisting in the recruitment, interviewing, and selection of employees	Provide Consultation and Advice to Others	Coordinating, Developing, Managing, and Advising
		Coordinating, assigning, and reviewing the work of clerks engaged in the following tasks: word processing, recording and archiving, operating the telephone and switchboards, data entry, desktop publishing and other activities involving general office and administrative skills	Guiding, Directing, and Motivating Subordinates	Coordinating, Developing, Managing, and Advising
		Establishing work schedules and procedures and coordinating activities with other work units or departments	Coordinating the Work and Activities of Others	Coordinating, Developing, Managing, and Advising
		Evaluating employee performance and conformance to regulations, and recommending appropriate action	Provide Consultation and Advice to Others	Coordinating, Developing, Managing, and Advising
		Training and teaching employees in job duties, safety procedures, and company policies, or arranging training	Coaching and Developing Others	Coordinating, Developing, Managing, and Advising
3513	Computer network and systems technicians	Executing start-up and close-down as well as backup and disaster recovery for computer networks	Interacting With Computers	Performing Complex and Technical Activities
		Helping users with network and data communications problems	Provide Consultation and Advice to Others	Coordinating, Developing, Managing, and Advising
		Identifying areas that require upgrades of equipment and software	Making Decisions and Solving Problems	Reasoning and Decision Making

KBJI Code	Occupation	Tasks	Generalized task (O*NET Generalized Work Activity)	Task group (O*NET Generalized Work Activity Group)
		Installing computer hardware, network software, operating system software, and application software	Interacting With Computers	Performing Complex and Technical Activities
		Operating and maintaining the network in addition to data communication systems	Controlling Machines and Processes	Performing Physical and Manual Work Activities
		Operating, maintaining, and troubleshooting network systems	Repairing and Maintaining Electronic Equipment	Performing Complex and Technical Activities
4110	General office clerks	Checking figures, preparing invoices, and recording details of financial transactions	Estimating the Quantifiable Characteristics of Products, Events, or Information	Identifying and Evaluating Job-Relevant Information
		Copying information into the computer, correcting the records, and fixing copy	Interacting With Computers	Performing Complex and Technical Activities
		Copying and faxing documents	Performing General Physical Activities	Performing Physical and Manual Work Activities
		Keeping notes and preparing, sorting, classifying, and archiving information	Analyzing Data or Information	Information and Data Processing
		Notifying staff about equipment problems	Documenting/Recording Information	Performing Complex and Technical Activities
		Preparing reports and correspondence that are routine	Performing Administrative Activities	Administering
		Responding to questions by phone or electronically, or forwarding them to the right person	Communicating with Supervisors, Peers, or Subordinates	Communicating and Interacting
		Sorting, opening, and sending mail	Processing Information	Information and Data Processing
4120	Secretaries (general)	Checking, formatting, and copying correspondence, checking and making reports from dictation, electronic documents or written drafts to meet office standards, using a typewriter, personal computer, or other word processing equipment	Getting Information	Looking for and Receiving Job-Related Information
		Screening leave requests and recording leave and other staff rights	Documenting/Recording Information	Performing Complex and Technical Activities
		Screening meeting requests or appointments and helping arrange meetings	Documenting/Recording Information	Performing Complex and Technical Activities
		Handling incoming or outgoing email	Establishing and Maintaining Interpersonal Relationships	Communicating and Interacting
		Handling routine correspondence on their own initiative	Making Decisions and Solving Problems	Reasoning and Decision Making
		Organizing and supervising filing systems	Monitor Processes, Materials, or Surroundings	Looking for and Receiving Job-Related Information
		Scanning, recording, and distributing mail, correspondence, and documents	Interpreting the Meaning of Information for Others	Communicating and Interacting
		Using a variety of computer software packages, including spreadsheets, to provide administrative support	Interacting With Computers	Performing Complex and Technical Activities

KBJI Code	Occupation	Tasks	Generalized task (O*NET Generalized Work Activity)	Task group (O*NET Generalized Work Activity Group)
4132	Data entry clerks	Entering numerical data, codes, and text from source material into computer-compatible storage and processing devices	Interacting With Computers	Performing Complex and Technical Activities
		Importing and exporting data between database systems and different software	Analyzing Data or Information	Information and Data Processing
		Operating book-keeping machines and counting	Interacting With Computers	Performing Complex and Technical Activities
		Receiving and registering invoices, forms, records, and other documents for data capture	Estimating the Quantifiable Characteristics of Products, Events, or Information	Identify and Evaluating Job-Relevant Information
		Verifying the accuracy and completeness of the data and correcting the data that is entered, if necessary	Inspecting Equipment, Structures, or Material	Identify and Evaluating Job-Relevant Information
4214	Debt collectors and related workers	Asking for and collecting charity payments	Communicating with Supervisors, Peers, or Subordinates	Communicating and Interacting
		Calling, visiting, or writing to customers to collect money or arrange the next payment	Communicating with Persons Outside Organization	Communicating and Interacting
		Preparing reports, including amounts collected, and maintaining records and files related to billing	Interpreting the Meaning of Information for Others	Communicating and Interacting
		Recommending legal action or discontinuation of service when payment is not obtained	Evaluating Information to Determine Compliance with Standards	Information and Data Processing
		Searching for and finding debtors	Identifying Objects, Actions, and Events	Identify and Evaluating Job-Relevant Information
4222	Contact center information clerks	Advising clients about additional products or services	Selling or Influencing Others	Communicating and Interacting
		Handling incoming calls and messages from clients to answer questions, handling calls for service, or sorting out complaints	Assisting and Caring for Others	Communicating and Interacting
		Handling invoices or payments	Performing Administrative Activities	Administering
		Identifying requirements and entering events into a computer system	Interacting With Computers	Performing Complex and Technical Activities
		Sending letters or information sheets and other documents to clients	Interpreting the Meaning of Information for Others	Communicating and Interacting
		Sending tasks to other units	Coordinating the Work and Activities of Others	Coordinating, Developing, Managing, and Advising
4416	Human resource clerical	Maintaining and updating manual and computerized filing and registration systems, and compiling and preparing reports and documents relating to personnel activities	Interacting With Computers	Performing Complex and Technical Activities
		Processing applications for employment and promotions and notifying applicants of the results	Judging the Qualities of Things, Services, or People	Information and Data Processing
		Receiving and answering questions about rights and working conditions	Interpreting the Meaning of Information for Others	Communicating and Interacting

KBJI Code	Occupation	Tasks	Generalized task (O*NET Generalized Work Activity)	Task group (O*NET Generalized Work Activity Group)
		Starting records for newly appointed workers and checking records for completeness	Documenting/Recording Information	Performing Complex and Technical Activities
		Storing and retrieving personnel records and files on request	Performing Administrative Activities	Administering
		Submitting job applications, announcing vacancies, and testing / interviewing for jobs	Performing Administrative Activities	Administering
		Updating information about work history, salaries, performance evaluations, qualifications and training, and leave taken and accumulated	Performing Administrative Activities	Administering
5151	Cleaners supervisors	Cleaning the kitchen and assisting with work in the kitchen, including dishwashing	Performing General Physical Activities	Performing Physical and Manual Work Activities
		Engaging, training, firing, organizing, and supervising helpers, cleaners, and other household staff	Guiding, Directing, and Motivating Subordinates	Coordinating, Developing, Managing, and Advising
		Making the beds, cleaning the bathroom, and providing towels, soap, and related goods	Performing General Physical Activities	Performing Physical and Manual Work Activities
		Overseeing the general welfare and behavior of individuals in institutions	Staffing Organizational Units	Administering
		Paying or controlling inventory purchases	Monitoring and Controlling Resources	Administering
		Restocking minibars and replenishing items such as drinking glasses and writing utensils	Performing General Physical Activities	Performing Physical and Manual Work Activities
		Managing storage and handling inventory control problems	Monitoring and Controlling Resources	Administering
		Sweeping or vacuum cleaning, and washing and polishing floors, furniture, and other equipment	Performing General Physical Activities	Performing Physical and Manual Work Activities
5243	Traveling salesman	Compiling a list of prospective clients and contacting clients to get new business	Identifying Objects, Actions, and Events	Identify and Evaluating Job-Relevant Information
		Distributing letters, information sheets, and other documents to clients	Performing Administrative Activities	Administering
		Giving out details about various goods or services and the terms of sale by visiting clients and potential clients from door to door	Interpreting the Meaning of Information for Others	Communicating and Interacting
		Preparing invoices and sales contracts and accepting payment	Performing Administrative Activities	Administering
		Showing or explain the goods or services offered	Selling or Influencing Others	Communicating and Interacting
		Taking orders and transactions and placing orders received with suppliers	Documenting/Recording Information	Performing Complex and Technical Activities
		Traveling between sales territories and clients and transporting samples or goods for sale	Handling and Moving Objects	Performing Physical and Manual Work Activities
5244	Contact center salespersons	Arranging appointments for sales representatives	Coordinating the Work and Activities of Others	Coordinating, Developing, Managing, and Advising
		Creating interest in goods and services, and seeking a sale or agreement to see sales representatives	Selling or Influencing Others	Communicating and Interacting
		Maintaining statistics of calls made and successes achieved	Updating and Using Relevant Knowledge	Reasoning and Decision Making

KBJI Code	Occupation	Tasks	Generalized task (O*NET Generalized Work Activity)	Task group (O*NET Generalized Work Activity Group)
		Promoting goods and services by telephone or electronic mail, following scripts and work in the form of a list of contacts	Interacting With Computers	Performing Complex and Technical Activities
		Recording notes for follow-up and updating marketing databases to reflect the change in status of each customer	Documenting/Recording Information	Performing Complex and Technical Activities
		Reporting on the activities of competitors and issues raised by contacts for attention by managers	Analyzing Data or Information	Information and Data Processing
		Set the processing and delivery of goods and services, information kits and brochures to customers	Monitor Processes, Materials, or Surroundings	Looking for and Receiving Job-Related Information
		Submitting periodic reports on telemarketing activities and results	Interpreting the Meaning of Information for Others	Communicating and Interacting
5249	Sales workers not elsewhere classified	Displaying or showing goods / services (can be in rental)	Assisting and Caring for Others	Communicating and Interacting
		Offering goods / services (can be in rental)	Selling or Influencing Others	Communicating and Interacting
		Receiving payments for goods / services (can be in rental)	Communicating with Persons Outside Organization	Communicating and Interacting
7233	Agricultural and industrial machinery mechanics and repairers	Checking and testing new machinery and mechanical equipment for conformity with standards and specifications	Judging the Qualities of Things, Services, or People	Information and Data Processing
		Dismantling machinery and equipment to dispose of parts and make repairs	Repairing and Maintaining Mechanical Equipment	Performing Complex and Technical Activities
		Examining parts with defects such as breakage and excessive wear	Inspecting Equipment, Structures, or Material	Identify and Evaluating Job-Relevant Information
		Lubricating and greasing stationary engines and machinery	Repairing and Maintaining Mechanical Equipment	Performing Complex and Technical Activities
		Noting repair and maintenance has been done	Documenting/Recording Information	Performing Complex and Technical Activities
		Operating machinery and newly repaired equipment to verify the effectiveness of repair	Operating Vehicles, Mechanized Devices, or Equipment	Performing Physical and Manual Work Activities
		Setting, installing, inspecting, maintaining, and repairing machinery and mechanical equipment	Controlling Machines and Processes	Performing Physical and Manual Work Activities
7318	Handicraft workers in textile, leather and related materials	Pulling warp to the loom by hand	Performing General Physical Activities	Performing Physical and Manual Work Activities
		Cleaning and patting textile fibers	Performing General Physical Activities	Performing Physical and Manual Work Activities
		Crocheting or making braids by hand	Performing General Physical Activities	Performing Physical and Manual Work Activities
		Forming fibers into pieces, combing fibers, combining fiber in pieces, or forming fibers into rovings	Performing General Physical Activities	Performing Physical and Manual Work Activities
		Grading and classifying natural textile fibers	Judging the Qualities of Things, Services, or People	Information and Data Processing

KBJI Code	Occupation	Tasks	Generalized task (O*NET Generalized Work Activity)	Task group (O*NET Generalized Work Activity Group)
		Knitting garments and other articles with powered hand tools or by hand	Performing General Physical Activities	Performing Physical and Manual Work Activities
		Made rugs using a knotting technique	Performing General Physical Activities	Performing Physical and Manual Work Activities
		Making lace and weaving, knitting, or embroidering various garments and household articles	Performing General Physical Activities	Performing Physical and Manual Work Activities
		Making nets by hand	Performing General Physical Activities	Performing Physical and Manual Work Activities
		Plain-weaving fabric or clothing by description; making tapestries, lace, carpets, or other fabrics on hand looms	Operating Vehicles, Mechanized Devices, or Equipment	Performing Physical and Manual Work Activities
		Preparing and naturally dyeing leather and making traditional footwear or handbags, belts, and other accessories	Performing General Physical Activities	Performing Physical and Manual Work Activities
		Twisting wool, cotton, and other fibers and dyeing with natural dyes	Performing General Physical Activities	Performing Physical and Manual Work Activities
		Twisting and twining yarn by hand	Performing General Physical Activities	Performing Physical and Manual Work Activities
		Washing wool fibers	Performing General Physical Activities	Performing Physical and Manual Work Activities
7412	Electrical mechanics and fitters	Connecting the electrical system for power supply	Drafting, Laying Out, and Specifying Technical Devices, Parts, and Equipment	Performing Complex and Technical Activities
		Designing, installing, maintaining, servicing and repairing electric passenger and freight elevators, and hydraulic, escalators, moving roads and other lifting equipment	Drafting, Laying Out, and Specifying Technical Devices, Parts, and Equipment	Performing Complex and Technical Activities
		Inspecting and testing electrical products manufactured	Repairing and Maintaining Electronic Equipment	Performing Complex and Technical Activities
		Installing, adjusting, and repairing electrical parts in domestic appliances, industrial machinery, and other equipment	Drafting, Laying Out, and Specifying Technical Devices, Parts, and Equipment	Performing Complex and Technical Activities
		Installing, adjusting, and repairing various kinds of electrical machinery and motors, generators, switchgear, and control equipment, instruments, or electrical parts of elevators and related equipment	Drafting, Laying Out, and Specifying Technical Devices, Parts, and Equipment	Performing Complex and Technical Activities
		Installing, testing, connecting, supervising, maintaining, and modifying electrical equipment, wiring, and control systems	Drafting, Laying Out, and Specifying Technical Devices, Parts, and Equipment	Performing Complex and Technical Activities
		Replacing and repairing defective parts	Repairing and Maintaining Electronic Equipment	Performing Complex and Technical Activities
8131	Chemical products plant and machine operators	Cleaning and making minor repairs to machinery and equipment	Repairing and Maintaining Mechanical Equipment	Performing Complex and Technical Activities

KBJI Code	Occupation	Tasks	Generalized task (O*NET Generalized Work Activity)	Task group (O*NET Generalized Work Activity Group)
		Measuring, weighing, and loading chemical ingredients following the formulation	Estimating the Quantifiable Characteristics of Products, Events, or Information	Identify and Evaluating Job-Relevant Information
		Monitoring gauges and electronic equipment at one or more chemical or formulation units, such as a mixer machine, kettle, blender, or dryer or a machine for tabletting, encapsulation, granulation, or coating	Controlling Machines and Processes	Performing Physical and Manual Work Activities
		Monitoring the reaction process and conducting the appropriate product safety procedures	Handling and Moving Objects	Performing Physical and Manual Work Activities
		Setting up, starting, controlling, adjusting, and stopping machines and equipment	Operating Vehicles, Mechanized Devices, or Equipment	Performing Physical and Manual Work Activities
		Taking samples and conducting chemical and physical tests on a regular basis to perform data-recording products and production results	Identifying Objects, Actions, and Events	Identify and Evaluating Job-Relevant Information
8141	Rubber products machine operators	Looking for defective products and improving tire wear and defects, through a vulcanization process or other processes	Evaluating Information to Determine Compliance with Standards	Information and Data Processing
		Operating and monitoring machine kneading, mixing and stirring rubber and rubber mixtures for further processing	Operating Vehicles, Mechanized Devices, or Equipment	Performing Physical and Manual Work Activities
		Operating and monitoring machines or a mixture of rubber or vulcanized rubber formed by a mold	Operating Vehicles, Mechanized Devices, or Equipment	Performing Physical and Manual Work Activities
		Operating and monitoring machines that make and shape tires, perform tire retreading, and print or reprocess used tires	Operating Vehicles, Mechanized Devices, or Equipment	Performing Physical and Manual Work Activities
		Operating and monitoring machines that produce sheets of rubber or rubber-coated fabric through a process of rolling	Operating Vehicles, Mechanized Devices, or Equipment	Performing Physical and Manual Work Activities
		Testing results to adapt them to the specifications required	Judging the Qualities of Things, Services, or People	Information and Data Processing
8211	Mechanical machinery assemblers	Assembling and installing prefabricated parts or components that are used to form products, assembling mechanical machines, assembling machines and vehicles	Drafting, Laying Out, and Specifying Technical Devices, Parts, and Equipment	Performing Complex and Technical Activities
		Inspecting and testing components that have been assembled	Inspecting Equipment, Structures, or Material	Identify and Evaluating Job-Relevant Information
		Recording data for production and recording how to work under certain conditions	Documenting/Recording Information	Performing Complex and Technical Activities
		Rejecting / cancelling the installation and components that are wrong	Judging the Qualities of Things, Services, or People	Information and Data Processing
		Reviewing work orders, details, charts, and drawings to determine materials needed and give the command assembly	Updating and Using Relevant Knowledge	Reasoning and Decision Making
8322	Car, taxi, and van drivers	Assisting passengers with disabilities	Assisting and Caring for Others	Communicating and Interacting
		Assisting passengers with their luggage	Assisting and Caring for Others	Communicating and Interacting

KBJI Code	Occupation	Tasks	Generalized task (O*NET Generalized Work Activity)	Task group (O*NET Generalized Work Activity Group)
		Collecting fees, payment of delivery, or the cost of delivery of official documents	Performing for or Working Directly with the Public	Communicating and Interacting
		Determining the most appropriate service	Identifying Objects, Actions, and Events	Identify and Evaluating Job-Relevant Information
		Directing and taking care of a car, truck, or small truck used to send letters or goods	Operating Vehicles, Mechanized Devices, or Equipment	Performing Physical and Manual Work Activities
		Driving and maintaining passenger, truck, car, or taxi	Operating Vehicles, Mechanized Devices, or Equipment	Performing Physical and Manual Work Activities
		Operating equipment to facilitate the loading and unloading of passengers with disabilities	Operating Vehicles, Mechanized Devices, or Equipment	Performing Physical and Manual Work Activities
		Operating telecommunications equipment to report locations and availability, and following instructions from the control center	Operating Vehicles, Mechanized Devices, or Equipment	Performing Physical and Manual Work Activities
8344	Lifting truck operators	Checking equipment to identify wear and damage	Repairing and Maintaining Electronic Equipment	Performing Complex and Technical Activities
		Keeping records of the work done and damage to equipment	Documenting/Recording Information	Performing Complex and Technical Activities
		Lifting equipment positioned below, above, or around the pallet load, sliding pallets and containers, as well as securing material or products to be transported to the designated place	Handling and Moving Objects	Performing Physical and Manual Work Activities
		Operating and supervising the lifting trucks and equipment, such as for raising and lowering loads, transporting, lifting, and arranging goods and pallets in terminals, ports, warehouses, factories and other buildings	Inspecting Equipment, Structures, or Material	Identify and Evaluating Job-Relevant Information
		Performing routine maintenance on equipment and accessories	Repairing and Maintaining Mechanical Equipment	Performing Complex and Technical Activities
9214	Garden and horticultural laborers	Caring for plants, watering plants, and weeding by hand	Performing General Physical Activities	Performing Physical and Manual Work Activities
		Cleaning the garden and disposing of waste	Performing General Physical Activities	Performing Physical and Manual Work Activities
		Harvesting and packing plants for sale and transport	Performing General Physical Activities	Performing Physical and Manual Work Activities
		Helping spread, grow, and plant the seeds, bulbs and cuttings	Performing General Physical Activities	Performing Physical and Manual Work Activities
		Helping plant and transplant flowers, shrubs, trees, and lawns	Performing General Physical Activities	Performing Physical and Manual Work Activities
		Maintaining the garden by watering, weeding, and mowing the lawn	Performing General Physical Activities	Performing Physical and Manual Work Activities
		Performing minor repairs on fixtures, buildings, and fences	Repairing and Maintaining Mechanical Equipment	Performing Complex and Technical Activities
		Preparing plantations and land using hand tools and simple machines	Performing General Physical Activities	Performing Physical and Manual Work Activities
		Unloading and moving supplies, products and equipment	Handling and Moving Objects	Performing Physical and Manual Work Activities

KBJI Code	Occupation	Tasks	Generalized task (O*NET Generalized Work Activity)	Task group (O*NET Generalized Work Activity Group)
9329	Manufacturing laborers not elsewhere classified	Cleaning machine blockages; cleaning machinery, equipment, and supplies	Repairing and Maintaining Mechanical Equipment	Performing Complex and Technical Activities
		Sorting products or components manually	Handling and Moving Objects	Performing Physical and Manual Work Activities
		Transporting goods, materials, equipment, (etc.) to the work area, moving parts that have been completed	Handling and Moving Objects	Performing Physical and Manual Work Activities
		Unloading and loading vehicles, trucks and trolleys	Handling and Moving Objects	Performing Physical and Manual Work Activities
9334	Shelf fillers	Directing customers to the location of items sought	Assisting and Caring for Others	Communicating and Interacting
		Disposing of goods with expired dates of use	Performing General Physical Activities	Performing Physical and Manual Work Activities
		Filling shelves with goods, ensuring that goods with the earliest date of use are at the front of the rack	Estimating the Quantifiable Characteristics of Products, Events, or Information	Identify and Evaluating Job-Relevant Information
		Getting goods to customers from shelves or warehouses	Performing for or Working Directly with the Public	Communicating and Interacting
		Maintaining the shelf arrangement by moving stock that is in a different location	Handling and Moving Objects	Performing Physical and Manual Work Activities
		Noting the goods that have been sold and collecting goods needed from the supply room	Documenting/Recording Information	Performing Complex and Technical Activities
		Placing goods neatly in crates and on shelves, as well as large items piled on the floor	Handling and Moving Objects	Performing Physical and Manual Work Activities
		Receiving, opening, disassembling, and inspecting damaged merchandise from the manufacturer or distributor	Handling and Moving Objects	Performing Physical and Manual Work Activities
9621	Messengers, package deliverers and luggage porters	Carrying and delivering luggage at hotels, stations, airports, and other places	Performing General Physical Activities	Performing Physical and Manual Work Activities
		Delivering a wide range of goods to and from enterprises, shops, households and other places	Performing General Physical Activities	Performing Physical and Manual Work Activities
		Delivering messages, packages and other items within a company or between companies, or other	Performing General Physical Activities	Performing Physical and Manual Work Activities
		Planning and following the most efficient route	Judging the Qualities of Things, Services, or People	Information and Data Processing
		Receiving and marking baggage by completing the claim check attachments	Handling and Moving Objects	Performing Physical and Manual Work Activities
		Sorting items to be delivered according to the delivery route	Identifying Objects, Actions, and Events	Identify and Evaluating Job-Relevant Information
		Accepting tasks as a janitor	Performing General Physical Activities	Performing Physical and Manual Work Activities

Source: Indotask and O*NET.
Notes: For each task in each occupation, we paired it to relevant work activities and the relevant task group according to O*NET work activities module.

Table D2. Total tasks assigned to a task group, per occupation

KBJI Code	Occupation	Task group	Number of tasks
1219	Business services and administration managers not elsewhere classified	Administering	1
		Communicating and Interacting	1
		Coordinating, Developing, Managing, and Advising	2
		Information and Data Processing	1
		Performing Complex and Technical Activities	1
		Reasoning and Decision Making	4
1221	Sales and marketing managers	Administering	1
		Communicating and Interacting	1
		Coordinating, Developing, Managing, and Advising	2
		Identify and Evaluating Job-Relevant Information	1
		Reasoning and Decision Making	3
1323	Construction managers	Administering	1
		Communicating and Interacting	2
		Coordinating, Developing, Managing, and Advising	1
		Identify and Evaluating Job-Relevant Information	2
		Information and Data Processing	1
		Looking for and Receiving Job-Related Information	1
		Performing Complex and Technical Activities	1
		Reasoning and Decision Making	2
1324	Supply, distribution and related managers	Administering	1
		Communicating and Interacting	2
		Coordinating, Developing, Managing, and Advising	2
		Identify and Evaluating Job-Relevant Information	1
		Performing Complex and Technical Activities	1
		Performing Physical and Manual Work Activities	1
		Reasoning and Decision Making	3
1346	Financial and insurance services managers	Administering	2
		Communicating and Interacting	2
		Coordinating, Developing, Managing, and Advising	1
		Identify and Evaluating Job-Relevant Information	1
		Information and Data Processing	2
		Reasoning and Decision Making	3
2141	Industrial and production engineers	Communicating and Interacting	1
		Coordinating, Developing, Managing, and Advising	1
		Identify and Evaluating Job-Relevant Information	2
		Information and Data Processing	3
		Looking for and Receiving Job-Related Information	1
		Performing Complex and Technical Activities	2
		Reasoning and Decision Making	1

2142	Civil engineers	Information and Data Processing	3
		Performing Complex and Technical Activities	2
		Reasoning and Decision Making	2
2144	Mechanical engineers	Coordinating, Developing, Managing, and Advising	5
		Identify and Evaluating Job-Relevant Information	1
		Reasoning and Decision Making	1
2149	Engineering professionals not elsewhere classified	Identify and Evaluating Job-Relevant Information	2
		Performing Complex and Technical Activities	3
		Reasoning and Decision Making	4
2161	Building architects	Communicating and Interacting	1
		Coordinating, Developing, Managing, and Advising	1
		Information and Data Processing	2
		Performing Complex and Technical Activities	1
		Reasoning and Decision Making	4
2166	Graphic and multimedia designers	Communicating and Interacting	1
		Information and Data Processing	2
		Performing Complex and Technical Activities	2
		Performing Physical and Manual Work Activities	1
		Reasoning and Decision Making	4
2263	Environmental and occupational health and hygiene professionals	Coordinating, Developing, Managing, and Advising	4
		Identify and Evaluating Job-Relevant Information	1
		Performing Complex and Technical Activities	1
		Reasoning and Decision Making	4
2413	Financial analysts	Communicating and Interacting	1
		Coordinating, Developing, Managing, and Advising	1
		Information and Data Processing	3
		Looking for and Receiving Job-Related Information	1
		Reasoning and Decision Making	3
2431	Advertising and marketing professionals	Coordinating, Developing, Managing, and Advising	2
		Identify and Evaluating Job-Relevant Information	1
		Information and Data Processing	3
		Looking for and Receiving Job-Related Information	1
		Reasoning and Decision Making	2
2512	Software developers	Coordinating, Developing, Managing, and Advising	2
		Information and Data Processing	1
		Performing Complex and Technical Activities	3
		Reasoning and Decision Making	2
2642	Journalists	Communicating and Interacting	3
		Information and Data Processing	4
		Looking for and Receiving Job-Related Information	2
		Reasoning and Decision Making	1

3111	Chemical and physical science technicians	Identify and Evaluating Job-Relevant Information	2
		Information and Data Processing	1
		Performing Physical and Manual Work Activities	1
		Reasoning and Decision Making	2
3112	Civil engineering technicians	Identify and Evaluating Job-Relevant Information	2
		Information and Data Processing	3
		Performing Physical and Manual Work Activities	1
		Reasoning and Decision Making	3
3115	Mechanical engineering technicians	Identify and Evaluating Job-Relevant Information	2
		Information and Data Processing	2
		Performing Complex and Technical Activities	1
		Performing Physical and Manual Work Activities	1
		Reasoning and Decision Making	2
3118	Draftspersons	Performing Complex and Technical Activities	6
		Performing Physical and Manual Work Activities	2
3122	Manufacturing supervisors	Coordinating, Developing, Managing, and Advising	2
		Information and Data Processing	2
		Performing Physical and Manual Work Activities	1
		Reasoning and Decision Making	1
3123	Construction supervisors	Administering	1
		Coordinating, Developing, Managing, and Advising	1
		Identify and Evaluating Job-Relevant Information	1
		Information and Data Processing	1
		Looking for and Receiving Job-Related Information	1
		Reasoning and Decision Making	1
3131	Power production plant operators	Performing Complex and Technical Activities	3
		Performing Physical and Manual Work Activities	3
3257	Environmental and occupational health inspectors and associates	Communicating and Interacting	3
		Identify and Evaluating Job-Relevant Information	2
		Information and Data Processing	4
		Reasoning and Decision Making	1
3322	Commercial sales representatives	Communicating and Interacting	6
		Information and Data Processing	1
3323	Buyers	Communicating and Interacting	3
		Identify and Evaluating Job-Relevant Information	1
		Information and Data Processing	3
		Looking for and Receiving Job-Related Information	1
		Reasoning and Decision Making	2
3331	Clearing and forwarding agents	Information and Data Processing	3
		Reasoning and Decision Making	2
3341	Office supervisors	Coordinating, Developing, Managing, and Advising	5
		Reasoning and Decision Making	1

3513	Computer network and systems technicians	Coordinating, Developing, Managing, and Advising	1
		Performing Complex and Technical Activities	3
		Performing Physical and Manual Work Activities	1
		Reasoning and Decision Making	1
4110	General office clerks	Administering	1
		Communicating and Interacting	1
		Identify and Evaluating Job-Relevant Information	1
		Information and Data Processing	2
		Performing Complex and Technical Activities	2
		Performing Physical and Manual Work Activities	1
4120	Secretaries (general)	Communicating and Interacting	2
		Looking for and Receiving Job-Related Information	2
		Performing Complex and Technical Activities	3
		Reasoning and Decision Making	1
4132	Data entry clerks	Identify and Evaluating Job-Relevant Information	2
		Information and Data Processing	1
		Performing Complex and Technical Activities	2
4214	Debt-collectors and related workers	Communicating and Interacting	3
		Identify and Evaluating Job-Relevant Information	1
		Information and Data Processing	1
4222	Contact center information clerks	Administering	1
		Communicating and Interacting	3
		Coordinating, Developing, Managing, and Advising	1
		Performing Complex and Technical Activities	1
4416	Human resource clerical	Administering	3
		Communicating and Interacting	1
		Information and Data Processing	1
		Performing Complex and Technical Activities	2
5151	Cleaners supervisors	Administering	3
		Coordinating, Developing, Managing, and Advising	1
		Performing Physical and Manual Work Activities	4
5243	Traveling salesman	Administering	2
		Communicating and Interacting	2
		Identify and Evaluating Job-Relevant Information	1
		Performing Complex and Technical Activities	1
		Performing Physical and Manual Work Activities	1
5244	Contact center salespersons	Communicating and Interacting	2
		Coordinating, Developing, Managing, and Advising	1
		Information and Data Processing	1
		Looking for and Receiving Job-Related Information	1
		Performing Complex and Technical Activities	2
		Reasoning and Decision Making	1

5249	Sales workers not elsewhere classified	Communicating and Interacting	3
7233	Agricultural and industrial machinery mechanics and repairers	Identify and Evaluating Job-Relevant Information	1
		Information and Data Processing	1
		Performing Complex and Technical Activities	3
		Performing Physical and Manual Work Activities	2
7318	Handicraft workers in textile, leather, and related materials	Information and Data Processing	1
		Performing Physical and Manual Work Activities	13
7412	Electrical mechanics and fitters	Performing Complex and Technical Activities	7
8131	Chemical products plant and machine operators	Identify and Evaluating Job-Relevant Information	2
		Performing Complex and Technical Activities	1
		Performing Physical and Manual Work Activities	3
8141	Rubber products machine operators	Information and Data Processing	2
		Performing Physical and Manual Work Activities	4
8211	Mechanical machinery assemblers	Identify and Evaluating Job-Relevant Information	1
		Information and Data Processing	1
		Performing Complex and Technical Activities	2
		Reasoning and Decision Making	1
8322	Car, taxi, and van drivers	Communicating and Interacting	3
		Identify and Evaluating Job-Relevant Information	1
		Performing Physical and Manual Work Activities	4
8344	Lifting truck operators	Identify and Evaluating Job-Relevant Information	1
		Performing Complex and Technical Activities	3
		Performing Physical and Manual Work Activities	1
9214	Garden and horticultural laborers	Performing Complex and Technical Activities	1
		Performing Physical and Manual Work Activities	8
9329	Manufacturing laborers not elsewhere classified	Performing Complex and Technical Activities	1
		Performing Physical and Manual Work Activities	3
9334	Shelf fillers	Communicating and Interacting	2
		Identify and Evaluating Job-Relevant Information	1
		Performing Complex and Technical Activities	1
		Performing Physical and Manual Work Activities	4
9621	Messengers, package deliverers and luggage porters	Identify and Evaluating Job-Relevant Information	1
		Information and Data Processing	1
		Performing Physical and Manual Work Activities	5

Source: IndOTaSk and O*NET.
Notes: For each task in each occupation, we paired it to relevant work activities and task group according to O*NET work activities module.

Appendix E.
Apprenticeships and job certifications additional analysis

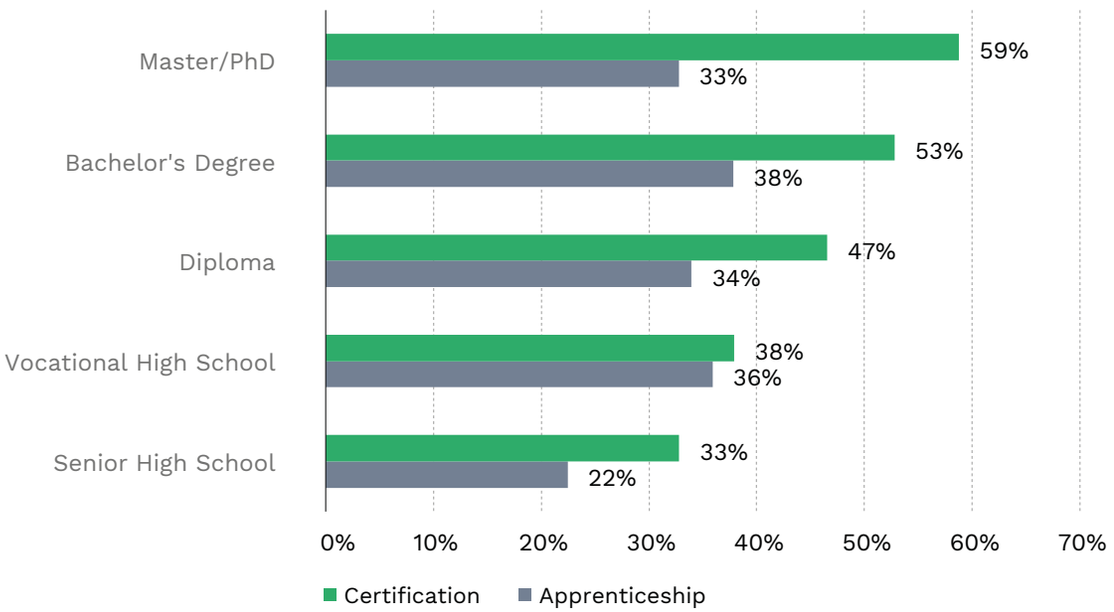
Table E1. Cross tabulation between importance of apprenticeship and importance of job certification

		Apprenticeship		
		Not important	**Important**	**Total**
Certification	**Not important**	4%	27%	31%
	Important	4%	65%	69%
	Total	8%	92%	100%

Source: World Bank, based on IndOTaSk.
Notes: The table shows the cross tabulation proportion of importance of apprenticeship and job certification. We classify as important when, on average, the respondents for each occupation give a score of 3 or more, while we classify as not important when the score is below 3. The average score is calculated using weights based on the number of respondents per occupation.

Fig. E.1

Probit regression marginal effects on formal education requirements



Source: World Bank, based on IndOTaSk.
Notes: The regression is using occupation as the control for fixed effect. The data is from IndOTaSK which has 944 respondents for 51 selected occupations. The number of respondents per occupation is used as weight for the regression.

Appendix F.
Skills description and categorization

O*NET categorizes the 35 skills into 6 skills groups. Table F1 contains the skills groups and their description. Table F2 contains the categorization of the 35 skills and the skills description.

Table F1. O*NET skills group

Skills group	Skills group description
Basic Skills	Developed capacities that facilitate learning or the more rapid acquisition of knowledge
Complex Problem-Solving Skills	Developed capacities used to solve novel, ill-defined problems in complex, real-world settings
Resource Management Skills	Developed capacities used to allocate resources efficiently
Social Skills	Developed capacities used to work with people to achieve goals
Systems Skills	Developed capacities used to understand, monitor, and improve socio-technical systems
Technical Skills	Developed capacities used to design, set-up, operate, and correct malfunctions involving application of machines or technological systems

Source: O*NET Data Descriptor.

Table F2. O*NET skills categorization

Skills group	Skill	Skills description
Basic Skills	Active Learning	Understanding the implications of new information for both current and future problem-solving and decision-making.
	Active Listening	Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
	Critical Thinking	Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
	Learning Strategies	Selecting and using training/instructional methods and procedures appropriate for the situation when learning or teaching new things.
	Mathematics	Using mathematics to solve problems.
	Monitoring	Monitoring/assessing performance of yourself, other individuals, or organizations to make improvements or take corrective action.
	Reading Comprehension	Understanding written sentences and paragraphs in work-related documents.

Skills group	Skill	Skills description
	Science	Using scientific rules and methods to solve problems.
	Speaking	Talking to others to convey information effectively.
	Writing	Communicating effectively in writing as appropriate for the needs of the audience.
Complex Problem-Solving Skills	Complex Problem Solving	Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions.
Resource Management Skills	Management of Financial Resources	Determining how money will be spent to get the work done, and accounting for these expenditures.
	Management of Material Resources	Obtaining and seeing to the appropriate use of equipment, facilities, and materials needed to do certain work.
	Management of Personnel Resources	Motivating, developing, and directing people as they work, identifying the best people for the job.
	Time Management	Managing one's own time and the time of others.
Social Skills	Coordination	Adjusting actions in relation to others' actions.
	Instructing	Teaching others how to do something.
	Negotiation	Bringing others together and trying to reconcile differences.
	Persuasion	Persuading others to change their minds or behavior.
	Service Orientation	Actively looking for ways to help people.
	Social Perceptiveness	Being aware of others' reactions and understanding why they react as they do.
Systems Skills	Judgment and Decision Making	Considering the relative costs and benefits of potential actions to choose the most appropriate one.
	Systems Analysis	Determining how a system should work and how changes in conditions, operations, and the environment will affect outcomes.
	Systems Evaluation	Identifying measures or indicators of system performance and the actions needed to improve or correct performance, relative to the goals of the system.
Technical Skills	Equipment Maintenance	Performing routine maintenance on equipment and determining when and what kind of maintenance is needed.
	Equipment Selection	Determining the kind of tools and equipment needed to do a job.
	Installation	Installing equipment, machines, wiring, or programs to meet specifications.
	Operation and Control	Controlling operations of equipment or systems.
	Operation Monitoring	Watching gauges, dials, or other indicators to make sure a machine is working properly.
	Operations Analysis	Analyzing needs and product requirements to create a design.
	Programming	Writing computer programs for various purposes.
	Quality Control Analysis	Conducting tests and inspections of products, services, or processes to evaluate quality or performance.
	Repairing	Repairing machines or systems using the needed tools.
	Technology Design	Generating or adapting equipment and technology to serve user needs.
	Troubleshooting	Determining causes of operating errors and deciding what to do about it.

Source: O*NET Data Descriptor.

Table F3. Top three occupations with highest importance score for each top demanded skills

Skill	Occupation with highest importance score	Level of education
Active Learning	Graphic and multimedia designers	Vocational high school
Active Learning	Mechanical engineering technicians	Vocational high school
Active Learning	Software developers	Bachelor's degree
Complex Problem Solving	Civil engineers	Bachelor's degree
Complex Problem Solving	Environmental and occupational health and hygiene professionals	Bachelor's degree
Complex Problem Solving	Mechanical engineering technicians	Vocational high school
Coordination	Building architects	Bachelor's degree
Coordination	Contact center information clerks	Bachelor's degree
Coordination	Mechanical engineers	Bachelor's degree
Critical Thinking	Business services and administration managers not elsewhere classified	Bachelor's degree
Critical Thinking	Environmental and occupational health and hygiene professionals	Bachelor's degree
Critical Thinking	Financial and insurance services managers	Bachelor's degree
Equipment Maintenance	Construction supervisors	Vocational high school
Equipment Maintenance	Mechanical engineering technicians	Vocational high school
Equipment Maintenance	Power production plant operators	Bachelor's degree
Instructing	Civil engineering technicians	Bachelor's degree
Instructing	Civil engineers	Bachelor's degree
Instructing	Environmental and occupational health and hygiene professionals	Bachelor's degree
Judgment and Decision Making	Construction managers	Bachelor's degree
Judgment and Decision Making	Engineering professionals not elsewhere classified	Senior high school
Judgment and Decision Making	Graphic and multimedia designers	Vocational high school
Learning Strategies	Contact center information clerks	Bachelor's degree
Learning Strategies	Environmental and occupational health and hygiene professionals	Bachelor's degree
Learning Strategies	Financial and insurance services managers	Bachelor's degree

Skill	Occupation with highest importance score	Level of education
Management of Personnel Resources	Financial and insurance services managers	Bachelor's degree
Management of Personnel Resources	Mechanical engineering technicians	Vocational high school
Management of Personnel Resources	Sales and marketing managers	Bachelor's degree
Mathematics	Draftspersons	Vocational high school
Mathematics	Engineering professionals not elsewhere classified	Senior high school
Mathematics	Financial analysts	Bachelor's degree
Monitoring	Contact center salespersons	Diploma
Monitoring	Environmental and occupational health and hygiene professionals	Bachelor's degree
Monitoring	Financial analysts	Bachelor's degree
Negotiation	Clearing and forwarding agents	Bachelor's degree
Negotiation	Commercial sales representatives	Senior high school
Negotiation	Sales and marketing managers	Bachelor's degree
Operations Analysis	Financial analysts	Bachelor's degree
Operations Analysis	Financial and insurance services managers	Bachelor's degree
Operations Analysis	Sales and marketing managers	Bachelor's degree
Quality Control Analysis	Chemical products plant and machine operators	Senior high school
Quality Control Analysis	Manufacturing supervisors	Bachelor's degree
Quality Control Analysis	Mechanical machinery assemblers	Vocational high school
Reading Comprehension	Building architects	Bachelor's degree
Reading Comprehension	Commercial sales representatives	Senior high school
Reading Comprehension	Computer network and systems technicians	Vocational high school
Service Orientation	Building architects	Bachelor's degree
Service Orientation	Contact center salespersons	Diploma
Service Orientation	Traveling salesman	Bachelor's degree
Speaking	Commercial sales representatives	Senior high school
Speaking	Sales and marketing managers	Bachelor's degree
Speaking	Traveling salesman	Bachelor's degree

Skill	Occupation with highest importance score	Level of education
Time Management	Construction managers	Bachelor's degree
Time Management	Environmental and occupational health and hygiene professionals	Bachelor's degree
Time Management	Financial and insurance services managers	Bachelor's degree
Writing	Commercial sales representatives	Senior high school
Writing	Data entry clerks	Bachelor's degree
Writing	Journalists	Bachelor's degree

Source: World Bank, based on Indotask data.
Note: The occupation for each skill is determined using importance score from 944 respondents in 51 high-demanded occupations in Indotask data. The score from respondents were averaged to occupation and skill level and using number of respondents from this data as the weight. Occupation with higher score then were selected from each skill, and the highest frequency education is showed for the chosen occupations.

Table F4. Occupation ranking for each of the 35 skills according to the mean importance score

Skill	Ranking	KBJI	Occupation title	Mean
Active Learning	1	2512	Software developers	4.10
Active Learning	2	4222	Contact center information clerks	4.00
Active Learning	3	2166	Graphic and multimedia designers	3.93
Active Learning	4	2642	Journalists	3.92
Active Learning	5	2413	Financial analysts	3.83
Active Learning	6	3115	Mechanical engineering technicians	3.82
Active Learning	7	1346	Financial and insurance services managers	3.81
Active Learning	8	5249	Sales workers not elsewhere classified	3.80
Active Learning	9	8211	Mechanical machinery assemblers	3.80
Active Learning	10	2149	Engineering professionals not elsewhere classified	3.79
Active Learning	11	2263	Environmental and occupational health and hygiene professionals	3.77
Active Learning	12	2141	Industrial and production engineers	3.75
Active Learning	13	1323	Construction managers	3.73
Active Learning	14	5243	Traveling salesman	3.68
Active Learning	15	1221	Sales and marketing managers	3.67
Active Learning	16	2144	Mechanical engineers	3.67
Active Learning	17	3112	Civil engineering technicians	3.64

Skill	Ranking	KBJI	Occupation title	Mean
Active Learning	18	3123	Construction supervisors	3.63
Active Learning	19	3341	Office supervisors	3.57
Active Learning	20	3131	Power production plant operators	3.55
Active Learning	21	3257	Environmental and occupational health inspectors and associates	3.53
Active Learning	22	3513	Computer network and systems technicians	3.48
Active Learning	23	3323	Buyers	3.47
Active Learning	24	3331	Clearing and forwarding agents	3.47
Active Learning	25	1219	Business services and administration managers not elsewhere classified	3.45
Active Learning	26	1324	Supply, distribution, and related managers	3.45
Active Learning	27	3122	Manufacturing supervisors	3.43
Active Learning	28	3118	Draughts persons	3.42
Active Learning	29	8141	Rubber products machine operators	3.42
Active Learning	30	4132	Data entry clerks	3.36
Active Learning	31	4214	Debt-collectors and related workers	3.32
Active Learning	32	3322	Commercial sales representatives	3.30
Active Learning	33	2142	Civil engineers	3.30
Active Learning	34	4110	General office clerks	3.30
Active Learning	35	7233	Agricultural and industrial machinery mechanics and repairers	3.29
Active Learning	36	4416	Human resource clerical	3.29
Active Learning	37	2431	Advertising and marketing professionals	3.20
Active Learning	38	8131	Chemical products plant and machine operators	3.19
Active Learning	39	8322	Car, taxi, and van drivers	3.17
Active Learning	40	2161	Building architects	3.15
Active Learning	41	5244	Contact center salespersons	3.15
Active Learning	42	5151	Cleaners supervisors	3.11
Active Learning	43	7412	Electrical mechanics and fitters	3.08
Active Learning	44	4120	Secretaries (general)	3.06
Active Learning	45	8344	Lifting truck operators	3.05

Skill	Ranking	KBJI	Occupation title	Mean
Active Learning	46	9621	Messengers, package deliverers and luggage porters	3.00
Active Learning	47	9334	Shelf fillers	3.00
Active Learning	48	3111	Chemical and physical science technicians	3.00
Active Learning	49	9214	Garden and horticultural laborer	2.71
Active Learning	50	7318	Handicraft workers in textile, leather, and related materials	2.64
Active Learning	51	9329	Manufacturing laborer not elsewhere classified	2.48
Active Listening	1	2642	Journalists	4.54
Active Listening	2	3118	Draughtspersons	4.25
Active Listening	3	1221	Sales and marketing managers	4.24
Active Listening	4	3112	Civil engineering technicians	4.21
Active Listening	5	3331	Clearing and forwarding agents	4.20
Active Listening	6	5244	Contact center salespersons	4.15
Active Listening	7	8211	Mechanical machinery assemblers	4.10
Active Listening	8	3322	Commercial sales representatives	4.10
Active Listening	9	1346	Financial and insurance services managers	4.10
Active Listening	10	2149	Engineering professionals not elsewhere classified	4.07
Active Listening	11	2166	Graphic and multimedia designers	4.07
Active Listening	12	3115	Mechanical engineering technicians	4.06
Active Listening	13	4132	Data entry clerks	4.05
Active Listening	14	2263	Environmental and occupational health and hygiene professionals	4.00
Active Listening	15	3123	Construction supervisors	4.00
Active Listening	16	4110	General office clerks	4.00
Active Listening	17	5243	Traveling salesman	4.00
Active Listening	18	2413	Financial analysts	4.00
Active Listening	19	8322	Car, taxi, and van drivers	4.00
Active Listening	20	4222	Contact center information clerks	4.00
Active Listening	21	4214	Debt-collectors and related workers	4.00
Active Listening	22	3513	Computer network and systems technicians	4.00

Skill	Ranking	KBJI	Occupation title	Mean
Active Listening	23	1219	Business services and administration managers not elsewhere classified	4.00
Active Listening	24	1324	Supply, distribution, and related managers	3.95
Active Listening	25	2161	Building architects	3.92
Active Listening	26	9334	Shelf fillers	3.89
Active Listening	27	2144	Mechanical engineers	3.89
Active Listening	28	4416	Human resource clerical	3.88
Active Listening	29	5249	Sales workers not elsewhere classified	3.87
Active Listening	30	3323	Buyers	3.84
Active Listening	31	5151	Cleaners supervisors	3.83
Active Listening	32	2141	Industrial and production engineers	3.80
Active Listening	33	3341	Office supervisors	3.78
Active Listening	34	3122	Manufacturing supervisors	3.76
Active Listening	35	1323	Construction managers	3.73
Active Listening	36	7233	Agricultural and industrial machinery mechanics and repairers	3.71
Active Listening	37	2512	Software developers	3.70
Active Listening	38	2431	Advertising and marketing professionals	3.70
Active Listening	39	4120	Secretaries (general)	3.69
Active Listening	40	3257	Environmental and occupational health inspectors and associates	3.67
Active Listening	41	9621	Messengers, package deliverers and luggage porters	3.67
Active Listening	42	8131	Chemical products plant and machine operators	3.65
Active Listening	43	3131	Power production plant operators	3.64
Active Listening	44	2142	Civil engineers	3.64
Active Listening	45	8344	Lifting truck operators	3.40
Active Listening	46	7412	Electrical mechanics and fitters	3.38
Active Listening	47	9329	Manufacturing laborer not elsewhere classified	3.36
Active Listening	48	3111	Chemical and physical science technicians	3.29
Active Listening	49	8141	Rubber products machine operators	3.17
Active Listening	50	9214	Garden and horticultural laborer	3.13

Skill	Ranking	KBJI	Occupation title	Mean
Active Listening	51	7318	Handicraft workers in textile, leather, and related materials	2.57
Complex Problem Solving	1	3115	Mechanical engineering technicians	4.18
Complex Problem Solving	2	2263	Environmental and occupational health and hygiene professionals	4.08
Complex Problem Solving	3	1221	Sales and marketing managers	4.00
Complex Problem Solving	4	4222	Contact center information clerks	4.00
Complex Problem Solving	5	2141	Industrial and production engineers	3.95
Complex Problem Solving	6	3331	Clearing and forwarding agents	3.93
Complex Problem Solving	7	1323	Construction managers	3.93
Complex Problem Solving	8	2413	Financial analysts	3.92
Complex Problem Solving	9	1346	Financial and insurance services managers	3.90
Complex Problem Solving	10	2144	Mechanical engineers	3.89
Complex Problem Solving	11	2642	Journalists	3.85
Complex Problem Solving	12	8211	Mechanical machinery assemblers	3.80
Complex Problem Solving	13	2166	Graphic and multimedia designers	3.80
Complex Problem Solving	14	2149	Engineering professionals not elsewhere classified	3.79
Complex Problem Solving	15	3112	Civil engineering technicians	3.77
Complex Problem Solving	16	2512	Software developers	3.70
Complex Problem Solving	17	1219	Business services and administration managers not elsewhere classified	3.68
Complex Problem Solving	18	5243	Traveling salesman	3.65
Complex Problem Solving	19	3131	Power production plant operators	3.64
Complex Problem Solving	20	4132	Data entry clerks	3.62
Complex Problem Solving	21	5244	Contact center salespersons	3.62
Complex Problem Solving	22	2142	Civil engineers	3.60
Complex Problem Solving	23	3513	Computer network and systems technicians	3.57
Complex Problem Solving	24	3341	Office supervisors	3.55
Complex Problem Solving	25	4416	Human resource clerical	3.53
Complex Problem Solving	26	7233	Agricultural and industrial machinery mechanics and repairers	3.53
Complex Problem Solving	27	3123	Construction supervisors	3.53

Skill	Ranking	KBJI	Occupation title	Mean
Complex Problem Solving	28	3118	Draughtspersons	3.50
Complex Problem Solving	29	4110	General office clerks	3.50
Complex Problem Solving	30	1324	Supply, distribution, and related managers	3.50
Complex Problem Solving	31	2431	Advertising and marketing professionals	3.47
Complex Problem Solving	32	3122	Manufacturing supervisors	3.43
Complex Problem Solving	33	3111	Chemical and physical science technicians	3.43
Complex Problem Solving	34	2161	Building architects	3.42
Complex Problem Solving	35	3257	Environmental and occupational health inspectors and associates	3.40
Complex Problem Solving	36	5249	Sales workers not elsewhere classified	3.40
Complex Problem Solving	37	3323	Buyers	3.37
Complex Problem Solving	38	4214	Debt-collectors and related workers	3.32
Complex Problem Solving	39	8131	Chemical products plant and machine operators	3.31
Complex Problem Solving	40	7412	Electrical mechanics and fitters	3.31
Complex Problem Solving	41	3322	Commercial sales representatives	3.30
Complex Problem Solving	42	4120	Secretaries (general)	3.25
Complex Problem Solving	43	8344	Lifting truck operators	3.11
Complex Problem Solving	44	8322	Car, taxi, and van drivers	3.09
Complex Problem Solving	45	8141	Rubber products machine operators	3.08
Complex Problem Solving	46	9334	Shelf fillers	3.00
Complex Problem Solving	47	5151	Cleaners supervisors	2.89
Complex Problem Solving	48	9621	Messengers, package deliverers and luggage porters	2.67
Complex Problem Solving	49	9214	Garden and horticultural laborer	2.64
Complex Problem Solving	50	9329	Manufacturing laborer not elsewhere classified	2.56
Complex Problem Solving	51	7318	Handicraft workers in textile, leather, and related materials	2.50
Coordination	1	4222	Contact center information clerks	4.23
Coordination	2	2144	Mechanical engineers	4.22
Coordination	3	2512	Software developers	4.20
Coordination	4	3131	Power production plant operators	4.18
Coordination	5	3118	Draughtspersons	4.17

Skill	Ranking	KBJI	Occupation title	Mean
Coordination	6	2642	Journalists	4.15
Coordination	7	1323	Construction managers	4.13
Coordination	8	2166	Graphic and multimedia designers	4.13
Coordination	9	8211	Mechanical machinery assemblers	4.10
Coordination	10	3115	Mechanical engineering technicians	4.06
Coordination	11	5243	Traveling salesman	4.06
Coordination	12	1221	Sales and marketing managers	4.05
Coordination	13	3341	Office supervisors	4.04
Coordination	14	2413	Financial analysts	4.00
Coordination	15	3123	Construction supervisors	4.00
Coordination	16	2149	Engineering professionals not elsewhere classified	4.00
Coordination	17	1324	Supply, distribution, and related managers	4.00
Coordination	18	3331	Clearing and forwarding agents	4.00
Coordination	19	4214	Debt-collectors and related workers	3.95
Coordination	20	3323	Buyers	3.95
Coordination	21	2431	Advertising and marketing professionals	3.95
Coordination	22	2263	Environmental and occupational health and hygiene professionals	3.92
Coordination	23	3112	Civil engineering technicians	3.92
Coordination	24	1346	Financial and insurance services managers	3.90
Coordination	25	3122	Manufacturing supervisors	3.90
Coordination	26	4110	General office clerks	3.90
Coordination	27	7233	Agricultural and industrial machinery mechanics and repairers	3.88
Coordination	28	8131	Chemical products plant and machine operators	3.88
Coordination	29	2141	Industrial and production engineers	3.85
Coordination	30	5244	Contact center salespersons	3.85
Coordination	31	3513	Computer network and systems technicians	3.83
Coordination	32	1219	Business services and administration managers not elsewhere classified	3.82
Coordination	33	3322	Commercial sales representatives	3.80

Skill	Ranking	KBJI	Occupation title	Mean
Coordination	34	2142	Civil engineers	3.80
Coordination	35	2161	Building architects	3.77
Coordination	36	4132	Data entry clerks	3.76
Coordination	37	3257	Environmental and occupational health inspectors and associates	3.73
Coordination	38	8322	Car, taxi, and van drivers	3.70
Coordination	39	4120	Secretaries (general)	3.69
Coordination	40	5249	Sales workers not elsewhere classified	3.67
Coordination	41	5151	Cleaners supervisors	3.67
Coordination	42	4416	Human resource clerical	3.65
Coordination	43	3111	Chemical and physical science technicians	3.64
Coordination	44	7412	Electrical mechanics and fitters	3.62
Coordination	45	8344	Lifting truck operators	3.58
Coordination	46	9621	Messengers, package deliverers and luggage porters	3.52
Coordination	47	9334	Shelf fillers	3.42
Coordination	48	8141	Rubber products machine operators	3.25
Coordination	49	9214	Garden and horticultural laborer	2.93
Coordination	50	7318	Handicraft workers in textile, leather, and related materials	2.71
Coordination	51	9329	Manufacturing laborer not elsewhere classified	2.68
Critical Thinking	1	2642	Journalists	4.46
Critical Thinking	2	1346	Financial and insurance services managers	4.14
Critical Thinking	3	4222	Contact center information clerks	4.08
Critical Thinking	4	2141	Industrial and production engineers	4.05
Critical Thinking	5	2413	Financial analysts	4.00
Critical Thinking	6	2512	Software developers	4.00
Critical Thinking	7	2144	Mechanical engineers	3.94
Critical Thinking	8	2166	Graphic and multimedia designers	3.93
Critical Thinking	9	2263	Environmental and occupational health and hygiene professionals	3.92
Critical Thinking	10	1221	Sales and marketing managers	3.90

Skill	Ranking	KBJI	Occupation title	Mean
Critical Thinking	11	3341	Office supervisors	3.87
Critical Thinking	12	1219	Business services and administration managers not elsewhere classified	3.82
Critical Thinking	13	8211	Mechanical machinery assemblers	3.80
Critical Thinking	14	1323	Construction managers	3.80
Critical Thinking	15	3331	Clearing and forwarding agents	3.80
Critical Thinking	16	2149	Engineering professionals not elsewhere classified	3.79
Critical Thinking	17	4132	Data entry clerks	3.77
Critical Thinking	18	4416	Human resource clerical	3.76
Critical Thinking	19	3123	Construction supervisors	3.74
Critical Thinking	20	5243	Traveling salesman	3.74
Critical Thinking	21	3115	Mechanical engineering technicians	3.65
Critical Thinking	22	3122	Manufacturing supervisors	3.62
Critical Thinking	23	2161	Building architects	3.62
Critical Thinking	24	3513	Computer network and systems technicians	3.61
Critical Thinking	25	2142	Civil engineers	3.60
Critical Thinking	26	3322	Commercial sales representatives	3.60
Critical Thinking	27	3257	Environmental and occupational health inspectors and associates	3.60
Critical Thinking	28	4214	Debt-collectors and related workers	3.59
Critical Thinking	29	3112	Civil engineering technicians	3.57
Critical Thinking	30	1324	Supply, distribution, and related managers	3.55
Critical Thinking	31	5244	Contact center salespersons	3.54
Critical Thinking	32	5249	Sales workers not elsewhere classified	3.53
Critical Thinking	33	7233	Agricultural and industrial machinery mechanics and repairers	3.53
Critical Thinking	34	4110	General office clerks	3.50
Critical Thinking	35	2431	Advertising and marketing professionals	3.50
Critical Thinking	36	3131	Power production plant operators	3.45
Critical Thinking	37	3118	Draughtspersons	3.42
Critical Thinking	38	5151	Cleaners supervisors	3.39

Skill	Ranking	KBJI	Occupation title	Mean
Critical Thinking	39	3111	Chemical and physical science technicians	3.36
Critical Thinking	40	8141	Rubber products machine operators	3.33
Critical Thinking	41	8322	Car, taxi, and van drivers	3.26
Critical Thinking	42	8131	Chemical products plant and machine operators	3.25
Critical Thinking	43	7412	Electrical mechanics and fitters	3.23
Critical Thinking	44	3323	Buyers	3.16
Critical Thinking	45	9334	Shelf fillers	3.11
Critical Thinking	46	9621	Messengers, package deliverers and luggage porters	3.10
Critical Thinking	47	4120	Secretaries (general)	3.06
Critical Thinking	48	8344	Lifting truck operators	3.00
Critical Thinking	49	9214	Garden and horticultural laborer	2.93
Critical Thinking	50	9329	Manufacturing laborer not elsewhere classified	2.44
Critical Thinking	51	7318	Handicraft workers in textile, leather, and related materials	2.29
Equipment Maintenance	1	3115	Mechanical engineering technicians	4.59
Equipment Maintenance	2	8211	Mechanical machinery assemblers	4.00
Equipment Maintenance	3	3131	Power production plant operators	3.91
Equipment Maintenance	4	2512	Software developers	3.90
Equipment Maintenance	5	3123	Construction supervisors	3.89
Equipment Maintenance	6	2141	Industrial and production engineers	3.85
Equipment Maintenance	7	3257	Environmental and occupational health inspectors and associates	3.80
Equipment Maintenance	8	3513	Computer network and systems technicians	3.78
Equipment Maintenance	9	7233	Agricultural and industrial machinery mechanics and repairers	3.76
Equipment Maintenance	10	2144	Mechanical engineers	3.72
Equipment Maintenance	11	3112	Civil engineering technicians	3.69
Equipment Maintenance	12	7412	Electrical mechanics and fitters	3.69
Equipment Maintenance	13	2263	Environmental and occupational health and hygiene professionals	3.62
Equipment Maintenance	14	8322	Car, taxi, and van drivers	3.61
Equipment Maintenance	15	2149	Engineering professionals not elsewhere classified	3.57

Skill	Ranking	KBJI	Occupation title	Mean
Equipment Maintenance	16	8131	Chemical products plant and machine operators	3.56
Equipment Maintenance	17	8344	Lifting truck operators	3.56
Equipment Maintenance	18	5151	Cleaners supervisors	3.56
Equipment Maintenance	19	1323	Construction managers	3.53
Equipment Maintenance	20	2166	Graphic and multimedia designers	3.53
Equipment Maintenance	21	8141	Rubber products machine operators	3.50
Equipment Maintenance	22	3118	Draughtspersons	3.42
Equipment Maintenance	23	3111	Chemical and physical science technicians	3.36
Equipment Maintenance	24	1346	Financial and insurance services managers	3.33
Equipment Maintenance	25	4132	Data entry clerks	3.33
Equipment Maintenance	26	1221	Sales and marketing managers	3.29
Equipment Maintenance	27	2142	Civil engineers	3.20
Equipment Maintenance	28	4120	Secretaries (general)	3.19
Equipment Maintenance	29	9334	Shelf fillers	3.16
Equipment Maintenance	30	4110	General office clerks	3.15
Equipment Maintenance	31	1324	Supply, distribution, and related managers	3.15
Equipment Maintenance	32	9214	Garden and horticultural laborer	3.14
Equipment Maintenance	33	3122	Manufacturing supervisors	3.14
Equipment Maintenance	34	3341	Office supervisors	3.14
Equipment Maintenance	35	4416	Human resource clerical	3.12
Equipment Maintenance	36	9621	Messengers, package deliverers and luggage porters	3.10
Equipment Maintenance	37	4222	Contact center information clerks	3.08
Equipment Maintenance	38	3331	Clearing and forwarding agents	3.07
Equipment Maintenance	39	1219	Business services and administration managers not elsewhere classified	3.05
Equipment Maintenance	40	9329	Manufacturing laborer not elsewhere classified	3.04
Equipment Maintenance	41	5243	Traveling salesman	3.00
Equipment Maintenance	42	3323	Buyers	3.00
Equipment Maintenance	43	4214	Debt-collectors and related workers	2.86
Equipment Maintenance	44	2642	Journalists	2.85

Skill	Ranking	KBJI	Occupation title	Mean
Equipment Maintenance	45	5244	Contact center salespersons	2.77
Equipment Maintenance	46	5249	Sales workers not elsewhere classified	2.73
Equipment Maintenance	47	7318	Handicraft workers in textile, leather, and related materials	2.71
Equipment Maintenance	48	3322	Commercial sales representatives	2.70
Equipment Maintenance	49	2431	Advertising and marketing professionals	2.58
Equipment Maintenance	50	2413	Financial analysts	2.50
Equipment Maintenance	51	2161	Building architects	2.33
Equipment Selection	1	2512	Software developers	4.10
Equipment Selection	2	3115	Mechanical engineering technicians	3.94
Equipment Selection	3	8211	Mechanical machinery assemblers	3.90
Equipment Selection	4	1323	Construction managers	3.80
Equipment Selection	5	2166	Graphic and multimedia designers	3.80
Equipment Selection	6	2144	Mechanical engineers	3.78
Equipment Selection	7	2141	Industrial and production engineers	3.75
Equipment Selection	8	3257	Environmental and occupational health inspectors and associates	3.73
Equipment Selection	9	2149	Engineering professionals not elsewhere classified	3.71
Equipment Selection	10	2142	Civil engineers	3.70
Equipment Selection	11	3513	Computer network and systems technicians	3.70
Equipment Selection	12	3123	Construction supervisors	3.68
Equipment Selection	13	5151	Cleaners supervisors	3.67
Equipment Selection	14	3131	Power production plant operators	3.64
Equipment Selection	15	2263	Environmental and occupational health and hygiene professionals	3.62
Equipment Selection	16	7412	Electrical mechanics and fitters	3.62
Equipment Selection	17	3118	Draughtspersons	3.58
Equipment Selection	18	7233	Agricultural and industrial machinery mechanics and repairers	3.53
Equipment Selection	19	1346	Financial and insurance services managers	3.52
Equipment Selection	20	1221	Sales and marketing managers	3.43
Equipment Selection	21	5244	Contact center salespersons	3.38

Skill	Ranking	KBJI	Occupation title	Mean
Equipment Selection	22	3112	Civil engineering technicians	3.38
Equipment Selection	23	3122	Manufacturing supervisors	3.38
Equipment Selection	24	1324	Supply, distribution, and related managers	3.35
Equipment Selection	25	2413	Financial analysts	3.33
Equipment Selection	26	2642	Journalists	3.31
Equipment Selection	27	5243	Traveling salesman	3.29
Equipment Selection	28	4132	Data entry clerks	3.29
Equipment Selection	29	8141	Rubber products machine operators	3.25
Equipment Selection	30	8131	Chemical products plant and machine operators	3.25
Equipment Selection	31	2161	Building architects	3.25
Equipment Selection	32	3341	Office supervisors	3.23
Equipment Selection	33	3111	Chemical and physical science technicians	3.21
Equipment Selection	34	8322	Car, taxi, and van drivers	3.17
Equipment Selection	35	4110	General office clerks	3.15
Equipment Selection	36	3323	Buyers	3.11
Equipment Selection	37	4222	Contact center information clerks	3.08
Equipment Selection	38	1219	Business services and administration managers not elsewhere classified	3.05
Equipment Selection	39	4416	Human resource clerical	3.00
Equipment Selection	40	9214	Garden and horticultural laborer	2.93
Equipment Selection	41	4214	Debt-collectors and related workers	2.91
Equipment Selection	42	8344	Lifting truck operators	2.89
Equipment Selection	43	9621	Messengers, package deliverers and luggage porters	2.86
Equipment Selection	44	2431	Advertising and marketing professionals	2.84
Equipment Selection	45	4120	Secretaries (general)	2.81
Equipment Selection	46	9334	Shelf fillers	2.79
Equipment Selection	47	3331	Clearing and forwarding agents	2.73
Equipment Selection	48	5249	Sales workers not elsewhere classified	2.67
Equipment Selection	49	7318	Handicraft workers in textile, leather, and related materials	2.64
Equipment Selection	50	3322	Commercial sales representatives	2.60

Skill	Ranking	KBJI	Occupation title	Mean
Equipment Selection	51	9329	Manufacturing laborer not elsewhere classified	2.48
Installation	1	3115	Mechanical engineering technicians	4.41
Installation	2	2512	Software developers	4.30
Installation	3	3112	Civil engineering technicians	3.92
Installation	4	3513	Computer network and systems technicians	3.91
Installation	5	7412	Electrical mechanics and fitters	3.85
Installation	6	3131	Power production plant operators	3.82
Installation	7	7233	Agricultural and industrial machinery mechanics and repairers	3.76
Installation	8	2166	Graphic and multimedia designers	3.67
Installation	9	1323	Construction managers	3.67
Installation	10	2149	Engineering professionals not elsewhere classified	3.64
Installation	11	2141	Industrial and production engineers	3.60
Installation	12	2142	Civil engineers	3.60
Installation	13	8211	Mechanical machinery assemblers	3.60
Installation	14	3123	Construction supervisors	3.58
Installation	15	8141	Rubber products machine operators	3.50
Installation	16	2144	Mechanical engineers	3.44
Installation	17	3118	Draughtspersons	3.42
Installation	18	3257	Environmental and occupational health inspectors and associates	3.40
Installation	19	1346	Financial and insurance services managers	3.19
Installation	20	5151	Cleaners supervisors	3.11
Installation	21	4132	Data entry clerks	3.10
Installation	22	8322	Car, taxi, and van drivers	3.09
Installation	23	8131	Chemical products plant and machine operators	3.06
Installation	24	5243	Traveling salesman	3.00
Installation	25	1221	Sales and marketing managers	2.90
Installation	26	3341	Office supervisors	2.86
Installation	27	4120	Secretaries (general)	2.81
Installation	28	3122	Manufacturing supervisors	2.81

Skill	Ranking	KBJI	Occupation title	Mean
Installation	29	5244	Contact center salespersons	2.77
Installation	30	2263	Environmental and occupational health and hygiene professionals	2.77
Installation	31	4110	General office clerks	2.75
Installation	32	2413	Financial analysts	2.75
Installation	33	8344	Lifting truck operators	2.74
Installation	34	4214	Debt-collectors and related workers	2.73
Installation	35	1324	Supply, distribution, and related managers	2.70
Installation	36	9334	Shelf fillers	2.68
Installation	37	3331	Clearing and forwarding agents	2.67
Installation	38	1219	Business services and administration managers not elsewhere classified	2.64
Installation	39	4222	Contact center information clerks	2.54
Installation	40	9214	Garden and horticultural laborer	2.50
Installation	41	3111	Chemical and physical science technicians	2.50
Installation	42	3322	Commercial sales representatives	2.50
Installation	43	2431	Advertising and marketing professionals	2.47
Installation	44	3323	Buyers	2.47
Installation	45	5249	Sales workers not elsewhere classified	2.40
Installation	46	9621	Messengers, package deliverers and luggage porters	2.38
Installation	47	9329	Manufacturing laborer not elsewhere classified	2.36
Installation	48	4416	Human resource clerical	2.35
Installation	49	2161	Building architects	2.25
Installation	50	2642	Journalists	2.23
Installation	51	7318	Handicraft workers in textile, leather, and related materials	1.71
Instructing	1	3112	Civil engineering technicians	4.31
Instructing	2	2263	Environmental and occupational health and hygiene professionals	4.23
Instructing	3	4222	Contact center information clerks	4.15
Instructing	4	1346	Financial and insurance services managers	4.10
Instructing	5	3122	Manufacturing supervisors	4.10

Skill	Ranking	KBJI	Occupation title	Mean
Instructing	6	2149	Engineering professionals not elsewhere classified	4.07
Instructing	7	1323	Construction managers	4.07
Instructing	8	3115	Mechanical engineering technicians	4.00
Instructing	9	2144	Mechanical engineers	3.83
Instructing	10	3131	Power production plant operators	3.82
Instructing	11	1221	Sales and marketing managers	3.81
Instructing	12	2142	Civil engineers	3.80
Instructing	13	8211	Mechanical machinery assemblers	3.80
Instructing	14	2512	Software developers	3.80
Instructing	15	2141	Industrial and production engineers	3.80
Instructing	16	3123	Construction supervisors	3.79
Instructing	17	3118	Draughtspersons	3.75
Instructing	18	3257	Environmental and occupational health inspectors and associates	3.73
Instructing	19	3341	Office supervisors	3.73
Instructing	20	1324	Supply, distribution, and related managers	3.70
Instructing	21	5244	Contact center salespersons	3.69
Instructing	22	2161	Building architects	3.69
Instructing	23	8131	Chemical products plant and machine operators	3.69
Instructing	24	1219	Business services and administration managers not elsewhere classified	3.68
Instructing	25	5243	Traveling salesman	3.61
Instructing	26	2166	Graphic and multimedia designers	3.60
Instructing	27	3331	Clearing and forwarding agents	3.60
Instructing	28	4416	Human resource clerical	3.59
Instructing	29	2413	Financial analysts	3.58
Instructing	30	8141	Rubber products machine operators	3.58
Instructing	31	3513	Computer network and systems technicians	3.57
Instructing	32	7233	Agricultural and industrial machinery mechanics and repairers	3.53
Instructing	33	4110	General office clerks	3.50

Skill	Ranking	KBJI	Occupation title	Mean
Instructing	34	2431	Advertising and marketing professionals	3.42
Instructing	35	3322	Commercial sales representatives	3.40
Instructing	36	5249	Sales workers not elsewhere classified	3.40
Instructing	37	7412	Electrical mechanics and fitters	3.38
Instructing	38	4132	Data entry clerks	3.38
Instructing	39	3111	Chemical and physical science technicians	3.36
Instructing	40	3323	Buyers	3.32
Instructing	41	4120	Secretaries (general)	3.31
Instructing	42	2642	Journalists	3.31
Instructing	43	4214	Debt-collectors and related workers	3.27
Instructing	44	5151	Cleaners supervisors	3.22
Instructing	45	9334	Shelf fillers	3.11
Instructing	46	8344	Lifting truck operators	3.05
Instructing	47	7318	Handicraft workers in textile, leather, and related materials	2.93
Instructing	48	8322	Car, taxi, and van drivers	2.91
Instructing	49	9214	Garden and horticultural laborer	2.86
Instructing	50	9329	Manufacturing laborer not elsewhere classified	2.80
Instructing	51	9621	Messengers, package deliverers and luggage porters	2.76
Judgment and Decision Making	1	1323	Construction managers	4.27
Judgment and Decision Making	2	1346	Financial and insurance services managers	4.14
Judgment and Decision Making	3	2144	Mechanical engineers	3.94
Judgment and Decision Making	4	2413	Financial analysts	3.92
Judgment and Decision Making	5	3115	Mechanical engineering technicians	3.88
Judgment and Decision Making	6	4222	Contact center information clerks	3.85
Judgment and Decision Making	7	3123	Construction supervisors	3.84

Skill	Ranking	KBJI	Occupation title	Mean
Judgment and Decision Making	8	4110	General office clerks	3.80
Judgment and Decision Making	9	8211	Mechanical machinery assemblers	3.80
Judgment and Decision Making	10	2263	Environmental and occupational health and hygiene professionals	3.77
Judgment and Decision Making	11	2166	Graphic and multimedia designers	3.71
Judgment and Decision Making	12	2512	Software developers	3.70
Judgment and Decision Making	13	2141	Industrial and production engineers	3.70
Judgment and Decision Making	14	3118	Draughtspersons	3.67
Judgment and Decision Making	15	3331	Clearing and forwarding agents	3.67
Judgment and Decision Making	16	2149	Engineering professionals not elsewhere classified	3.64
Judgment and Decision Making	17	3131	Power production plant operators	3.64
Judgment and Decision Making	18	1221	Sales and marketing managers	3.62
Judgment and Decision Making	19	5244	Contact center salespersons	3.62
Judgment and Decision Making	20	3257	Environmental and occupational health inspectors and associates	3.60
Judgment and Decision Making	21	1219	Business services and administration managers not elsewhere classified	3.59
Judgment and Decision Making	22	7233	Agricultural and industrial machinery mechanics and repairers	3.59
Judgment and Decision Making	23	3341	Office supervisors	3.55
Judgment and Decision Making	24	5243	Traveling salesman	3.53
Judgment and Decision Making	25	3122	Manufacturing supervisors	3.52
Judgment and Decision Making	26	1324	Supply, distribution, and related managers	3.50
Judgment and Decision Making	27	8131	Chemical products plant and machine operators	3.50

Skill	Ranking	KBJI	Occupation title	Mean
Judgment and Decision Making	28	5249	Sales workers not elsewhere classified	3.47
Judgment and Decision Making	29	3112	Civil engineering technicians	3.46
Judgment and Decision Making	30	3513	Computer network and systems technicians	3.43
Judgment and Decision Making	31	8141	Rubber products machine operators	3.42
Judgment and Decision Making	32	2142	Civil engineers	3.40
Judgment and Decision Making	33	5151	Cleaners supervisors	3.33
Judgment and Decision Making	34	2431	Advertising and marketing professionals	3.32
Judgment and Decision Making	35	2642	Journalists	3.31
Judgment and Decision Making	36	3111	Chemical and physical science technicians	3.29
Judgment and Decision Making	37	3323	Buyers	3.28
Judgment and Decision Making	38	8322	Car, taxi, and van drivers	3.26
Judgment and Decision Making	39	7412	Electrical mechanics and fitters	3.23
Judgment and Decision Making	40	3322	Commercial sales representatives	3.20
Judgment and Decision Making	41	4214	Debt-collectors and related workers	3.14
Judgment and Decision Making	42	4120	Secretaries (general)	3.13
Judgment and Decision Making	43	4416	Human resource clerical	3.12
Judgment and Decision Making	44	4132	Data entry clerks	3.10
Judgment and Decision Making	45	8344	Lifting truck operators	2.94
Judgment and Decision Making	46	9214	Garden and horticultural laborer	2.86
Judgment and Decision Making	47	2161	Building architects	2.83

Skill	Ranking	KBJI	Occupation title	Mean
Judgment and Decision Making	48	9621	Messengers, package deliverers and luggage porters	2.67
Judgment and Decision Making	49	9334	Shelf fillers	2.63
Judgment and Decision Making	50	9329	Manufacturing laborer not elsewhere classified	2.44
Judgment and Decision Making	51	7318	Handicraft workers in textile, leather, and related materials	2.00
Learning Strategies	1	1323	Construction managers	3.87
Learning Strategies	2	2166	Graphic and multimedia designers	3.87
Learning Strategies	3	1346	Financial and insurance services managers	3.81
Learning Strategies	4	2512	Software developers	3.80
Learning Strategies	5	2144	Mechanical engineers	3.72
Learning Strategies	6	1221	Sales and marketing managers	3.71
Learning Strategies	7	4222	Contact center information clerks	3.69
Learning Strategies	8	3115	Mechanical engineering technicians	3.65
Learning Strategies	9	3131	Power production plant operators	3.64
Learning Strategies	10	2642	Journalists	3.62
Learning Strategies	11	5243	Traveling salesman	3.61
Learning Strategies	12	8211	Mechanical machinery assemblers	3.60
Learning Strategies	13	2141	Industrial and production engineers	3.60
Learning Strategies	14	2413	Financial analysts	3.58
Learning Strategies	15	2263	Environmental and occupational health and hygiene professionals	3.54
Learning Strategies	16	5244	Contact center salespersons	3.54
Learning Strategies	17	3123	Construction supervisors	3.53
Learning Strategies	18	8322	Car, taxi, and van drivers	3.52
Learning Strategies	19	2149	Engineering professionals not elsewhere classified	3.50
Learning Strategies	20	4132	Data entry clerks	3.50
Learning Strategies	21	3513	Computer network and systems technicians	3.48
Learning Strategies	22	3331	Clearing and forwarding agents	3.47
Learning Strategies	23	3112	Civil engineering technicians	3.46

Skill	Ranking	KBJI	Occupation title	Mean
Learning Strategies	24	3341	Office supervisors	3.43
Learning Strategies	25	4110	General office clerks	3.40
Learning Strategies	26	5249	Sales workers not elsewhere classified	3.40
Learning Strategies	27	7233	Agricultural and industrial machinery mechanics and repairers	3.35
Learning Strategies	28	4416	Human resource clerical	3.35
Learning Strategies	29	3118	Draughtspersons	3.33
Learning Strategies	30	3122	Manufacturing supervisors	3.33
Learning Strategies	31	1324	Supply, distribution, and related managers	3.30
Learning Strategies	32	2142	Civil engineers	3.30
Learning Strategies	33	4214	Debt-collectors and related workers	3.27
Learning Strategies	34	1219	Business services and administration managers not elsewhere classified	3.27
Learning Strategies	35	3257	Environmental and occupational health inspectors and associates	3.27
Learning Strategies	36	5151	Cleaners supervisors	3.22
Learning Strategies	37	4120	Secretaries (general)	3.19
Learning Strategies	38	8344	Lifting truck operators	3.11
Learning Strategies	39	9334	Shelf fillers	3.11
Learning Strategies	40	3322	Commercial sales representatives	3.10
Learning Strategies	41	8141	Rubber products machine operators	3.08
Learning Strategies	42	8131	Chemical products plant and machine operators	3.06
Learning Strategies	43	2431	Advertising and marketing professionals	3.05
Learning Strategies	44	3323	Buyers	3.00
Learning Strategies	45	2161	Building architects	2.85
Learning Strategies	46	9621	Messengers, package deliverers and luggage porters	2.81
Learning Strategies	47	7412	Electrical mechanics and fitters	2.77
Learning Strategies	48	3111	Chemical and physical science technicians	2.71
Learning Strategies	49	9214	Garden and horticultural laborer	2.57
Learning Strategies	50	7318	Handicraft workers in textile, leather, and related materials	2.50
Learning Strategies	51	9329	Manufacturing laborer not elsewhere classified	2.36

Skill	Ranking	KBJI	Occupation title	Mean
Management of Financial Resources	1	1323	Construction managers	4.13
Management of Financial Resources	2	1346	Financial and insurance services managers	4.00
Management of Financial Resources	3	1221	Sales and marketing managers	3.95
Management of Financial Resources	4	3123	Construction supervisors	3.95
Management of Financial Resources	5	2413	Financial analysts	3.92
Management of Financial Resources	6	2263	Environmental and occupational health and hygiene professionals	3.85
Management of Financial Resources	7	3115	Mechanical engineering technicians	3.69
Management of Financial Resources	8	3131	Power production plant operators	3.64
Management of Financial Resources	9	8211	Mechanical machinery assemblers	3.60
Management of Financial Resources	10	2512	Software developers	3.60
Management of Financial Resources	11	3257	Environmental and occupational health inspectors and associates	3.60
Management of Financial Resources	12	2166	Graphic and multimedia designers	3.57
Management of Financial Resources	13	3323	Buyers	3.56
Management of Financial Resources	14	1219	Business services and administration managers not elsewhere classified	3.55
Management of Financial Resources	15	3112	Civil engineering technicians	3.54
Management of Financial Resources	16	5244	Contact center salespersons	3.54
Management of Financial Resources	17	5249	Sales workers not elsewhere classified	3.53
Management of Financial Resources	18	3322	Commercial sales representatives	3.50
Management of Financial Resources	19	7233	Agricultural and industrial machinery mechanics and repairers	3.47
Management of Financial Resources	20	3341	Office supervisors	3.45

Skill	Ranking	KBJI	Occupation title	Mean
Management of Financial Resources	21	2141	Industrial and production engineers	3.45
Management of Financial Resources	22	4110	General office clerks	3.45
Management of Financial Resources	23	5151	Cleaners supervisors	3.44
Management of Financial Resources	24	7318	Handicraft workers in textile, leather, and related materials	3.43
Management of Financial Resources	25	1324	Supply, distribution, and related managers	3.40
Management of Financial Resources	26	4120	Secretaries (general)	3.38
Management of Financial Resources	27	4214	Debt-collectors and related workers	3.36
Management of Financial Resources	28	3118	Draughtspersons	3.33
Management of Financial Resources	29	8141	Rubber products machine operators	3.33
Management of Financial Resources	30	2142	Civil engineers	3.30
Management of Financial Resources	31	5243	Traveling salesman	3.29
Management of Financial Resources	32	3331	Clearing and forwarding agents	3.27
Management of Financial Resources	33	3513	Computer network and systems technicians	3.26
Management of Financial Resources	34	4416	Human resource clerical	3.24
Management of Financial Resources	35	2144	Mechanical engineers	3.22
Management of Financial Resources	36	2149	Engineering professionals not elsewhere classified	3.21
Management of Financial Resources	37	2431	Advertising and marketing professionals	3.16
Management of Financial Resources	38	4222	Contact center information clerks	3.08
Management of Financial Resources	39	3122	Manufacturing supervisors	2.95
Management of Financial Resources	40	2642	Journalists	2.92

Skill	Ranking	KBJI	Occupation title	Mean
Management of Financial Resources	41	8322	Car, taxi, and van drivers	2.91
Management of Financial Resources	42	9334	Shelf fillers	2.84
Management of Financial Resources	43	9214	Garden and horticultural laborer	2.79
Management of Financial Resources	44	9621	Messengers, package deliverers and luggage porters	2.76
Management of Financial Resources	45	2161	Building architects	2.67
Management of Financial Resources	46	4132	Data entry clerks	2.67
Management of Financial Resources	47	8131	Chemical products plant and machine operators	2.50
Management of Financial Resources	48	7412	Electrical mechanics and fitters	2.46
Management of Financial Resources	49	3111	Chemical and physical science technicians	2.43
Management of Financial Resources	50	8344	Lifting truck operators	2.33
Management of Financial Resources	51	9329	Manufacturing laborer not elsewhere classified	2.20
Management of Material Resources	1	3115	Mechanical engineering technicians	4.19
Management of Material Resources	2	1323	Construction managers	4.13
Management of Material Resources	3	2263	Environmental and occupational health and hygiene professionals	3.85
Management of Material Resources	4	8211	Mechanical machinery assemblers	3.80
Management of Material Resources	5	2166	Graphic and multimedia designers	3.71
Management of Material Resources	6	2141	Industrial and production engineers	3.70
Management of Material Resources	7	3123	Construction supervisors	3.68
Management of Material Resources	8	2512	Software developers	3.60
Management of Material Resources	9	2149	Engineering professionals not elsewhere classified	3.43

Skill	Ranking	KBJI	Occupation title	Mean
Management of Material Resources	10	3322	Commercial sales representatives	3.40
Management of Material Resources	11	2144	Mechanical engineers	3.39
Management of Material Resources	12	3131	Power production plant operators	3.36
Management of Material Resources	13	7233	Agricultural and industrial machinery mechanics and repairers	3.35
Management of Material Resources	14	5151	Cleaners supervisors	3.33
Management of Material Resources	15	1221	Sales and marketing managers	3.29
Management of Material Resources	16	3257	Environmental and occupational health inspectors and associates	3.27
Management of Material Resources	17	3118	Draughtspersons	3.25
Management of Material Resources	18	8141	Rubber products machine operators	3.25
Management of Material Resources	19	2413	Financial analysts	3.25
Management of Material Resources	20	2142	Civil engineers	3.20
Management of Material Resources	21	1324	Supply, distribution, and related managers	3.20
Management of Material Resources	22	1346	Financial and insurance services managers	3.19
Management of Material Resources	23	4416	Human resource clerical	3.18
Management of Material Resources	24	3513	Computer network and systems technicians	3.17
Management of Material Resources	25	3111	Chemical and physical science technicians	3.14
Management of Material Resources	26	1219	Business services and administration managers not elsewhere classified	3.14
Management of Material Resources	27	4120	Secretaries (general)	3.13
Management of Material Resources	28	4110	General office clerks	3.10
Management of Material Resources	29	5243	Traveling salesman	3.06

Skill	Ranking	KBJI	Occupation title	Mean
Management of Material Resources	30	3323	Buyers	3.06
Management of Material Resources	31	3341	Office supervisors	3.05
Management of Material Resources	32	3112	Civil engineering technicians	3.00
Management of Material Resources	33	4222	Contact center information clerks	3.00
Management of Material Resources	34	4214	Debt-collectors and related workers	2.95
Management of Material Resources	35	3122	Manufacturing supervisors	2.95
Management of Material Resources	36	5249	Sales workers not elsewhere classified	2.93
Management of Material Resources	37	3331	Clearing and forwarding agents	2.93
Management of Material Resources	38	2642	Journalists	2.92
Management of Material Resources	39	8131	Chemical products plant and machine operators	2.88
Management of Material Resources	40	9214	Garden and horticultural laborer	2.86
Management of Material Resources	41	8322	Car, taxi, and van drivers	2.83
Management of Material Resources	42	8344	Lifting truck operators	2.78
Management of Material Resources	43	5244	Contact center salespersons	2.77
Management of Material Resources	44	4132	Data entry clerks	2.76
Management of Material Resources	45	2161	Building architects	2.75
Management of Material Resources	46	2431	Advertising and marketing professionals	2.74
Management of Material Resources	47	7318	Handicraft workers in textile, leather, and related materials	2.64
Management of Material Resources	48	9334	Shelf fillers	2.53
Management of Material Resources	49	7412	Electrical mechanics and fitters	2.38

Skill	Ranking	KBJI	Occupation title	Mean
Management of Material Resources	50	9621	Messengers, package deliverers and luggage porters	2.29
Management of Material Resources	51	9329	Manufacturing laborer not elsewhere classified	2.20
Management of Personnel Resources	1	1346	Financial and insurance services managers	4.29
Management of Personnel Resources	2	1323	Construction managers	4.20
Management of Personnel Resources	3	1221	Sales and marketing managers	4.10
Management of Personnel Resources	4	2166	Graphic and multimedia designers	4.07
Management of Personnel Resources	5	2141	Industrial and production engineers	4.05
Management of Personnel Resources	6	3115	Mechanical engineering technicians	4.00
Management of Personnel Resources	7	4416	Human resource clerical	3.94
Management of Personnel Resources	8	2149	Engineering professionals not elsewhere classified	3.93
Management of Personnel Resources	9	2263	Environmental and occupational health and hygiene professionals	3.92
Management of Personnel Resources	10	3257	Environmental and occupational health inspectors and associates	3.80
Management of Personnel Resources	11	3322	Commercial sales representatives	3.80
Management of Personnel Resources	12	3123	Construction supervisors	3.79
Management of Personnel Resources	13	3112	Civil engineering technicians	3.77
Management of Personnel Resources	14	2413	Financial analysts	3.75
Management of Personnel Resources	15	3341	Office supervisors	3.73
Management of Personnel Resources	16	1219	Business services and administration managers not elsewhere classified	3.73
Management of Personnel Resources	17	8141	Rubber products machine operators	3.67
Management of Personnel Resources	18	2144	Mechanical engineers	3.61

Skill	Ranking	KBJI	Occupation title	Mean
Management of Personnel Resources	19	2512	Software developers	3.60
Management of Personnel Resources	20	4110	General office clerks	3.60
Management of Personnel Resources	21	3122	Manufacturing supervisors	3.52
Management of Personnel Resources	22	2142	Civil engineers	3.50
Management of Personnel Resources	23	8211	Mechanical machinery assemblers	3.50
Management of Personnel Resources	24	7233	Agricultural and industrial machinery mechanics and repairers	3.47
Management of Personnel Resources	25	5243	Traveling salesman	3.47
Management of Personnel Resources	26	3131	Power production plant operators	3.45
Management of Personnel Resources	27	1324	Supply, distribution, and related managers	3.45
Management of Personnel Resources	28	3513	Computer network and systems technicians	3.43
Management of Personnel Resources	29	4222	Contact center information clerks	3.38
Management of Personnel Resources	30	8131	Chemical products plant and machine operators	3.38
Management of Personnel Resources	31	5249	Sales workers not elsewhere classified	3.33
Management of Personnel Resources	32	4214	Debt-collectors and related workers	3.32
Management of Personnel Resources	33	2431	Advertising and marketing professionals	3.32
Management of Personnel Resources	34	5244	Contact center salespersons	3.31
Management of Personnel Resources	35	3118	Draughtspersons	3.25
Management of Personnel Resources	36	5151	Cleaners supervisors	3.22
Management of Personnel Resources	37	3331	Clearing and forwarding agents	3.20
Management of Personnel Resources	38	2161	Building architects	3.17

Skill	Ranking	KBJI	Occupation title	Mean
Management of Personnel Resources	39	2642	Journalists	3.15
Management of Personnel Resources	40	4132	Data entry clerks	3.14
Management of Personnel Resources	41	7318	Handicraft workers in textile, leather, and related materials	3.14
Management of Personnel Resources	42	3111	Chemical and physical science technicians	3.07
Management of Personnel Resources	43	4120	Secretaries (general)	3.06
Management of Personnel Resources	44	8322	Car, taxi, and van drivers	3.04
Management of Personnel Resources	45	3323	Buyers	3.00
Management of Personnel Resources	46	7412	Electrical mechanics and fitters	2.92
Management of Personnel Resources	47	9334	Shelf fillers	2.79
Management of Personnel Resources	48	8344	Lifting truck operators	2.78
Management of Personnel Resources	49	9214	Garden and horticultural laborer	2.71
Management of Personnel Resources	50	9621	Messengers, package deliverers and luggage porters	2.62
Management of Personnel Resources	51	9329	Manufacturing laborer not elsewhere classified	2.52
Mathematics	1	1323	Construction managers	4.13
Mathematics	2	2149	Engineering professionals not elsewhere classified	4.07
Mathematics	3	2413	Financial analysts	3.92
Mathematics	4	3118	Draughtspersons	3.92
Mathematics	5	1346	Financial and insurance services managers	3.90
Mathematics	6	3322	Commercial sales representatives	3.90
Mathematics	7	8211	Mechanical machinery assemblers	3.90
Mathematics	8	2144	Mechanical engineers	3.78
Mathematics	9	3115	Mechanical engineering technicians	3.76
Mathematics	10	2141	Industrial and production engineers	3.75

Skill	Ranking	KBJI	Occupation title	Mean
Mathematics	11	3331	Clearing and forwarding agents	3.73
Mathematics	12	3131	Power production plant operators	3.73
Mathematics	13	4214	Debt-collectors and related workers	3.73
Mathematics	14	1221	Sales and marketing managers	3.71
Mathematics	15	5249	Sales workers not elsewhere classified	3.67
Mathematics	16	3112	Civil engineering technicians	3.64
Mathematics	17	4222	Contact center information clerks	3.62
Mathematics	18	1324	Supply, distribution, and related managers	3.60
Mathematics	19	2166	Graphic and multimedia designers	3.60
Mathematics	20	5243	Traveling salesman	3.58
Mathematics	21	9334	Shelf fillers	3.58
Mathematics	22	2431	Advertising and marketing professionals	3.55
Mathematics	23	2142	Civil engineers	3.55
Mathematics	24	3257	Environmental and occupational health inspectors and associates	3.53
Mathematics	25	7233	Agricultural and industrial machinery mechanics and repairers	3.53
Mathematics	26	3323	Buyers	3.53
Mathematics	27	2512	Software developers	3.50
Mathematics	28	3341	Office supervisors	3.48
Mathematics	29	3123	Construction supervisors	3.47
Mathematics	30	2161	Building architects	3.46
Mathematics	31	8141	Rubber products machine operators	3.42
Mathematics	32	5244	Contact center salespersons	3.38
Mathematics	33	2263	Environmental and occupational health and hygiene professionals	3.38
Mathematics	34	8131	Chemical products plant and machine operators	3.35
Mathematics	35	1219	Business services and administration managers not elsewhere classified	3.32
Mathematics	36	7412	Electrical mechanics and fitters	3.31
Mathematics	37	3111	Chemical and physical science technicians	3.29
Mathematics	38	3122	Manufacturing supervisors	3.24

Skill	Ranking	KBJI	Occupation title	Mean
Mathematics	39	4132	Data entry clerks	3.18
Mathematics	40	3513	Computer network and systems technicians	3.17
Mathematics	41	8322	Car, taxi, and van drivers	3.17
Mathematics	42	9621	Messengers, package deliverers and luggage porters	3.14
Mathematics	43	4120	Secretaries (general)	3.13
Mathematics	44	4416	Human resource clerical	3.12
Mathematics	45	5151	Cleaners supervisors	3.06
Mathematics	46	8344	Lifting truck operators	3.00
Mathematics	47	4110	General office clerks	3.00
Mathematics	48	2642	Journalists	2.92
Mathematics	49	9214	Garden and horticultural laborer	2.86
Mathematics	50	9329	Manufacturing laborer not elsewhere classified	2.68
Mathematics	51	7318	Handicraft workers in textile, leather, and related materials	2.64
Monitoring	1	1323	Construction managers	4.27
Monitoring	2	2166	Graphic and multimedia designers	4.13
Monitoring	3	2263	Environmental and occupational health and hygiene professionals	4.08
Monitoring	4	1346	Financial and insurance services managers	4.05
Monitoring	5	1324	Supply, distribution, and related managers	4.00
Monitoring	6	2413	Financial analysts	4.00
Monitoring	7	2642	Journalists	4.00
Monitoring	8	2144	Mechanical engineers	3.94
Monitoring	9	4222	Contact center information clerks	3.92
Monitoring	10	3341	Office supervisors	3.91
Monitoring	11	3131	Power production plant operators	3.91
Monitoring	12	1221	Sales and marketing managers	3.90
Monitoring	13	3115	Mechanical engineering technicians	3.88
Monitoring	14	2141	Industrial and production engineers	3.85
Monitoring	15	5244	Contact center salespersons	3.85
Monitoring	16	3123	Construction supervisors	3.84

Skill	Ranking	KBJI	Occupation title	Mean
Monitoring	17	3122	Manufacturing supervisors	3.81
Monitoring	18	3513	Computer network and systems technicians	3.78
Monitoring	19	3112	Civil engineering technicians	3.77
Monitoring	20	4110	General office clerks	3.75
Monitoring	21	3257	Environmental and occupational health inspectors and associates	3.73
Monitoring	22	3331	Clearing and forwarding agents	3.73
Monitoring	23	5249	Sales workers not elsewhere classified	3.73
Monitoring	24	1219	Business services and administration managers not elsewhere classified	3.73
Monitoring	25	2149	Engineering professionals not elsewhere classified	3.71
Monitoring	26	4416	Human resource clerical	3.71
Monitoring	27	8211	Mechanical machinery assemblers	3.70
Monitoring	28	3118	Draughtspersons	3.67
Monitoring	29	5243	Traveling salesman	3.61
Monitoring	30	2512	Software developers	3.60
Monitoring	31	4132	Data entry clerks	3.57
Monitoring	32	4214	Debt-collectors and related workers	3.55
Monitoring	33	7233	Agricultural and industrial machinery mechanics and repairers	3.53
Monitoring	34	3323	Buyers	3.53
Monitoring	35	2431	Advertising and marketing professionals	3.53
Monitoring	36	3322	Commercial sales representatives	3.50
Monitoring	37	8141	Rubber products machine operators	3.50
Monitoring	38	8131	Chemical products plant and machine operators	3.50
Monitoring	39	9334	Shelf fillers	3.42
Monitoring	40	2142	Civil engineers	3.40
Monitoring	41	5151	Cleaners supervisors	3.39
Monitoring	42	4120	Secretaries (general)	3.31
Monitoring	43	8344	Lifting truck operators	3.26
Monitoring	44	2161	Building architects	3.23

Skill	Ranking	KBJI	Occupation title	Mean
Monitoring	45	8322	Car, taxi, and van drivers	3.17
Monitoring	46	7412	Electrical mechanics and fitters	3.15
Monitoring	47	3111	Chemical and physical science technicians	3.00
Monitoring	48	9214	Garden and horticultural laborer	3.00
Monitoring	49	9621	Messengers, package deliverers and luggage porters	2.95
Monitoring	50	9329	Manufacturing laborer not elsewhere classified	2.60
Monitoring	51	7318	Handicraft workers in textile, leather, and related materials	2.07
Negotiation	1	1323	Construction managers	4.33
Negotiation	2	1221	Sales and marketing managers	4.19
Negotiation	3	3323	Buyers	4.05
Negotiation	4	2166	Graphic and multimedia designers	4.00
Negotiation	5	1346	Financial and insurance services managers	3.95
Negotiation	6	3115	Mechanical engineering technicians	3.94
Negotiation	7	3322	Commercial sales representatives	3.90
Negotiation	8	3331	Clearing and forwarding agents	3.87
Negotiation	9	1219	Business services and administration managers not elsewhere classified	3.86
Negotiation	10	4222	Contact center information clerks	3.85
Negotiation	11	5249	Sales workers not elsewhere classified	3.80
Negotiation	12	5243	Traveling salesman	3.78
Negotiation	13	2263	Environmental and occupational health and hygiene professionals	3.77
Negotiation	14	8211	Mechanical machinery assemblers	3.70
Negotiation	15	3123	Construction supervisors	3.68
Negotiation	16	3341	Office supervisors	3.65
Negotiation	17	4214	Debt-collectors and related workers	3.64
Negotiation	18	2431	Advertising and marketing professionals	3.63
Negotiation	19	3112	Civil engineering technicians	3.62
Negotiation	20	2141	Industrial and production engineers	3.60
Negotiation	21	1324	Supply, distribution, and related managers	3.60

Skill	Ranking	KBJI	Occupation title	Mean
Negotiation	22	2413	Financial analysts	3.58
Negotiation	23	4110	General office clerks	3.55
Negotiation	24	3131	Power production plant operators	3.55
Negotiation	25	3257	Environmental and occupational health inspectors and associates	3.53
Negotiation	26	3118	Draughtspersons	3.50
Negotiation	27	2142	Civil engineers	3.50
Negotiation	28	5244	Contact center salespersons	3.46
Negotiation	29	2161	Building architects	3.46
Negotiation	30	2144	Mechanical engineers	3.44
Negotiation	31	4120	Secretaries (general)	3.31
Negotiation	32	3513	Computer network and systems technicians	3.30
Negotiation	33	7233	Agricultural and industrial machinery mechanics and repairers	3.29
Negotiation	34	2149	Engineering professionals not elsewhere classified	3.29
Negotiation	35	4416	Human resource clerical	3.24
Negotiation	36	2642	Journalists	3.23
Negotiation	37	8141	Rubber products machine operators	3.08
Negotiation	38	4132	Data entry clerks	3.05
Negotiation	39	5151	Cleaners supervisors	3.00
Negotiation	40	2512	Software developers	3.00
Negotiation	41	8322	Car, taxi, and van drivers	2.96
Negotiation	42	3122	Manufacturing supervisors	2.95
Negotiation	43	8344	Lifting truck operators	2.95
Negotiation	44	8131	Chemical products plant and machine operators	2.88
Negotiation	45	9214	Garden and horticultural laborer	2.86
Negotiation	46	9621	Messengers, package deliverers and luggage porters	2.76
Negotiation	47	9334	Shelf fillers	2.74
Negotiation	48	7412	Electrical mechanics and fitters	2.69
Negotiation	49	3111	Chemical and physical science technicians	2.57
Negotiation	50	9329	Manufacturing laborer not elsewhere classified	2.32

Skill	Ranking	KBJI	Occupation title	Mean
Negotiation	51	7318	Handicraft workers in textile, leather, and related materials	2.29
Operation Monitoring	1	8211	Mechanical machinery assemblers	4.10
Operation Monitoring	2	2149	Engineering professionals not elsewhere classified	4.00
Operation Monitoring	3	2144	Mechanical engineers	3.89
Operation Monitoring	4	3115	Mechanical engineering technicians	3.88
Operation Monitoring	5	2512	Software developers	3.80
Operation Monitoring	6	2141	Industrial and production engineers	3.80
Operation Monitoring	7	2263	Environmental and occupational health and hygiene professionals	3.77
Operation Monitoring	8	1323	Construction managers	3.73
Operation Monitoring	9	8131	Chemical products plant and machine operators	3.69
Operation Monitoring	10	3123	Construction supervisors	3.68
Operation Monitoring	11	2413	Financial analysts	3.67
Operation Monitoring	12	7233	Agricultural and industrial machinery mechanics and repairers	3.65
Operation Monitoring	13	7412	Electrical mechanics and fitters	3.54
Operation Monitoring	14	2166	Graphic and multimedia designers	3.53
Operation Monitoring	15	3257	Environmental and occupational health inspectors and associates	3.53
Operation Monitoring	16	8141	Rubber products machine operators	3.50
Operation Monitoring	17	3118	Draughtspersons	3.50
Operation Monitoring	18	3513	Computer network and systems technicians	3.48
Operation Monitoring	19	3122	Manufacturing supervisors	3.48
Operation Monitoring	20	1221	Sales and marketing managers	3.43
Operation Monitoring	21	2142	Civil engineers	3.40
Operation Monitoring	22	3131	Power production plant operators	3.36
Operation Monitoring	23	3111	Chemical and physical science technicians	3.36
Operation Monitoring	24	4416	Human resource clerical	3.35
Operation Monitoring	25	1346	Financial and insurance services managers	3.33
Operation Monitoring	26	1219	Business services and administration managers not elsewhere classified	3.32
Operation Monitoring	27	3112	Civil engineering technicians	3.31

Skill	Ranking	KBJI	Occupation title	Mean
Operation Monitoring	28	5243	Traveling salesman	3.18
Operation Monitoring	29	5151	Cleaners supervisors	3.17
Operation Monitoring	30	5244	Contact center salespersons	3.15
Operation Monitoring	31	3331	Clearing and forwarding agents	3.13
Operation Monitoring	32	8344	Lifting truck operators	3.11
Operation Monitoring	33	2642	Journalists	3.08
Operation Monitoring	34	3341	Office supervisors	3.05
Operation Monitoring	35	8322	Car, taxi, and van drivers	2.96
Operation Monitoring	36	1324	Supply, distribution, and related managers	2.95
Operation Monitoring	37	4120	Secretaries (general)	2.94
Operation Monitoring	38	4110	General office clerks	2.85
Operation Monitoring	39	9334	Shelf fillers	2.84
Operation Monitoring	40	4214	Debt-collectors and related workers	2.82
Operation Monitoring	41	4132	Data entry clerks	2.76
Operation Monitoring	42	3323	Buyers	2.74
Operation Monitoring	43	5249	Sales workers not elsewhere classified	2.73
Operation Monitoring	44	4222	Contact center information clerks	2.69
Operation Monitoring	45	2431	Advertising and marketing professionals	2.68
Operation Monitoring	46	9214	Garden and horticultural laborer	2.64
Operation Monitoring	47	9329	Manufacturing laborer not elsewhere classified	2.60
Operation Monitoring	48	9621	Messengers, package deliverers and luggage porters	2.52
Operation Monitoring	49	7318	Handicraft workers in textile, leather, and related materials	2.36
Operation Monitoring	50	2161	Building architects	2.33
Operation Monitoring	51	3322	Commercial sales representatives	2.30
Operation and Control	1	3115	Mechanical engineering technicians	3.94
Operation and Control	2	1323	Construction managers	3.87
Operation and Control	3	2149	Engineering professionals not elsewhere classified	3.86
Operation and Control	4	2141	Industrial and production engineers	3.80
Operation and Control	5	2144	Mechanical engineers	3.78

Skill	Ranking	KBJI	Occupation title	Mean
Operation and Control	6	2263	Environmental and occupational health and hygiene professionals	3.77
Operation and Control	7	8141	Rubber products machine operators	3.75
Operation and Control	8	3118	Draughtspersons	3.75
Operation and Control	9	2166	Graphic and multimedia designers	3.73
Operation and Control	10	3131	Power production plant operators	3.73
Operation and Control	11	2512	Software developers	3.70
Operation and Control	12	3122	Manufacturing supervisors	3.62
Operation and Control	13	8131	Chemical products plant and machine operators	3.56
Operation and Control	14	3123	Construction supervisors	3.53
Operation and Control	15	1221	Sales and marketing managers	3.52
Operation and Control	16	7412	Electrical mechanics and fitters	3.46
Operation and Control	17	5244	Contact center salespersons	3.46
Operation and Control	18	3513	Computer network and systems technicians	3.45
Operation and Control	19	1219	Business services and administration managers not elsewhere classified	3.45
Operation and Control	20	2413	Financial analysts	3.42
Operation and Control	21	7233	Agricultural and industrial machinery mechanics and repairers	3.41
Operation and Control	22	3331	Clearing and forwarding agents	3.40
Operation and Control	23	3257	Environmental and occupational health inspectors and associates	3.40
Operation and Control	24	8211	Mechanical machinery assemblers	3.40
Operation and Control	25	4222	Contact center information clerks	3.38
Operation and Control	26	1346	Financial and insurance services managers	3.38
Operation and Control	27	3341	Office supervisors	3.32
Operation and Control	28	2142	Civil engineers	3.30
Operation and Control	29	3111	Chemical and physical science technicians	3.29
Operation and Control	30	5243	Traveling salesman	3.24
Operation and Control	31	8322	Car, taxi, and van drivers	3.22
Operation and Control	32	4132	Data entry clerks	3.19
Operation and Control	33	8344	Lifting truck operators	3.17

Skill	Ranking	KBJI	Occupation title	Mean
Operation and Control	34	7318	Handicraft workers in textile, leather, and related materials	3.14
Operation and Control	35	9334	Shelf fillers	3.11
Operation and Control	36	1324	Supply, distribution, and related managers	3.10
Operation and Control	37	4110	General office clerks	3.10
Operation and Control	38	3112	Civil engineering technicians	3.08
Operation and Control	39	5249	Sales workers not elsewhere classified	3.07
Operation and Control	40	4120	Secretaries (general)	3.06
Operation and Control	41	4416	Human resource clerical	3.06
Operation and Control	42	5151	Cleaners supervisors	3.06
Operation and Control	43	9329	Manufacturing laborer not elsewhere classified	2.92
Operation and Control	44	4214	Debt-collectors and related workers	2.91
Operation and Control	45	2431	Advertising and marketing professionals	2.89
Operation and Control	46	2642	Journalists	2.85
Operation and Control	47	3322	Commercial sales representatives	2.80
Operation and Control	48	3323	Buyers	2.72
Operation and Control	49	9214	Garden and horticultural laborer	2.71
Operation and Control	50	9621	Messengers, package deliverers and luggage porters	2.48
Operation and Control	51	2161	Building architects	2.33
Operations Analysis	1	1221	Sales and marketing managers	4.05
Operations Analysis	2	1346	Financial and insurance services managers	3.95
Operations Analysis	3	1323	Construction managers	3.93
Operations Analysis	4	2263	Environmental and occupational health and hygiene professionals	3.92
Operations Analysis	5	2413	Financial analysts	3.83
Operations Analysis	6	2166	Graphic and multimedia designers	3.80
Operations Analysis	7	2512	Software developers	3.80
Operations Analysis	8	2144	Mechanical engineers	3.78
Operations Analysis	9	1219	Business services and administration managers not elsewhere classified	3.73
Operations Analysis	10	8211	Mechanical machinery assemblers	3.70
Operations Analysis	11	5244	Contact center salespersons	3.69

Skill	Ranking	KBJI	Occupation title	Mean
Operations Analysis	12	3115	Mechanical engineering technicians	3.65
Operations Analysis	13	3111	Chemical and physical science technicians	3.64
Operations Analysis	14	2141	Industrial and production engineers	3.55
Operations Analysis	15	3131	Power production plant operators	3.55
Operations Analysis	16	4222	Contact center information clerks	3.54
Operations Analysis	17	3513	Computer network and systems technicians	3.48
Operations Analysis	18	3123	Construction supervisors	3.47
Operations Analysis	19	5243	Traveling salesman	3.47
Operations Analysis	20	3331	Clearing and forwarding agents	3.47
Operations Analysis	21	3112	Civil engineering technicians	3.46
Operations Analysis	22	2149	Engineering professionals not elsewhere classified	3.43
Operations Analysis	23	8141	Rubber products machine operators	3.42
Operations Analysis	24	7233	Agricultural and industrial machinery mechanics and repairers	3.41
Operations Analysis	25	2142	Civil engineers	3.40
Operations Analysis	26	8131	Chemical products plant and machine operators	3.38
Operations Analysis	27	3118	Draughtspersons	3.33
Operations Analysis	28	3257	Environmental and occupational health inspectors and associates	3.33
Operations Analysis	29	3341	Office supervisors	3.32
Operations Analysis	30	7412	Electrical mechanics and fitters	3.31
Operations Analysis	31	4110	General office clerks	3.30
Operations Analysis	32	3122	Manufacturing supervisors	3.29
Operations Analysis	33	5249	Sales workers not elsewhere classified	3.20
Operations Analysis	34	4120	Secretaries (general)	3.19
Operations Analysis	35	4214	Debt-collectors and related workers	3.18
Operations Analysis	36	2161	Building architects	3.17
Operations Analysis	37	2431	Advertising and marketing professionals	3.16
Operations Analysis	38	2642	Journalists	3.15
Operations Analysis	39	1324	Supply, distribution, and related managers	3.15
Operations Analysis	40	3323	Buyers	3.05

Skill	Ranking	KBJI	Occupation title	Mean
Operations Analysis	41	8322	Car, taxi, and van drivers	3.00
Operations Analysis	42	5151	Cleaners supervisors	3.00
Operations Analysis	43	3322	Commercial sales representatives	3.00
Operations Analysis	44	9334	Shelf fillers	2.95
Operations Analysis	45	4416	Human resource clerical	2.94
Operations Analysis	46	4132	Data entry clerks	2.90
Operations Analysis	47	8344	Lifting truck operators	2.74
Operations Analysis	48	9621	Messengers, package deliverers and luggage porters	2.67
Operations Analysis	49	9214	Garden and horticultural laborer	2.57
Operations Analysis	50	7318	Handicraft workers in textile, leather, and related materials	2.50
Operations Analysis	51	9329	Manufacturing laborer not elsewhere classified	2.44
Persuasion	1	1346	Financial and insurance services managers	3.95
Persuasion	2	1221	Sales and marketing managers	3.90
Persuasion	3	2413	Financial analysts	3.83
Persuasion	4	1323	Construction managers	3.73
Persuasion	5	3322	Commercial sales representatives	3.70
Persuasion	6	2263	Environmental and occupational health and hygiene professionals	3.69
Persuasion	7	3341	Office supervisors	3.65
Persuasion	8	3115	Mechanical engineering technicians	3.63
Persuasion	9	3112	Civil engineering technicians	3.62
Persuasion	10	5243	Traveling salesman	3.56
Persuasion	11	4222	Contact center information clerks	3.54
Persuasion	12	1219	Business services and administration managers not elsewhere classified	3.50
Persuasion	13	4214	Debt-collectors and related workers	3.50
Persuasion	14	2431	Advertising and marketing professionals	3.47
Persuasion	15	2166	Graphic and multimedia designers	3.47
Persuasion	16	1324	Supply, distribution, and related managers	3.40
Persuasion	17	2142	Civil engineers	3.40
Persuasion	18	2642	Journalists	3.38

Skill	Ranking	KBJI	Occupation title	Mean
Persuasion	19	2149	Engineering professionals not elsewhere classified	3.36
Persuasion	20	2144	Mechanical engineers	3.33
Persuasion	21	5244	Contact center salespersons	3.31
Persuasion	22	3513	Computer network and systems technicians	3.30
Persuasion	23	2512	Software developers	3.30
Persuasion	24	3131	Power production plant operators	3.27
Persuasion	25	3257	Environmental and occupational health inspectors and associates	3.27
Persuasion	26	3123	Construction supervisors	3.26
Persuasion	27	4110	General office clerks	3.25
Persuasion	28	4416	Human resource clerical	3.24
Persuasion	29	2141	Industrial and production engineers	3.20
Persuasion	30	4120	Secretaries (general)	3.19
Persuasion	31	8131	Chemical products plant and machine operators	3.19
Persuasion	32	3122	Manufacturing supervisors	3.14
Persuasion	33	3331	Clearing and forwarding agents	3.13
Persuasion	34	7233	Agricultural and industrial machinery mechanics and repairers	3.12
Persuasion	35	8211	Mechanical machinery assemblers	3.10
Persuasion	36	3118	Draughtspersons	3.08
Persuasion	37	5249	Sales workers not elsewhere classified	3.07
Persuasion	38	4132	Data entry clerks	3.05
Persuasion	39	7412	Electrical mechanics and fitters	3.00
Persuasion	40	8322	Car, taxi, and van drivers	2.96
Persuasion	41	8344	Lifting truck operators	2.95
Persuasion	42	8141	Rubber products machine operators	2.92
Persuasion	43	3323	Buyers	2.84
Persuasion	44	2161	Building architects	2.69
Persuasion	45	9334	Shelf fillers	2.63
Persuasion	46	5151	Cleaners supervisors	2.61
Persuasion	47	3111	Chemical and physical science technicians	2.50

Skill	Ranking	KBJI	Occupation title	Mean
Persuasion	48	9621	Messengers, package deliverers and luggage porters	2.48
Persuasion	49	9214	Garden and horticultural laborer	2.43
Persuasion	50	9329	Manufacturing laborer not elsewhere classified	2.28
Persuasion	51	7318	Handicraft workers in textile, leather, and related materials	1.64
Programming	1	2512	Software developers	3.90
Programming	2	3115	Mechanical engineering technicians	3.88
Programming	3	2166	Graphic and multimedia designers	3.60
Programming	4	3131	Power production plant operators	3.55
Programming	5	8211	Mechanical machinery assemblers	3.50
Programming	6	3513	Computer network and systems technicians	3.48
Programming	7	2144	Mechanical engineers	3.44
Programming	8	3118	Draughtspersons	3.42
Programming	9	1346	Financial and insurance services managers	3.38
Programming	10	4132	Data entry clerks	3.33
Programming	11	1221	Sales and marketing managers	3.29
Programming	12	5243	Traveling salesman	3.18
Programming	13	2141	Industrial and production engineers	3.10
Programming	14	2142	Civil engineers	3.10
Programming	15	2413	Financial analysts	3.08
Programming	16	8141	Rubber products machine operators	3.00
Programming	17	4120	Secretaries (general)	3.00
Programming	18	3257	Environmental and occupational health inspectors and associates	3.00
Programming	19	1323	Construction managers	3.00
Programming	20	1219	Business services and administration managers not elsewhere classified	2.95
Programming	21	5151	Cleaners supervisors	2.94
Programming	22	7233	Agricultural and industrial machinery mechanics and repairers	2.94
Programming	23	4416	Human resource clerical	2.94
Programming	24	3331	Clearing and forwarding agents	2.93

Skill	Ranking	KBJI	Occupation title	Mean
Programming	25	2149	Engineering professionals not elsewhere classified	2.93
Programming	26	2263	Environmental and occupational health and hygiene professionals	2.92
Programming	27	4214	Debt-collectors and related workers	2.86
Programming	28	3112	Civil engineering technicians	2.85
Programming	29	4222	Contact center information clerks	2.85
Programming	30	3123	Construction supervisors	2.84
Programming	31	2431	Advertising and marketing professionals	2.79
Programming	32	7412	Electrical mechanics and fitters	2.77
Programming	33	5244	Contact center salespersons	2.77
Programming	34	5249	Sales workers not elsewhere classified	2.73
Programming	35	4110	General office clerks	2.70
Programming	36	3341	Office supervisors	2.64
Programming	37	3323	Buyers	2.63
Programming	38	3122	Manufacturing supervisors	2.52
Programming	39	8322	Car, taxi, and van drivers	2.52
Programming	40	8131	Chemical products plant and machine operators	2.50
Programming	41	8344	Lifting truck operators	2.47
Programming	42	1324	Supply, distribution, and related managers	2.40
Programming	43	9334	Shelf fillers	2.37
Programming	44	3322	Commercial sales representatives	2.30
Programming	45	9329	Manufacturing laborer not elsewhere classified	2.24
Programming	46	9621	Messengers, package deliverers and luggage porters	2.24
Programming	47	9214	Garden and horticultural laborer	2.21
Programming	48	2642	Journalists	2.15
Programming	49	7318	Handicraft workers in textile, leather, and related materials	2.14
Programming	50	2161	Building architects	2.08
Programming	51	3111	Chemical and physical science technicians	1.93
Quality Control Analysis	1	2149	Engineering professionals not elsewhere classified	4.21
Quality Control Analysis	2	8211	Mechanical machinery assemblers	4.20

Skill	Ranking	KBJI	Occupation title	Mean
Quality Control Analysis	3	1323	Construction managers	4.07
Quality Control Analysis	4	3111	Chemical and physical science technicians	3.93
Quality Control Analysis	5	2512	Software developers	3.90
Quality Control Analysis	6	3115	Mechanical engineering technicians	3.88
Quality Control Analysis	7	2141	Industrial and production engineers	3.80
Quality Control Analysis	8	2263	Environmental and occupational health and hygiene professionals	3.77
Quality Control Analysis	9	3112	Civil engineering technicians	3.77
Quality Control Analysis	10	1221	Sales and marketing managers	3.76
Quality Control Analysis	11	8131	Chemical products plant and machine operators	3.75
Quality Control Analysis	12	3513	Computer network and systems technicians	3.74
Quality Control Analysis	13	7233	Agricultural and industrial machinery mechanics and repairers	3.71
Quality Control Analysis	14	3118	Draughtspersons	3.67
Quality Control Analysis	15	1346	Financial and insurance services managers	3.67
Quality Control Analysis	16	7318	Handicraft workers in textile, leather, and related materials	3.64
Quality Control Analysis	17	3122	Manufacturing supervisors	3.62
Quality Control Analysis	18	5244	Contact center salespersons	3.62
Quality Control Analysis	19	2642	Journalists	3.62
Quality Control Analysis	20	2144	Mechanical engineers	3.61
Quality Control Analysis	21	2166	Graphic and multimedia designers	3.60
Quality Control Analysis	22	3123	Construction supervisors	3.53
Quality Control Analysis	23	2142	Civil engineers	3.50
Quality Control Analysis	24	2413	Financial analysts	3.50
Quality Control Analysis	25	8141	Rubber products machine operators	3.50
Quality Control Analysis	26	4416	Human resource clerical	3.47
Quality Control Analysis	27	3257	Environmental and occupational health inspectors and associates	3.47
Quality Control Analysis	28	3131	Power production plant operators	3.45
Quality Control Analysis	29	1219	Business services and administration managers not elsewhere classified	3.45
Quality Control Analysis	30	4110	General office clerks	3.45

Skill	Ranking	KBJI	Occupation title	Mean
Quality Control Analysis	31	3341	Office supervisors	3.41
Quality Control Analysis	32	5243	Traveling salesman	3.35
Quality Control Analysis	33	1324	Supply, distribution, and related managers	3.35
Quality Control Analysis	34	5249	Sales workers not elsewhere classified	3.33
Quality Control Analysis	35	4222	Contact center information clerks	3.31
Quality Control Analysis	36	7412	Electrical mechanics and fitters	3.31
Quality Control Analysis	37	5151	Cleaners supervisors	3.17
Quality Control Analysis	38	4132	Data entry clerks	3.14
Quality Control Analysis	39	8322	Car, taxi, and van drivers	3.09
Quality Control Analysis	40	3331	Clearing and forwarding agents	3.07
Quality Control Analysis	41	4120	Secretaries (general)	3.06
Quality Control Analysis	42	9334	Shelf fillers	3.05
Quality Control Analysis	43	2431	Advertising and marketing professionals	3.00
Quality Control Analysis	44	3323	Buyers	3.00
Quality Control Analysis	45	9214	Garden and horticultural laborer	3.00
Quality Control Analysis	46	9329	Manufacturing laborer not elsewhere classified	3.00
Quality Control Analysis	47	4214	Debt-collectors and related workers	3.00
Quality Control Analysis	48	8344	Lifting truck operators	2.94
Quality Control Analysis	49	2161	Building architects	2.92
Quality Control Analysis	50	3322	Commercial sales representatives	2.90
Quality Control Analysis	51	9621	Messengers, package deliverers and luggage porters	2.43
Reading Comprehension	1	2642	Journalists	4.77
Reading Comprehension	2	2161	Building architects	4.46
Reading Comprehension	3	2149	Engineering professionals not elsewhere classified	4.43
Reading Comprehension	4	8211	Mechanical machinery assemblers	4.40
Reading Comprehension	5	3331	Clearing and forwarding agents	4.33
Reading Comprehension	6	5244	Contact center salespersons	4.31
Reading Comprehension	7	3513	Computer network and systems technicians	4.26
Reading Comprehension	8	2144	Mechanical engineers	4.22

Skill	Ranking	KBJI	Occupation title	Mean
Reading Comprehension	9	3341	Office supervisors	4.22
Reading Comprehension	10	2166	Graphic and multimedia designers	4.20
Reading Comprehension	11	4132	Data entry clerks	4.18
Reading Comprehension	12	1346	Financial and insurance services managers	4.14
Reading Comprehension	13	3112	Civil engineering technicians	4.14
Reading Comprehension	14	3115	Mechanical engineering technicians	4.12
Reading Comprehension	15	4416	Human resource clerical	4.12
Reading Comprehension	16	2512	Software developers	4.10
Reading Comprehension	17	3131	Power production plant operators	4.09
Reading Comprehension	18	2413	Financial analysts	4.08
Reading Comprehension	19	2263	Environmental and occupational health and hygiene professionals	4.08
Reading Comprehension	20	7233	Agricultural and industrial machinery mechanics and repairers	4.06
Reading Comprehension	21	5243	Traveling salesman	4.05
Reading Comprehension	22	3118	Draughtspersons	4.00
Reading Comprehension	23	9334	Shelf fillers	4.00
Reading Comprehension	24	1221	Sales and marketing managers	4.00
Reading Comprehension	25	3123	Construction supervisors	4.00
Reading Comprehension	26	4222	Contact center information clerks	4.00
Reading Comprehension	27	2141	Industrial and production engineers	3.95
Reading Comprehension	28	1324	Supply, distribution, and related managers	3.95
Reading Comprehension	29	4110	General office clerks	3.95
Reading Comprehension	30	5151	Cleaners supervisors	3.94
Reading Comprehension	31	3322	Commercial sales representatives	3.90
Reading Comprehension	32	2431	Advertising and marketing professionals	3.90
Reading Comprehension	33	3323	Buyers	3.89
Reading Comprehension	34	8131	Chemical products plant and machine operators	3.88
Reading Comprehension	35	1323	Construction managers	3.87
Reading Comprehension	36	9621	Messengers, package deliverers and luggage porters	3.86
Reading Comprehension	37	8141	Rubber products machine operators	3.83

Skill	Ranking	KBJI	Occupation title	Mean
Reading Comprehension	38	4214	Debt-collectors and related workers	3.82
Reading Comprehension	39	1219	Business services and administration managers not elsewhere classified	3.82
Reading Comprehension	40	3257	Environmental and occupational health inspectors and associates	3.80
Reading Comprehension	41	7412	Electrical mechanics and fitters	3.77
Reading Comprehension	42	8322	Car, taxi, and van drivers	3.75
Reading Comprehension	43	3122	Manufacturing supervisors	3.67
Reading Comprehension	44	5249	Sales workers not elsewhere classified	3.67
Reading Comprehension	45	2142	Civil engineers	3.64
Reading Comprehension	46	4120	Secretaries (general)	3.63
Reading Comprehension	47	3111	Chemical and physical science technicians	3.57
Reading Comprehension	48	8344	Lifting truck operators	3.55
Reading Comprehension	49	9214	Garden and horticultural laborer	3.13
Reading Comprehension	50	9329	Manufacturing laborer not elsewhere classified	3.04
Reading Comprehension	51	7318	Handicraft workers in textile, leather, and related materials	2.64
Repairing	1	2512	Software developers	4.20
Repairing	2	3115	Mechanical engineering technicians	4.06
Repairing	3	2144	Mechanical engineers	3.83
Repairing	4	7233	Agricultural and industrial machinery mechanics and repairers	3.82
Repairing	5	7412	Electrical mechanics and fitters	3.77
Repairing	6	3131	Power production plant operators	3.73
Repairing	7	3112	Civil engineering technicians	3.54
Repairing	8	3257	Environmental and occupational health inspectors and associates	3.53
Repairing	9	3118	Draughtspersons	3.50
Repairing	10	2141	Industrial and production engineers	3.50
Repairing	11	3513	Computer network and systems technicians	3.48
Repairing	12	3123	Construction supervisors	3.42
Repairing	13	8322	Car, taxi, and van drivers	3.39
Repairing	14	8211	Mechanical machinery assemblers	3.30

Skill	Ranking	KBJI	Occupation title	Mean
Repairing	15	8141	Rubber products machine operators	3.25
Repairing	16	1323	Construction managers	3.20
Repairing	17	5151	Cleaners supervisors	3.17
Repairing	18	2166	Graphic and multimedia designers	3.14
Repairing	19	2149	Engineering professionals not elsewhere classified	3.07
Repairing	20	2263	Environmental and occupational health and hygiene professionals	3.00
Repairing	21	8131	Chemical products plant and machine operators	3.00
Repairing	22	1346	Financial and insurance services managers	3.00
Repairing	23	5243	Traveling salesman	2.94
Repairing	24	9214	Garden and horticultural laborer	2.93
Repairing	25	2142	Civil engineers	2.90
Repairing	26	8344	Lifting truck operators	2.89
Repairing	27	1221	Sales and marketing managers	2.86
Repairing	28	3331	Clearing and forwarding agents	2.80
Repairing	29	4416	Human resource clerical	2.76
Repairing	30	3322	Commercial sales representatives	2.70
Repairing	31	4110	General office clerks	2.65
Repairing	32	9329	Manufacturing laborer not elsewhere classified	2.64
Repairing	33	4214	Debt-collectors and related workers	2.59
Repairing	34	3341	Office supervisors	2.59
Repairing	35	4120	Secretaries (general)	2.56
Repairing	36	1219	Business services and administration managers not elsewhere classified	2.55
Repairing	37	4222	Contact center information clerks	2.54
Repairing	38	3122	Manufacturing supervisors	2.48
Repairing	39	4132	Data entry clerks	2.48
Repairing	40	9334	Shelf fillers	2.42
Repairing	41	1324	Supply, distribution, and related managers	2.40
Repairing	42	3323	Buyers	2.39

Skill	Ranking	KBJI	Occupation title	Mean
Repairing	43	9621	Messengers, package deliverers and luggage porters	2.33
Repairing	44	5249	Sales workers not elsewhere classified	2.33
Repairing	45	2413	Financial analysts	2.33
Repairing	46	5244	Contact center salespersons	2.31
Repairing	47	3111	Chemical and physical science technicians	2.21
Repairing	48	2431	Advertising and marketing professionals	2.21
Repairing	49	2642	Journalists	2.00
Repairing	50	7318	Handicraft workers in textile, leather, and related materials	1.86
Repairing	51	2161	Building architects	1.83
Science	1	1323	Construction managers	3.73
Science	2	2144	Mechanical engineers	3.67
Science	3	2263	Environmental and occupational health and hygiene professionals	3.62
Science	4	2141	Industrial and production engineers	3.60
Science	5	4222	Contact center information clerks	3.54
Science	6	3115	Mechanical engineering technicians	3.53
Science	7	3257	Environmental and occupational health inspectors and associates	3.47
Science	8	2642	Journalists	3.46
Science	9	2149	Engineering professionals not elsewhere classified	3.43
Science	10	1346	Financial and insurance services managers	3.43
Science	11	3111	Chemical and physical science technicians	3.43
Science	12	2166	Graphic and multimedia designers	3.40
Science	13	1221	Sales and marketing managers	3.38
Science	14	2413	Financial analysts	3.33
Science	15	2512	Software developers	3.30
Science	16	2142	Civil engineers	3.30
Science	17	8131	Chemical products plant and machine operators	3.29
Science	18	3118	Draughtspersons	3.25
Science	19	2161	Building architects	3.15

Skill	Ranking	KBJI	Occupation title	Mean
Science	20	3513	Computer network and systems technicians	3.13
Science	21	3123	Construction supervisors	3.11
Science	22	8211	Mechanical machinery assemblers	3.10
Science	23	2431	Advertising and marketing professionals	3.10
Science	24	3131	Power production plant operators	3.09
Science	25	7233	Agricultural and industrial machinery mechanics and repairers	3.06
Science	26	3112	Civil engineering technicians	3.00
Science	27	5243	Traveling salesman	3.00
Science	28	4110	General office clerks	3.00
Science	29	3122	Manufacturing supervisors	2.95
Science	30	8141	Rubber products machine operators	2.92
Science	31	4214	Debt-collectors and related workers	2.91
Science	32	3341	Office supervisors	2.87
Science	33	5249	Sales workers not elsewhere classified	2.87
Science	34	4416	Human resource clerical	2.82
Science	35	4132	Data entry clerks	2.82
Science	36	1219	Business services and administration managers not elsewhere classified	2.82
Science	37	3331	Clearing and forwarding agents	2.80
Science	38	5244	Contact center salespersons	2.77
Science	39	8322	Car, taxi, and van drivers	2.75
Science	40	5151	Cleaners supervisors	2.72
Science	41	3322	Commercial sales representatives	2.70
Science	42	4120	Secretaries (general)	2.63
Science	43	8344	Lifting truck operators	2.55
Science	44	7412	Electrical mechanics and fitters	2.54
Science	45	3323	Buyers	2.53
Science	46	1324	Supply, distribution, and related managers	2.45
Science	47	9621	Messengers, package deliverers and luggage porters	2.38
Science	48	9214	Garden and horticultural laborer	2.29

Skill	Ranking	KBJI	Occupation title	Mean
Science	49	9334	Shelf fillers	2.21
Science	50	9329	Manufacturing laborer not elsewhere classified	2.04
Science	51	7318	Handicraft workers in textile, leather, and related materials	1.57
Service Orientation	1	1346	Financial and insurance services managers	3.95
Service Orientation	2	5249	Sales workers not elsewhere classified	3.93
Service Orientation	3	5243	Traveling salesman	3.89
Service Orientation	4	1323	Construction managers	3.87
Service Orientation	5	1221	Sales and marketing managers	3.86
Service Orientation	6	3322	Commercial sales representatives	3.80
Service Orientation	7	5244	Contact center salespersons	3.77
Service Orientation	8	2263	Environmental and occupational health and hygiene professionals	3.77
Service Orientation	9	2166	Graphic and multimedia designers	3.73
Service Orientation	10	2141	Industrial and production engineers	3.70
Service Orientation	11	2512	Software developers	3.70
Service Orientation	12	3112	Civil engineering technicians	3.69
Service Orientation	13	4222	Contact center information clerks	3.62
Service Orientation	14	8211	Mechanical machinery assemblers	3.60
Service Orientation	15	1324	Supply, distribution, and related managers	3.60
Service Orientation	16	3341	Office supervisors	3.59
Service Orientation	17	3115	Mechanical engineering technicians	3.56
Service Orientation	18	2144	Mechanical engineers	3.56
Service Orientation	19	3131	Power production plant operators	3.55
Service Orientation	20	2642	Journalists	3.54
Service Orientation	21	3513	Computer network and systems technicians	3.52
Service Orientation	22	1219	Business services and administration managers not elsewhere classified	3.50
Service Orientation	23	4416	Human resource clerical	3.47
Service Orientation	24	4110	General office clerks	3.45
Service Orientation	25	5151	Cleaners supervisors	3.44

Skill	Ranking	KBJI	Occupation title	Mean
Service Orientation	26	8322	Car, taxi, and van drivers	3.43
Service Orientation	27	2431	Advertising and marketing professionals	3.42
Service Orientation	28	3118	Draughtspersons	3.42
Service Orientation	29	3331	Clearing and forwarding agents	3.40
Service Orientation	30	9621	Messengers, package deliverers and luggage porters	3.38
Service Orientation	31	8344	Lifting truck operators	3.37
Service Orientation	32	3123	Construction supervisors	3.37
Service Orientation	33	2149	Engineering professionals not elsewhere classified	3.36
Service Orientation	34	7233	Agricultural and industrial machinery mechanics and repairers	3.35
Service Orientation	35	2413	Financial analysts	3.33
Service Orientation	36	2142	Civil engineers	3.30
Service Orientation	37	9214	Garden and horticultural laborer	3.29
Service Orientation	38	4214	Debt-collectors and related workers	3.23
Service Orientation	39	4120	Secretaries (general)	3.19
Service Orientation	40	8141	Rubber products machine operators	3.17
Service Orientation	41	7412	Electrical mechanics and fitters	3.15
Service Orientation	42	4132	Data entry clerks	3.10
Service Orientation	43	3257	Environmental and occupational health inspectors and associates	3.07
Service Orientation	44	8131	Chemical products plant and machine operators	3.06
Service Orientation	45	2161	Building architects	3.00
Service Orientation	46	3323	Buyers	3.00
Service Orientation	47	3122	Manufacturing supervisors	2.95
Service Orientation	48	3111	Chemical and physical science technicians	2.86
Service Orientation	49	9334	Shelf fillers	2.84
Service Orientation	50	9329	Manufacturing laborer not elsewhere classified	2.64
Service Orientation	51	7318	Handicraft workers in textile, leather, and related materials	1.93
Social Perceptiveness	1	1346	Financial and insurance services managers	3.81
Social Perceptiveness	2	3341	Office supervisors	3.74
Social Perceptiveness	3	2642	Journalists	3.69

Skill	Ranking	KBJI	Occupation title	Mean
Social Perceptiveness	4	4222	Contact center information clerks	3.69
Social Perceptiveness	5	1323	Construction managers	3.67
Social Perceptiveness	6	1221	Sales and marketing managers	3.57
Social Perceptiveness	7	2144	Mechanical engineers	3.56
Social Perceptiveness	8	2166	Graphic and multimedia designers	3.53
Social Perceptiveness	9	3118	Draughtspersons	3.50
Social Perceptiveness	10	2141	Industrial and production engineers	3.50
Social Perceptiveness	11	4416	Human resource clerical	3.47
Social Perceptiveness	12	5249	Sales workers not elsewhere classified	3.47
Social Perceptiveness	13	5244	Contact center salespersons	3.46
Social Perceptiveness	14	2512	Software developers	3.40
Social Perceptiveness	15	3123	Construction supervisors	3.37
Social Perceptiveness	16	3513	Computer network and systems technicians	3.35
Social Perceptiveness	17	2413	Financial analysts	3.33
Social Perceptiveness	18	5243	Traveling salesman	3.33
Social Perceptiveness	19	2431	Advertising and marketing professionals	3.32
Social Perceptiveness	20	2263	Environmental and occupational health and hygiene professionals	3.31
Social Perceptiveness	21	3322	Commercial sales representatives	3.30
Social Perceptiveness	22	4110	General office clerks	3.30
Social Perceptiveness	23	8211	Mechanical machinery assemblers	3.30
Social Perceptiveness	24	4214	Debt-collectors and related workers	3.27
Social Perceptiveness	25	1219	Business services and administration managers not elsewhere classified	3.27
Social Perceptiveness	26	4132	Data entry clerks	3.24
Social Perceptiveness	27	2149	Engineering professionals not elsewhere classified	3.21
Social Perceptiveness	28	1324	Supply, distribution, and related managers	3.20
Social Perceptiveness	29	3331	Clearing and forwarding agents	3.20
Social Perceptiveness	30	2142	Civil engineers	3.20
Social Perceptiveness	31	4120	Secretaries (general)	3.19

Skill	Ranking	KBJI	Occupation title	Mean
Social Perceptiveness	32	3131	Power production plant operators	3.18
Social Perceptiveness	33	3115	Mechanical engineering technicians	3.18
Social Perceptiveness	34	3257	Environmental and occupational health inspectors and associates	3.13
Social Perceptiveness	35	5151	Cleaners supervisors	3.11
Social Perceptiveness	36	7233	Agricultural and industrial machinery mechanics and repairers	3.06
Social Perceptiveness	37	3323	Buyers	3.05
Social Perceptiveness	38	3122	Manufacturing supervisors	3.05
Social Perceptiveness	39	8322	Car, taxi, and van drivers	3.04
Social Perceptiveness	40	3112	Civil engineering technicians	3.00
Social Perceptiveness	41	8141	Rubber products machine operators	3.00
Social Perceptiveness	42	9621	Messengers, package deliverers and luggage porters	2.95
Social Perceptiveness	43	9334	Shelf fillers	2.95
Social Perceptiveness	44	8131	Chemical products plant and machine operators	2.94
Social Perceptiveness	45	8344	Lifting truck operators	2.79
Social Perceptiveness	46	9214	Garden and horticultural laborer	2.79
Social Perceptiveness	47	3111	Chemical and physical science technicians	2.57
Social Perceptiveness	48	7412	Electrical mechanics and fitters	2.54
Social Perceptiveness	49	2161	Building architects	2.46
Social Perceptiveness	50	7318	Handicraft workers in textile, leather, and related materials	2.43
Social Perceptiveness	51	9329	Manufacturing laborer not elsewhere classified	2.32
Speaking	1	4222	Contact center information clerks	4.62
Speaking	2	1221	Sales and marketing managers	4.48
Speaking	3	1219	Business services and administration managers not elsewhere classified	4.36
Speaking	4	1346	Financial and insurance services managers	4.33
Speaking	5	5243	Traveling salesman	4.26
Speaking	6	5249	Sales workers not elsewhere classified	4.20
Speaking	7	3341	Office supervisors	4.17
Speaking	8	1323	Construction managers	4.13

Skill	Ranking	KBJI	Occupation title	Mean
Speaking	9	3115	Mechanical engineering technicians	4.12
Speaking	10	3322	Commercial sales representatives	4.10
Speaking	11	2642	Journalists	4.08
Speaking	12	3112	Civil engineering technicians	4.07
Speaking	13	2166	Graphic and multimedia designers	4.07
Speaking	14	2413	Financial analysts	4.00
Speaking	15	2263	Environmental and occupational health and hygiene professionals	4.00
Speaking	16	2431	Advertising and marketing professionals	3.95
Speaking	17	4416	Human resource clerical	3.94
Speaking	18	3331	Clearing and forwarding agents	3.93
Speaking	19	2149	Engineering professionals not elsewhere classified	3.93
Speaking	20	2512	Software developers	3.90
Speaking	21	2144	Mechanical engineers	3.83
Speaking	22	4132	Data entry clerks	3.82
Speaking	23	4214	Debt-collectors and related workers	3.82
Speaking	24	3122	Manufacturing supervisors	3.81
Speaking	25	3257	Environmental and occupational health inspectors and associates	3.80
Speaking	26	8211	Mechanical machinery assemblers	3.80
Speaking	27	5244	Contact center salespersons	3.77
Speaking	28	4110	General office clerks	3.75
Speaking	29	8322	Car, taxi, and van drivers	3.75
Speaking	30	3513	Computer network and systems technicians	3.74
Speaking	31	3323	Buyers	3.74
Speaking	32	3123	Construction supervisors	3.74
Speaking	33	5151	Cleaners supervisors	3.72
Speaking	34	1324	Supply, distribution, and related managers	3.65
Speaking	35	3118	Draughtspersons	3.58
Speaking	36	8344	Lifting truck operators	3.55

Skill	Ranking	KBJI	Occupation title	Mean
Speaking	37	2142	Civil engineers	3.55
Speaking	38	2161	Building architects	3.54
Speaking	39	2141	Industrial and production engineers	3.50
Speaking	40	9621	Messengers, package deliverers and luggage porters	3.48
Speaking	41	3131	Power production plant operators	3.45
Speaking	42	8141	Rubber products machine operators	3.42
Speaking	43	8131	Chemical products plant and machine operators	3.41
Speaking	44	4120	Secretaries (general)	3.38
Speaking	45	9334	Shelf fillers	3.37
Speaking	46	7412	Electrical mechanics and fitters	3.31
Speaking	47	9214	Garden and horticultural laborer	3.29
Speaking	48	3111	Chemical and physical science technicians	3.21
Speaking	49	7233	Agricultural and industrial machinery mechanics and repairers	3.18
Speaking	50	9329	Manufacturing laborer not elsewhere classified	2.80
Speaking	51	7318	Handicraft workers in textile, leather, and related materials	2.50
Systems Analysis	1	2512	Software developers	4.10
Systems Analysis	2	3115	Mechanical engineering technicians	3.94
Systems Analysis	3	3131	Power production plant operators	3.91
Systems Analysis	4	2144	Mechanical engineers	3.89
Systems Analysis	5	2166	Graphic and multimedia designers	3.86
Systems Analysis	6	1323	Construction managers	3.80
Systems Analysis	7	2263	Environmental and occupational health and hygiene professionals	3.77
Systems Analysis	8	2141	Industrial and production engineers	3.70
Systems Analysis	9	2149	Engineering professionals not elsewhere classified	3.64
Systems Analysis	10	3257	Environmental and occupational health inspectors and associates	3.60
Systems Analysis	11	4222	Contact center information clerks	3.54
Systems Analysis	12	2413	Financial analysts	3.50
Systems Analysis	13	3513	Computer network and systems technicians	3.48

Skill	Ranking	KBJI	Occupation title	Mean
Systems Analysis	14	1346	Financial and insurance services managers	3.48
Systems Analysis	15	3123	Construction supervisors	3.42
Systems Analysis	16	8141	Rubber products machine operators	3.42
Systems Analysis	17	8211	Mechanical machinery assemblers	3.40
Systems Analysis	18	7412	Electrical mechanics and fitters	3.38
Systems Analysis	19	7233	Agricultural and industrial machinery mechanics and repairers	3.35
Systems Analysis	20	5243	Traveling salesman	3.35
Systems Analysis	21	3118	Draughtspersons	3.33
Systems Analysis	22	5151	Cleaners supervisors	3.28
Systems Analysis	23	1219	Business services and administration managers not elsewhere classified	3.27
Systems Analysis	24	8131	Chemical products plant and machine operators	3.25
Systems Analysis	25	1221	Sales and marketing managers	3.24
Systems Analysis	26	4416	Human resource clerical	3.24
Systems Analysis	27	3122	Manufacturing supervisors	3.19
Systems Analysis	28	2142	Civil engineers	3.10
Systems Analysis	29	5244	Contact center salespersons	3.08
Systems Analysis	30	4110	General office clerks	3.05
Systems Analysis	31	4132	Data entry clerks	3.05
Systems Analysis	32	3341	Office supervisors	3.05
Systems Analysis	33	8322	Car, taxi, and van drivers	3.00
Systems Analysis	34	2431	Advertising and marketing professionals	3.00
Systems Analysis	35	1324	Supply, distribution, and related managers	2.95
Systems Analysis	36	3331	Clearing and forwarding agents	2.93
Systems Analysis	37	2642	Journalists	2.92
Systems Analysis	38	3112	Civil engineering technicians	2.92
Systems Analysis	39	4214	Debt-collectors and related workers	2.91
Systems Analysis	40	3111	Chemical and physical science technicians	2.86
Systems Analysis	41	3323	Buyers	2.83
Systems Analysis	42	2161	Building architects	2.75

Skill	Ranking	KBJI	Occupation title	Mean
Systems Analysis	43	4120	Secretaries (general)	2.69
Systems Analysis	44	5249	Sales workers not elsewhere classified	2.67
Systems Analysis	45	9334	Shelf fillers	2.63
Systems Analysis	46	8344	Lifting truck operators	2.61
Systems Analysis	47	3322	Commercial sales representatives	2.60
Systems Analysis	48	9214	Garden and horticultural laborer	2.57
Systems Analysis	49	9329	Manufacturing laborer not elsewhere classified	2.40
Systems Analysis	50	7318	Handicraft workers in textile, leather, and related materials	2.29
Systems Analysis	51	9621	Messengers, package deliverers and luggage porters	2.24
Systems Evaluation	1	1323	Construction managers	3.93
Systems Evaluation	2	2512	Software developers	3.90
Systems Evaluation	3	2166	Graphic and multimedia designers	3.79
Systems Evaluation	4	2263	Environmental and occupational health and hygiene professionals	3.77
Systems Evaluation	5	1346	Financial and insurance services managers	3.71
Systems Evaluation	6	3115	Mechanical engineering technicians	3.71
Systems Evaluation	7	2144	Mechanical engineers	3.67
Systems Evaluation	8	3131	Power production plant operators	3.64
Systems Evaluation	9	4222	Contact center information clerks	3.62
Systems Evaluation	10	3513	Computer network and systems technicians	3.61
Systems Evaluation	11	8141	Rubber products machine operators	3.58
Systems Evaluation	12	2141	Industrial and production engineers	3.55
Systems Evaluation	13	1219	Business services and administration managers not elsewhere classified	3.50
Systems Evaluation	14	8211	Mechanical machinery assemblers	3.50
Systems Evaluation	15	3123	Construction supervisors	3.47
Systems Evaluation	16	3257	Environmental and occupational health inspectors and associates	3.47
Systems Evaluation	17	3112	Civil engineering technicians	3.46
Systems Evaluation	18	3118	Draughtspersons	3.42
Systems Evaluation	19	5244	Contact center salespersons	3.38

Skill	Ranking	KBJI	Occupation title	Mean
Systems Evaluation	20	2642	Journalists	3.38
Systems Evaluation	21	1221	Sales and marketing managers	3.38
Systems Evaluation	22	3111	Chemical and physical science technicians	3.36
Systems Evaluation	23	5243	Traveling salesman	3.35
Systems Evaluation	24	7233	Agricultural and industrial machinery mechanics and repairers	3.35
Systems Evaluation	25	4110	General office clerks	3.35
Systems Evaluation	26	2413	Financial analysts	3.33
Systems Evaluation	27	2431	Advertising and marketing professionals	3.32
Systems Evaluation	28	3341	Office supervisors	3.27
Systems Evaluation	29	1324	Supply, distribution, and related managers	3.25
Systems Evaluation	30	4416	Human resource clerical	3.24
Systems Evaluation	31	5151	Cleaners supervisors	3.22
Systems Evaluation	32	2149	Engineering professionals not elsewhere classified	3.21
Systems Evaluation	33	3122	Manufacturing supervisors	3.19
Systems Evaluation	34	8131	Chemical products plant and machine operators	3.19
Systems Evaluation	35	2142	Civil engineers	3.10
Systems Evaluation	36	4132	Data entry clerks	3.10
Systems Evaluation	37	3323	Buyers	3.06
Systems Evaluation	38	7412	Electrical mechanics and fitters	3.00
Systems Evaluation	39	4214	Debt-collectors and related workers	3.00
Systems Evaluation	40	3331	Clearing and forwarding agents	2.93
Systems Evaluation	41	2161	Building architects	2.92
Systems Evaluation	42	3322	Commercial sales representatives	2.90
Systems Evaluation	43	8344	Lifting truck operators	2.83
Systems Evaluation	44	8322	Car, taxi, and van drivers	2.78
Systems Evaluation	45	9334	Shelf fillers	2.74
Systems Evaluation	46	4120	Secretaries (general)	2.69
Systems Evaluation	47	9214	Garden and horticultural laborer	2.64
Systems Evaluation	48	5249	Sales workers not elsewhere classified	2.60

Skill	Ranking	KBJI	Occupation title	Mean
Systems Evaluation	49	9329	Manufacturing laborer not elsewhere classified	2.36
Systems Evaluation	50	9621	Messengers, package deliverers and luggage porters	2.33
Systems Evaluation	51	7318	Handicraft workers in textile, leather, and related materials	2.21
Technology Design	1	2166	Graphic and multimedia designers	4.20
Technology Design	2	8211	Mechanical machinery assemblers	4.00
Technology Design	3	2512	Software developers	4.00
Technology Design	4	3115	Mechanical engineering technicians	3.76
Technology Design	5	1323	Construction managers	3.73
Technology Design	6	3118	Draughtspersons	3.67
Technology Design	7	2141	Industrial and production engineers	3.60
Technology Design	8	1346	Financial and insurance services managers	3.57
Technology Design	9	3131	Power production plant operators	3.45
Technology Design	10	1221	Sales and marketing managers	3.43
Technology Design	11	1219	Business services and administration managers not elsewhere classified	3.36
Technology Design	12	2149	Engineering professionals not elsewhere classified	3.36
Technology Design	13	2144	Mechanical engineers	3.33
Technology Design	14	3123	Construction supervisors	3.32
Technology Design	15	3257	Environmental and occupational health inspectors and associates	3.27
Technology Design	16	3513	Computer network and systems technicians	3.26
Technology Design	17	2142	Civil engineers	3.20
Technology Design	18	7233	Agricultural and industrial machinery mechanics and repairers	3.18
Technology Design	19	2413	Financial analysts	3.17
Technology Design	20	2263	Environmental and occupational health and hygiene professionals	3.15
Technology Design	21	3111	Chemical and physical science technicians	3.14
Technology Design	22	5249	Sales workers not elsewhere classified	3.13
Technology Design	23	8141	Rubber products machine operators	3.08
Technology Design	24	5244	Contact center salespersons	3.08
Technology Design	25	5243	Traveling salesman	3.06

Skill	Ranking	KBJI	Occupation title	Mean
Technology Design	26	5151	Cleaners supervisors	3.06
Technology Design	27	7412	Electrical mechanics and fitters	3.00
Technology Design	28	4110	General office clerks	2.95
Technology Design	29	3122	Manufacturing supervisors	2.90
Technology Design	30	3331	Clearing and forwarding agents	2.87
Technology Design	31	4214	Debt-collectors and related workers	2.86
Technology Design	32	4222	Contact center information clerks	2.85
Technology Design	33	3112	Civil engineering technicians	2.85
Technology Design	34	1324	Supply, distribution, and related managers	2.80
Technology Design	35	2431	Advertising and marketing professionals	2.79
Technology Design	36	3341	Office supervisors	2.77
Technology Design	37	2642	Journalists	2.77
Technology Design	38	4416	Human resource clerical	2.76
Technology Design	39	8322	Car, taxi, and van drivers	2.70
Technology Design	40	9334	Shelf fillers	2.68
Technology Design	41	9214	Garden and horticultural laborer	2.64
Technology Design	42	3323	Buyers	2.63
Technology Design	43	4120	Secretaries (general)	2.63
Technology Design	44	8131	Chemical products plant and machine operators	2.63
Technology Design	45	8344	Lifting truck operators	2.58
Technology Design	46	7318	Handicraft workers in textile, leather, and related materials	2.57
Technology Design	47	4132	Data entry clerks	2.52
Technology Design	48	2161	Building architects	2.50
Technology Design	49	3322	Commercial sales representatives	2.50
Technology Design	50	9621	Messengers, package deliverers and luggage porters	2.38
Technology Design	51	9329	Manufacturing laborer not elsewhere classified	1.96
Time Management	1	2263	Environmental and occupational health and hygiene professionals	4.23
Time Management	2	1323	Construction managers	4.20
Time Management	3	1346	Financial and insurance services managers	4.14

Skill	Ranking	KBJI	Occupation title	Mean
Time Management	4	2166	Graphic and multimedia designers	4.07
Time Management	5	2144	Mechanical engineers	4.00
Time Management	6	2642	Journalists	4.00
Time Management	7	3123	Construction supervisors	3.95
Time Management	8	3115	Mechanical engineering technicians	3.94
Time Management	9	8131	Chemical products plant and machine operators	3.94
Time Management	10	3112	Civil engineering technicians	3.92
Time Management	11	2413	Financial analysts	3.92
Time Management	12	1219	Business services and administration managers not elsewhere classified	3.91
Time Management	13	8211	Mechanical machinery assemblers	3.90
Time Management	14	4416	Human resource clerical	3.88
Time Management	15	1221	Sales and marketing managers	3.86
Time Management	16	3118	Draughtspersons	3.83
Time Management	17	5243	Traveling salesman	3.82
Time Management	18	2512	Software developers	3.80
Time Management	19	2141	Industrial and production engineers	3.80
Time Management	20	1324	Supply, distribution, and related managers	3.80
Time Management	21	4222	Contact center information clerks	3.77
Time Management	22	4132	Data entry clerks	3.76
Time Management	23	3122	Manufacturing supervisors	3.76
Time Management	24	3257	Environmental and occupational health inspectors and associates	3.73
Time Management	25	7233	Agricultural and industrial machinery mechanics and repairers	3.71
Time Management	26	3341	Office supervisors	3.68
Time Management	27	3331	Clearing and forwarding agents	3.67
Time Management	28	5151	Cleaners supervisors	3.67
Time Management	29	5249	Sales workers not elsewhere classified	3.67
Time Management	30	4110	General office clerks	3.65
Time Management	31	3131	Power production plant operators	3.64

Skill	Ranking	KBJI	Occupation title	Mean
Time Management	32	3322	Commercial sales representatives	3.60
Time Management	33	4120	Secretaries (general)	3.56
Time Management	34	2149	Engineering professionals not elsewhere classified	3.50
Time Management	35	3323	Buyers	3.50
Time Management	36	2431	Advertising and marketing professionals	3.47
Time Management	37	4214	Debt-collectors and related workers	3.45
Time Management	38	3513	Computer network and systems technicians	3.43
Time Management	39	9334	Shelf fillers	3.42
Time Management	40	2161	Building architects	3.42
Time Management	41	8141	Rubber products machine operators	3.42
Time Management	42	2142	Civil engineers	3.40
Time Management	43	9621	Messengers, package deliverers and luggage porters	3.38
Time Management	44	5244	Contact center salespersons	3.31
Time Management	45	3111	Chemical and physical science technicians	3.29
Time Management	46	8322	Car, taxi, and van drivers	3.26
Time Management	47	7412	Electrical mechanics and fitters	3.23
Time Management	48	8344	Lifting truck operators	3.22
Time Management	49	9214	Garden and horticultural laborer	3.00
Time Management	50	7318	Handicraft workers in textile, leather, and related materials	2.71
Time Management	51	9329	Manufacturing laborer not elsewhere classified	2.68
Troubleshooting	1	2512	Software developers	4.50
Troubleshooting	2	2144	Mechanical engineers	4.11
Troubleshooting	3	7233	Agricultural and industrial machinery mechanics and repairers	4.00
Troubleshooting	4	3115	Mechanical engineering technicians	4.00
Troubleshooting	5	2141	Industrial and production engineers	4.00
Troubleshooting	6	3513	Computer network and systems technicians	3.91
Troubleshooting	7	3123	Construction supervisors	3.74
Troubleshooting	8	1323	Construction managers	3.73
Troubleshooting	9	2149	Engineering professionals not elsewhere classified	3.71

Skill	Ranking	KBJI	Occupation title	Mean
Troubleshooting	10	7412	Electrical mechanics and fitters	3.69
Troubleshooting	11	3257	Environmental and occupational health inspectors and associates	3.67
Troubleshooting	12	3131	Power production plant operators	3.64
Troubleshooting	13	8211	Mechanical machinery assemblers	3.60
Troubleshooting	14	3118	Draughtspersons	3.58
Troubleshooting	15	2166	Graphic and multimedia designers	3.50
Troubleshooting	16	2263	Environmental and occupational health and hygiene professionals	3.46
Troubleshooting	17	3112	Civil engineering technicians	3.46
Troubleshooting	18	1221	Sales and marketing managers	3.43
Troubleshooting	19	3331	Clearing and forwarding agents	3.40
Troubleshooting	20	1346	Financial and insurance services managers	3.38
Troubleshooting	21	4132	Data entry clerks	3.33
Troubleshooting	22	8322	Car, taxi, and van drivers	3.26
Troubleshooting	23	8131	Chemical products plant and machine operators	3.25
Troubleshooting	24	8141	Rubber products machine operators	3.17
Troubleshooting	25	5151	Cleaners supervisors	3.17
Troubleshooting	26	5244	Contact center salespersons	3.15
Troubleshooting	27	3122	Manufacturing supervisors	3.10
Troubleshooting	28	1219	Business services and administration managers not elsewhere classified	3.09
Troubleshooting	29	4416	Human resource clerical	3.06
Troubleshooting	30	4120	Secretaries (general)	3.00
Troubleshooting	31	2142	Civil engineers	3.00
Troubleshooting	32	8344	Lifting truck operators	3.00
Troubleshooting	33	9334	Shelf fillers	2.95
Troubleshooting	34	5243	Traveling salesman	2.94
Troubleshooting	35	4222	Contact center information clerks	2.92
Troubleshooting	36	2642	Journalists	2.92
Troubleshooting	37	3341	Office supervisors	2.91

Skill	Ranking	KBJI	Occupation title	Mean
Troubleshooting	38	1324	Supply, distribution, and related managers	2.90
Troubleshooting	39	2413	Financial analysts	2.83
Troubleshooting	40	5249	Sales workers not elsewhere classified	2.80
Troubleshooting	41	3322	Commercial sales representatives	2.80
Troubleshooting	42	3323	Buyers	2.78
Troubleshooting	43	9329	Manufacturing laborer not elsewhere classified	2.72
Troubleshooting	44	3111	Chemical and physical science technicians	2.71
Troubleshooting	45	4110	General office clerks	2.70
Troubleshooting	46	4214	Debt-collectors and related workers	2.68
Troubleshooting	47	9214	Garden and horticultural laborer	2.43
Troubleshooting	48	2431	Advertising and marketing professionals	2.42
Troubleshooting	49	2161	Building architects	2.25
Troubleshooting	50	9621	Messengers, package deliverers and luggage porters	2.19
Troubleshooting	51	7318	Handicraft workers in textile, leather, and related materials	2.00
Writing	1	2642	Journalists	4.69
Writing	2	2149	Engineering professionals not elsewhere classified	4.07
Writing	3	4132	Data entry clerks	4.00
Writing	4	3331	Clearing and forwarding agents	3.93
Writing	5	3322	Commercial sales representatives	3.90
Writing	6	3115	Mechanical engineering technicians	3.88
Writing	7	1346	Financial and insurance services managers	3.86
Writing	8	2144	Mechanical engineers	3.83
Writing	9	4214	Debt-collectors and related workers	3.82
Writing	10	4110	General office clerks	3.80
Writing	11	3341	Office supervisors	3.78
Writing	12	1324	Supply, distribution, and related managers	3.75
Writing	13	2141	Industrial and production engineers	3.75
Writing	14	9334	Shelf fillers	3.74
Writing	15	2166	Graphic and multimedia designers	3.73

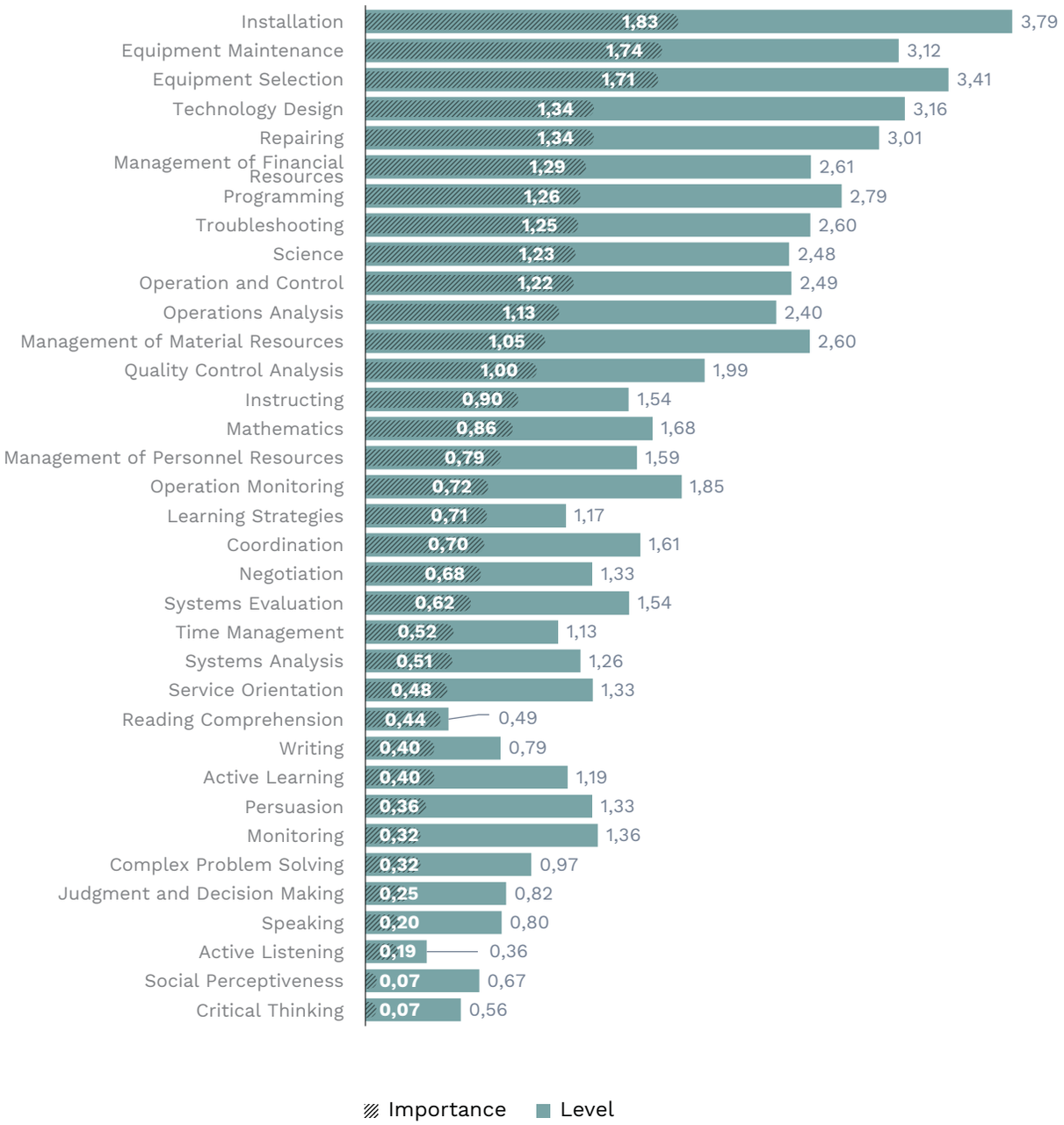
Skill	Ranking	KBJI	Occupation title	Mean
Writing	16	1323	Construction managers	3.73
Writing	17	3112	Civil engineering technicians	3.71
Writing	18	4416	Human resource clerical	3.71
Writing	19	8211	Mechanical machinery assemblers	3.70
Writing	20	2512	Software developers	3.70
Writing	21	5244	Contact center salespersons	3.69
Writing	22	4222	Contact center information clerks	3.69
Writing	23	2263	Environmental and occupational health and hygiene professionals	3.69
Writing	24	1221	Sales and marketing managers	3.67
Writing	25	3118	Draughtspersons	3.67
Writing	26	3513	Computer network and systems technicians	3.65
Writing	27	3131	Power production plant operators	3.64
Writing	28	3123	Construction supervisors	3.63
Writing	29	5249	Sales workers not elsewhere classified	3.60
Writing	30	8322	Car, taxi, and van drivers	3.58
Writing	31	5243	Traveling salesman	3.58
Writing	32	5151	Cleaners supervisors	3.50
Writing	33	2413	Financial analysts	3.50
Writing	34	2431	Advertising and marketing professionals	3.45
Writing	35	9621	Messengers, package deliverers and luggage porters	3.43
Writing	36	3257	Environmental and occupational health inspectors and associates	3.40
Writing	37	4120	Secretaries (general)	3.38
Writing	38	3323	Buyers	3.37
Writing	39	8141	Rubber products machine operators	3.33
Writing	40	7233	Agricultural and industrial machinery mechanics and repairers	3.29
Writing	41	8344	Lifting truck operators	3.25
Writing	42	3122	Manufacturing supervisors	3.24
Writing	43	8131	Chemical products plant and machine operators	3.24

Skill	Ranking	KBJI	Occupation title	Mean
Writing	44	2161	Building architects	3.23
Writing	45	1219	Business services and administration managers not elsewhere classified	3.23
Writing	46	2142	Civil engineers	3.18
Writing	47	3111	Chemical and physical science technicians	3.07
Writing	48	9214	Garden and horticultural laborer	3.00
Writing	49	7412	Electrical mechanics and fitters	2.92
Writing	50	7318	Handicraft workers in textile, leather, and related materials	2.86
Writing	51	9329	Manufacturing laborer not elsewhere classified	2.84

Appendix G.
Indotask and O*NET comparison

Fig. G.1

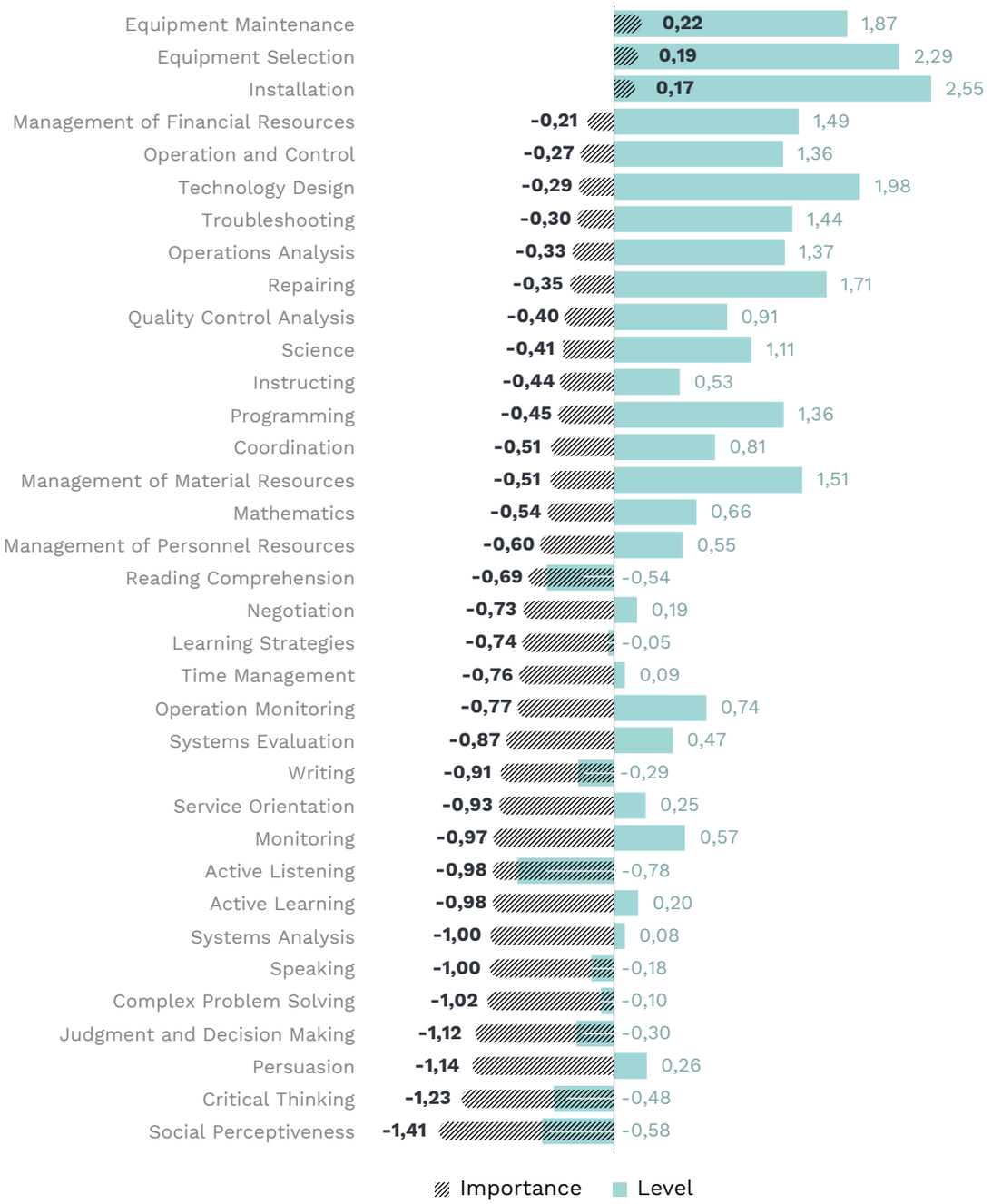
Absolute mean difference in importance and level of skills between Indotask and O*NET



Source: World Bank, based on Indotask data.
Notes: The mean differences were constructed by subtracting O*NET score from Indotask score for each occupation and skill element. Indotask score was calculated using weight from number of respondents to the occupation skill level from 944 respondent's data from 51 selected occupations in Indonesia.

Fig. G.2

Standardized mean difference in importance and level of skills between Indotask and O*NET



Source: Indotask data.
Notes: The mean differences were constructed by subtracting standardized O*NET score from standardized Indotask score for each occupation and skill element. Indotask score was calculated using weight from number of respondents to the occupation skill level from 944 respondent's data from 51 selected occupations in Indonesia. Standardization technique that was used is by subtracting the mean from each observation and then divide it by standard deviation.

Table G1. Absolute differences in importance and skill level between Indotask and O*NET, by occupation

Sorted by difference in importance, largest to smallest.

Skills group	Occupation (1-digit KBJI)	Difference importance	Difference level
Equipment Selection	Managers	2.44	4.70
Equipment Maintenance	Managers	2.30	4.40
Equipment Selection	Professionals	2.17	3.95
Equipment Maintenance	Clerical Support Workers	2.12	3.86
Installation	Managers	2.10	4.70
Equipment Maintenance	Professionals	2.04	3.79
Installation	Professionals	2.02	4.05
Installation	Technicians and Associate Professionals	2.00	4.04
Equipment Selection	Clerical Support Workers	1.93	3.88
Operation and Control	Clerical Support Workers	1.93	3.71
Science	Clerical Support Workers	1.91	3.34
Repairing	Managers	1.90	4.32
Operation and Control	Managers	1.89	3.27
Equipment Maintenance	Technicians and Associate Professionals	1.84	3.00
Troubleshooting	Clerical Support Workers	1.82	3.70
Technology Design	Managers	1.79	3.99
Installation	Service and Sales Workers	1.76	3.75
Operations Analysis	Service and Sales Workers	1.75	3.27
Installation	Plant and Machine Operators and Assemblers	1.75	3.17
Science	Service and Sales Workers	1.75	3.48
Troubleshooting	Managers	1.75	3.45
Technology Design	Service and Sales Workers	1.72	3.60
Installation	Clerical Support Workers	1.71	3.82
Management of Financial Resources	Service and Sales Workers	1.71	2.66
Equipment Selection	Service and Sales Workers	1.70	3.40
Operations Analysis	Clerical Support Workers	1.67	3.21
Operation and Control	Professionals	1.66	3.06
Programming	Service and Sales Workers	1.65	3.06

Skills group	Occupation (1-digit KBJI)	Difference importance	Difference level
Science	Managers	1.65	3.12
Repairing	Professionals	1.64	3.53
Troubleshooting	Professionals	1.62	3.09
Equipment Selection	Technicians and Associate Professionals	1.62	3.29
Repairing	Clerical Support Workers	1.60	3.50
Quality Control Analysis	Clerical Support Workers	1.57	3.00
Programming	Managers	1.56	3.43
Operation and Control	Service and Sales Workers	1.53	2.74
Management of Financial Resources	Craft and Related Trades Workers	1.50	2.69
Troubleshooting	Service and Sales Workers	1.46	3.04
Quality Control Analysis	Service and Sales Workers	1.46	2.67
Equipment Maintenance	Service and Sales Workers	1.44	3.12
Operations Analysis	Plant and Machine Operators and Assemblers	1.44	3.16
Management of Financial Resources	Clerical Support Workers	1.43	2.80
Mathematics	Service and Sales Workers	1.41	2.60
Repairing	Technicians and Associate Professionals	1.41	2.98
Programming	Plant and Machine Operators and Assemblers	1.40	3.02
Quality Control Analysis	Managers	1.40	2.55
Programming	Clerical Support Workers	1.38	2.97
Technology Design	Plant and Machine Operators and Assemblers	1.36	3.35
Installation	Elementary Occupations	1.33	3.09
Management of Financial Resources	Technicians and Associate Professionals	1.32	2.69
Technology Design	Clerical Support Workers	1.31	3.16
Technology Design	Technicians and Associate Professionals	1.31	3.19
Operations Analysis	Craft and Related Trades Workers	1.27	2.27
Technology Design	Craft and Related Trades Workers	1.27	2.74
Management of Financial Resources	Professionals	1.26	2.58
Management of Material Resources	Clerical Support Workers	1.26	3.00
Operations Analysis	Elementary Occupations	1.25	2.94
Technology Design	Professionals	1.23	2.78

Skills group	Occupation (1-digit KBJI)	Difference importance	Difference level
Science	Plant and Machine Operators and Assemblers	1.22	2.75
Programming	Technicians and Associate Professionals	1.22	2.90
Programming	Craft and Related Trades Workers	1.22	2.00
Equipment Selection	Plant and Machine Operators and Assemblers	1.22	2.73
Management of Financial Resources	Plant and Machine Operators and Assemblers	1.20	3.00
Learning Strategies	Service and Sales Workers	1.18	1.68
Programming	Elementary Occupations	1.16	2.84
Management of Material Resources	Professionals	1.16	2.56
Troubleshooting	Technicians and Associate Professionals	1.14	2.45
Operation Monitoring	Service and Sales Workers	1.14	2.56
Operations Analysis	Managers	1.14	2.16
Systems Analysis	Service and Sales Workers	1.13	2.13
Equipment Maintenance	Elementary Occupations	1.13	2.23
Quality Control Analysis	Professionals	1.13	2.18
Operation Monitoring	Professionals	1.13	2.23
Operations Analysis	Technicians and Associate Professionals	1.13	2.29
Management of Material Resources	Plant and Machine Operators and Assemblers	1.12	2.61
Management of Material Resources	Technicians and Associate Professionals	1.11	2.72
Operation and Control	Technicians and Associate Professionals	1.11	2.53
Repairing	Service and Sales Workers	1.10	2.68
Learning Strategies	Clerical Support Workers	1.10	1.47
Management of Financial Resources	Elementary Occupations	1.10	2.61
Operation Monitoring	Clerical Support Workers	1.10	2.67
Mathematics	Clerical Support Workers	1.10	1.79
Equipment Maintenance	Plant and Machine Operators and Assemblers	1.09	1.69
Science	Technicians and Associate Professionals	1.09	2.33
Mathematics	Craft and Related Trades Workers	1.08	1.79
Operation Monitoring	Managers	1.08	2.27
Systems Evaluation	Service and Sales Workers	1.07	2.54
Management of Material Resources	Service and Sales Workers	1.06	2.46

Skills group	Occupation (1-digit KBJI)	Difference importance	Difference level
Installation	Craft and Related Trades Workers	1.05	2.23
Instructing	Service and Sales Workers	1.02	1.74
Instructing	Clerical Support Workers	1.02	1.62
Systems Evaluation	Clerical Support Workers	1.01	1.77
Mathematics	Plant and Machine Operators and Assemblers	1.00	2.12
Mathematics	Managers	0.99	1.74
Programming	Professionals	0.99	2.34
Equipment Selection	Elementary Occupations	0.99	2.30
Management of Material Resources	Craft and Related Trades Workers	0.98	2.47
Technology Design	Elementary Occupations	0.96	2.92
Instructing	Plant and Machine Operators and Assemblers	0.96	1.46
Science	Elementary Occupations	0.95	2.52
Management of Personnel Resources	Clerical Support Workers	0.95	1.51
Science	Professionals	0.93	1.64
Instructing	Craft and Related Trades Workers	0.93	1.40
Instructing	Professionals	0.91	1.67
Management of Personnel Resources	Professionals	0.91	1.58
Management of Personnel Resources	Service and Sales Workers	0.91	2.04
Learning Strategies	Plant and Machine Operators and Assemblers	0.91	1.30
Management of Personnel Resources	Craft and Related Trades Workers	0.90	1.61
Mathematics	Elementary Occupations	0.88	1.86
Systems Analysis	Clerical Support Workers	0.88	1.43
Systems Evaluation	Plant and Machine Operators and Assemblers	0.87	1.94
Coordination	Professionals	0.87	1.86
Mathematics	Technicians and Associate Professionals	0.86	1.56
Management of Financial Resources	Managers	0.86	1.54
Management of Personnel Resources	Plant and Machine Operators and Assemblers	0.85	1.87
Active Learning	Service and Sales Workers	0.85	1.79
Reading Comprehension	Service and Sales Workers	0.85	1.12
Writing	Service and Sales Workers	0.84	1.40

Skills group	Occupation (1-digit KBJI)	Difference importance	Difference level
Negotiation	Plant and Machine Operators and Assemblers	0.84	1.27
Instructing	Technicians and Associate Professionals	0.84	1.43
Learning Strategies	Craft and Related Trades Workers	0.84	1.29
Coordination	Clerical Support Workers	0.83	1.67
Repairing	Plant and Machine Operators and Assemblers	0.83	1.81
Systems Evaluation	Craft and Related Trades Workers	0.82	1.82
Reading Comprehension	Plant and Machine Operators and Assemblers	0.81	0.83
Negotiation	Clerical Support Workers	0.81	1.27
Writing	Elementary Occupations	0.81	1.51
Coordination	Service and Sales Workers	0.81	1.64
Service Orientation	Plant and Machine Operators and Assemblers	0.81	1.38
Coordination	Plant and Machine Operators and Assemblers	0.79	1.73
Quality Control Analysis	Plant and Machine Operators and Assemblers	0.78	1.53
Instructing	Managers	0.78	1.69
Science	Craft and Related Trades Workers	0.78	2.16
Judgment and Decision Making	Service and Sales Workers	0.76	1.41
Repairing	Elementary Occupations	0.76	1.97
Time Management	Service and Sales Workers	0.76	1.24
Management of Material Resources	Elementary Occupations	0.75	2.65
Monitoring	Service and Sales Workers	0.74	1.65
Instructing	Elementary Occupations	0.73	1.27
Systems Analysis	Plant and Machine Operators and Assemblers	0.72	1.57
Coordination	Technicians and Associate Professionals	0.71	1.69
Reading Comprehension	Elementary Occupations	0.71	0.77
Management of Personnel Resources	Technicians and Associate Professionals	0.70	1.60
Quality Control Analysis	Technicians and Associate Professionals	0.68	1.63
Negotiation	Professionals	0.68	1.25
Quality Control Analysis	Elementary Occupations	0.68	1.70
Systems Analysis	Craft and Related Trades Workers	0.67	1.37
Writing	Plant and Machine Operators and Assemblers	0.67	1.00

Skills group	Occupation (1-digit KBJI)	Difference importance	Difference level
Negotiation	Technicians and Associate Professionals	0.67	1.38
Equipment Maintenance	Craft and Related Trades Workers	0.66	1.32
Active Learning	Plant and Machine Operators and Assemblers	0.66	1.62
Negotiation	Elementary Occupations	0.65	1.32
Persuasion	Plant and Machine Operators and Assemblers	0.65	1.74
Troubleshooting	Plant and Machine Operators and Assemblers	0.65	1.36
Time Management	Professionals	0.63	1.23
Service Orientation	Professionals	0.62	1.66
Learning Strategies	Professionals	0.62	1.11
Reading Comprehension	Craft and Related Trades Workers	0.62	0.44
Coordination	Craft and Related Trades Workers	0.61	0.89
Negotiation	Craft and Related Trades Workers	0.61	1.46
Complex Problem Solving	Clerical Support Workers	0.61	1.33
Equipment Selection	Craft and Related Trades Workers	0.61	1.63
Management of Personnel Resources	Elementary Occupations	0.60	1.52
Learning Strategies	Managers	0.60	1.31
Complex Problem Solving	Service and Sales Workers	0.59	1.54
Operation Monitoring	Technicians and Associate Professionals	0.56	1.81
Writing	Craft and Related Trades Workers	0.56	0.88
Time Management	Clerical Support Workers	0.55	1.02
Negotiation	Service and Sales Workers	0.54	1.55
Systems Evaluation	Technicians and Associate Professionals	0.54	1.49
Time Management	Plant and Machine Operators and Assemblers	0.52	1.13
Systems Evaluation	Elementary Occupations	0.51	1.84
Quality Control Analysis	Craft and Related Trades Workers	0.51	0.44
Persuasion	Clerical Support Workers	0.50	1.44
Time Management	Technicians and Associate Professionals	0.49	1.18
Learning Strategies	Technicians and Associate Professionals	0.49	0.93
Active Learning	Elementary Occupations	0.49	1.28
Speaking	Plant and Machine Operators and Assemblers	0.49	1.00

Skills group	Occupation (1-digit KBJI)	Difference importance	Difference level
Service Orientation	Managers	0.48	1.51
Systems Analysis	Elementary Occupations	0.48	1.76
Learning Strategies	Elementary Occupations	0.48	0.86
Monitoring	Clerical Support Workers	0.48	1.60
Systems Evaluation	Managers	0.47	1.26
Operations Analysis	Professionals	0.47	1.50
Service Orientation	Technicians and Associate Professionals	0.47	1.38
Management of Material Resources	Managers	0.46	1.88
Negotiation	Managers	0.45	1.31
Management of Personnel Resources	Managers	0.45	1.07
Critical Thinking	Service and Sales Workers	0.45	0.95
Active Learning	Clerical Support Workers	0.44	1.02
Active Listening	Plant and Machine Operators and Assemblers	0.44	0.41
Service Orientation	Elementary Occupations	0.44	0.71
Judgment and Decision Making	Clerical Support Workers	0.44	1.00
Reading Comprehension	Technicians and Associate Professionals	0.43	0.47
Monitoring	Professionals	0.42	1.17
Critical Thinking	Clerical Support Workers	0.42	0.77
Complex Problem Solving	Plant and Machine Operators and Assemblers	0.41	1.09
Mathematics	Professionals	0.41	1.22
Time Management	Craft and Related Trades Workers	0.41	0.86
Operation and Control	Craft and Related Trades Workers	0.40	0.82
Active Learning	Craft and Related Trades Workers	0.40	0.94
Judgment and Decision Making	Plant and Machine Operators and Assemblers	0.40	0.99
Speaking	Managers	0.40	0.96
Active Listening	Elementary Occupations	0.39	0.32
Persuasion	Professionals	0.39	1.29
Writing	Technicians and Associate Professionals	0.38	0.72
Service Orientation	Service and Sales Workers	0.38	1.05
Systems Analysis	Technicians and Associate Professionals	0.38	1.25

Skills group	Occupation (1-digit KBJI)	Difference importance	Difference level
Persuasion	Technicians and Associate Professionals	0.35	1.23
Writing	Clerical Support Workers	0.34	0.86
Complex Problem Solving	Technicians and Associate Professionals	0.33	1.10
Persuasion	Managers	0.33	1.22
Active Learning	Technicians and Associate Professionals	0.33	1.20
Active Listening	Service and Sales Workers	0.33	0.42
Complex Problem Solving	Managers	0.32	1.14
Time Management	Elementary Occupations	0.32	0.90
Active Learning	Professionals	0.30	0.97
Persuasion	Elementary Occupations	0.30	1.51
Repairing	Craft and Related Trades Workers	0.30	1.82
Troubleshooting	Elementary Occupations	0.30	1.65
Time Management	Managers	0.30	1.12
Judgment and Decision Making	Managers	0.30	0.95
Systems Analysis	Managers	0.29	1.05
Systems Evaluation	Professionals	0.28	0.99
Coordination	Elementary Occupations	0.28	0.93
Speaking	Service and Sales Workers	0.27	1.05
Service Orientation	Craft and Related Trades Workers	0.26	0.97
Reading Comprehension	Professionals	0.26	0.22
Monitoring	Technicians and Associate Professionals	0.26	1.33
Reading Comprehension	Clerical Support Workers	0.26	0.34
Complex Problem Solving	Craft and Related Trades Workers	0.25	0.58
Systems Analysis	Professionals	0.24	0.71
Judgment and Decision Making	Technicians and Associate Professionals	0.24	0.92
Troubleshooting	Craft and Related Trades Workers	0.23	0.79
Writing	Managers	0.23	0.40
Monitoring	Plant and Machine Operators and Assemblers	0.23	1.60
Operation Monitoring	Plant and Machine Operators and Assemblers	0.23	0.81
Operation and Control	Plant and Machine Operators and Assemblers	0.22	1.01

Skills group	Occupation (1-digit KBJI)	Difference importance	Difference level
Complex Problem Solving	Elementary Occupations	0.22	0.76
Active Listening	Technicians and Associate Professionals	0.22	0.27
Social Perceptiveness	Clerical Support Workers	0.21	0.70
Monitoring	Managers	0.20	1.33
Persuasion	Craft and Related Trades Workers	0.19	1.27
Critical Thinking	Plant and Machine Operators and Assemblers	0.19	0.85
Speaking	Technicians and Associate Professionals	0.19	0.85
Speaking	Clerical Support Workers	0.18	0.69
Speaking	Elementary Occupations	0.17	0.77
Active Learning	Managers	0.14	1.09
Service Orientation	Clerical Support Workers	0.14	1.09
Social Perceptiveness	Professionals	0.14	0.75
Social Perceptiveness	Plant and Machine Operators and Assemblers	0.14	0.87
Monitoring	Elementary Occupations	0.13	1.31
Critical Thinking	Managers	0.13	0.58
Writing	Professionals	0.13	0.50
Active Listening	Clerical Support Workers	0.13	0.38
Coordination	Managers	0.13	1.46
Reading Comprehension	Managers	0.11	0.43
Active Listening	Craft and Related Trades Workers	0.11	-0.09
Social Perceptiveness	Service and Sales Workers	0.10	0.56
Complex Problem Solving	Professionals	0.09	0.52
Social Perceptiveness	Elementary Occupations	0.08	0.51
Active Listening	Managers	0.08	0.55
Speaking	Professionals	0.08	0.65
Judgment and Decision Making	Elementary Occupations	0.08	0.73
Judgment and Decision Making	Professionals	0.06	0.41
Active Listening	Professionals	0.06	0.47
Social Perceptiveness	Technicians and Associate Professionals	0.02	0.63
Speaking	Craft and Related Trades Workers	0.00	0.54

Skills group	Occupation (1-digit KBJI)	Difference importance	Difference level
Judgment and Decision Making	Craft and Related Trades Workers	-0.01	0.63
Critical Thinking	Professionals	-0.01	0.39
Monitoring	Craft and Related Trades Workers	-0.01	1.14
Critical Thinking	Elementary Occupations	-0.04	0.92
Operation and Control	Elementary Occupations	-0.07	0.72
Operation Monitoring	Craft and Related Trades Workers	-0.08	0.57
Critical Thinking	Technicians and Associate Professionals	-0.10	0.39
Social Perceptiveness	Craft and Related Trades Workers	-0.11	0.62
Operation Monitoring	Elementary Occupations	-0.13	0.73
Social Perceptiveness	Managers	-0.19	0.47
Critical Thinking	Craft and Related Trades Workers	-0.23	0.18
Persuasion	Service and Sales Workers	-0.30	1.04

Table G2. Standardized differences in importance and skill level between Indotask and O*NET, by occupation

Sorted by difference in importance, largest to smallest.

Skills group	Occupation (1-digit KBJI)	Difference importance	Difference level
Equipment Selection	Managers	0.94	3.69
Equipment Selection	Professionals	0.74	2.94
Equipment Maintenance	Managers	0.73	3.25
Equipment Maintenance	Clerical Support Workers	0.48	2.47
Operation and Control	Managers	0.48	2.24
Equipment Maintenance	Professionals	0.46	2.56
Installation	Managers	0.44	3.68
Installation	Technicians and Associate Professionals	0.43	2.94
Equipment Maintenance	Technicians and Associate Professionals	0.41	1.80
Installation	Professionals	0.40	2.88
Technology Design	Managers	0.37	3.12
Operation and Control	Clerical Support Workers	0.30	2.38
Management of Financial Resources	Service and Sales Workers	0.29	1.46
Troubleshooting	Managers	0.27	2.43

Skills group	Occupation (1-digit KBJI)	Difference importance	Difference level
Equipment Selection	Clerical Support Workers	0.26	2.56
Operations Analysis	Service and Sales Workers	0.22	2.11
Science	Clerical Support Workers	0.19	1.75
Operation and Control	Professionals	0.19	1.95
Installation	Plant and Machine Operators and Assemblers	0.16	1.84
Repairing	Managers	0.16	3.13
Science	Managers	0.14	1.95
Equipment Selection	Service and Sales Workers	0.14	2.12
Equipment Selection	Technicians and Associate Professionals	0.13	2.27
Troubleshooting	Professionals	0.11	2.02
Troubleshooting	Clerical Support Workers	0.11	2.32
Quality Control Analysis	Managers	0.11	1.65
Technology Design	Service and Sales Workers	0.08	2.31
Operations Analysis	Clerical Support Workers	0.08	1.92
Quality Control Analysis	Clerical Support Workers	0.02	1.71
Quality Control Analysis	Service and Sales Workers	-0.02	1.41
Programming	Managers	-0.03	2.23
Operation and Control	Service and Sales Workers	-0.04	1.49
Installation	Service and Sales Workers	-0.04	2.32
Science	Service and Sales Workers	-0.04	1.94
Operations Analysis	Managers	-0.04	1.52
Mathematics	Service and Sales Workers	-0.06	1.49
Repairing	Professionals	-0.08	2.24
Operations Analysis	Plant and Machine Operators and Assemblers	-0.10	2.02
Management of Financial Resources	Craft and Related Trades Workers	-0.11	1.26
Installation	Clerical Support Workers	-0.11	2.42
Programming	Service and Sales Workers	-0.12	1.45
Management of Financial Resources	Technicians and Associate Professionals	-0.13	1.61
Management of Financial Resources	Clerical Support Workers	-0.14	1.53
Troubleshooting	Service and Sales Workers	-0.18	1.78

Skills group	Occupation (1-digit KBJI)	Difference importance	Difference level
Repairing	Technicians and Associate Professionals	-0.20	1.78
Equipment Maintenance	Service and Sales Workers	-0.21	1.81
Management of Financial Resources	Professionals	-0.22	1.62
Quality Control Analysis	Professionals	-0.22	1.23
Equipment Maintenance	Plant and Machine Operators and Assemblers	-0.23	0.50
Mathematics	Managers	-0.26	0.93
Coordination	Professionals	-0.26	1.29
Learning Strategies	Service and Sales Workers	-0.27	0.26
Technology Design	Professionals	-0.28	1.80
Repairing	Clerical Support Workers	-0.28	1.96
Equipment Selection	Plant and Machine Operators and Assemblers	-0.29	1.64
Reading Comprehension	Service and Sales Workers	-0.29	0.15
Operation Monitoring	Professionals	-0.29	1.24
Technology Design	Technicians and Associate Professionals	-0.30	2.07
Technology Design	Plant and Machine Operators and Assemblers	-0.30	2.12
Programming	Clerical Support Workers	-0.30	1.53
Management of Financial Resources	Managers	-0.31	0.91
Troubleshooting	Technicians and Associate Professionals	-0.32	1.38
Operations Analysis	Technicians and Associate Professionals	-0.32	1.32
Management of Material Resources	Professionals	-0.33	1.56
Operation Monitoring	Managers	-0.34	1.31
Operation and Control	Technicians and Associate Professionals	-0.34	1.56
Learning Strategies	Clerical Support Workers	-0.34	0.22
Instructing	Clerical Support Workers	-0.34	0.55
Operations Analysis	Craft and Related Trades Workers	-0.34	0.84
Instructing	Professionals	-0.35	0.86
Coordination	Clerical Support Workers	-0.36	0.78
Programming	Plant and Machine Operators and Assemblers	-0.36	1.50
Reading Comprehension	Plant and Machine Operators and Assemblers	-0.37	-0.39
Instructing	Managers	-0.38	1.06

Skills group	Occupation (1-digit KBJI)	Difference importance	Difference level
Management of Material Resources	Clerical Support Workers	-0.38	1.80
Instructing	Service and Sales Workers	-0.39	0.55
Mathematics	Clerical Support Workers	-0.40	0.56
Management of Personnel Resources	Professionals	-0.40	0.66
Management of Material Resources	Technicians and Associate Professionals	-0.40	1.74
Instructing	Technicians and Associate Professionals	-0.42	0.47
Technology Design	Craft and Related Trades Workers	-0.43	1.34
Coordination	Technicians and Associate Professionals	-0.43	0.97
Coordination	Service and Sales Workers	-0.45	0.81
Mathematics	Plant and Machine Operators and Assemblers	-0.45	1.06
Technology Design	Clerical Support Workers	-0.46	1.72
Science	Plant and Machine Operators and Assemblers	-0.47	1.37
Programming	Technicians and Associate Professionals	-0.47	1.54
Equipment Maintenance	Elementary Occupations	-0.47	0.87
Instructing	Plant and Machine Operators and Assemblers	-0.47	0.25
Management of Material Resources	Plant and Machine Operators and Assemblers	-0.47	1.35
Management of Personnel Resources	Clerical Support Workers	-0.47	0.30
Mathematics	Craft and Related Trades Workers	-0.48	0.42
Mathematics	Technicians and Associate Professionals	-0.48	0.58
Coordination	Plant and Machine Operators and Assemblers	-0.48	0.80
Management of Financial Resources	Plant and Machine Operators and Assemblers	-0.48	1.75
Writing	Service and Sales Workers	-0.48	0.37
Operation Monitoring	Service and Sales Workers	-0.49	1.31
Science	Professionals	-0.50	0.47
Systems Analysis	Service and Sales Workers	-0.51	0.72
Science	Technicians and Associate Professionals	-0.52	1.02
Speaking	Managers	-0.53	0.34
Systems Evaluation	Service and Sales Workers	-0.54	1.39
Installation	Craft and Related Trades Workers	-0.54	0.91
Systems Evaluation	Clerical Support Workers	-0.55	0.50

Skills group	Occupation (1-digit KBJI)	Difference importance	Difference level
Monitoring	Service and Sales Workers	-0.55	0.82
Instructing	Craft and Related Trades Workers	-0.56	0.09
Management of Personnel Resources	Service and Sales Workers	-0.58	0.99
Management of Material Resources	Service and Sales Workers	-0.58	1.28
Learning Strategies	Plant and Machine Operators and Assemblers	-0.59	-0.06
Quality Control Analysis	Plant and Machine Operators and Assemblers	-0.59	0.44
Time Management	Service and Sales Workers	-0.59	0.05
Time Management	Professionals	-0.59	0.38
Negotiation	Clerical Support Workers	-0.59	0.07
Operation Monitoring	Clerical Support Workers	-0.59	1.37
Active Learning	Service and Sales Workers	-0.60	0.60
Negotiation	Managers	-0.61	0.66
Management of Personnel Resources	Managers	-0.61	0.44
Operations Analysis	Elementary Occupations	-0.62	1.32
Installation	Elementary Occupations	-0.62	1.44
Programming	Craft and Related Trades Workers	-0.62	0.06
Judgment and Decision Making	Service and Sales Workers	-0.62	0.17
Management of Personnel Resources	Plant and Machine Operators and Assemblers	-0.63	0.73
Management of Personnel Resources	Craft and Related Trades Workers	-0.64	0.28
Programming	Professionals	-0.64	1.10
Service Orientation	Plant and Machine Operators and Assemblers	-0.65	0.06
Management of Personnel Resources	Technicians and Associate Professionals	-0.66	0.63
Reading Comprehension	Technicians and Associate Professionals	-0.66	-0.52
Systems Evaluation	Plant and Machine Operators and Assemblers	-0.67	0.75
Negotiation	Technicians and Associate Professionals	-0.67	0.34
Learning Strategies	Managers	-0.68	0.47
Negotiation	Professionals	-0.68	0.20
Quality Control Analysis	Technicians and Associate Professionals	-0.68	0.65
Systems Analysis	Clerical Support Workers	-0.71	0.07
Repairing	Plant and Machine Operators and Assemblers	-0.71	0.57

Skills group	Occupation (1-digit KBJI)	Difference importance	Difference level
Time Management	Clerical Support Workers	-0.72	-0.13
Service Orientation	Managers	-0.72	0.73
Negotiation	Plant and Machine Operators and Assemblers	-0.73	-0.23
Reading Comprehension	Elementary Occupations	-0.73	-0.78
Writing	Plant and Machine Operators and Assemblers	-0.73	-0.31
Complex Problem Solving	Clerical Support Workers	-0.73	0.22
Repairing	Service and Sales Workers	-0.74	1.12
Reading Comprehension	Professionals	-0.74	-0.56
Service Orientation	Professionals	-0.74	0.79
Learning Strategies	Professionals	-0.74	0.10
Reading Comprehension	Craft and Related Trades Workers	-0.75	-1.05
Management of Financial Resources	Elementary Occupations	-0.75	0.95
Equipment Maintenance	Craft and Related Trades Workers	-0.76	-0.01
Management of Material Resources	Craft and Related Trades Workers	-0.76	1.06
Time Management	Technicians and Associate Professionals	-0.77	0.21
Writing	Elementary Occupations	-0.77	0.03
Equipment Selection	Elementary Occupations	-0.77	0.80
Time Management	Managers	-0.77	0.47
Active Listening	Service and Sales Workers	-0.79	-0.82
Monitoring	Professionals	-0.79	0.51
Coordination	Craft and Related Trades Workers	-0.79	-0.45
Active Learning	Plant and Machine Operators and Assemblers	-0.79	0.51
Mathematics	Elementary Occupations	-0.80	0.35
Monitoring	Clerical Support Workers	-0.81	0.74
Time Management	Plant and Machine Operators and Assemblers	-0.81	-0.06
Systems Evaluation	Managers	-0.81	0.50
Quality Control Analysis	Craft and Related Trades Workers	-0.82	-0.94
Speaking	Plant and Machine Operators and Assemblers	-0.82	-0.21
Systems Analysis	Plant and Machine Operators and Assemblers	-0.83	0.28
Complex Problem Solving	Managers	-0.83	0.44

Skills group	Occupation (1-digit KBJI)	Difference importance	Difference level
Active Listening	Plant and Machine Operators and Assemblers	-0.83	-0.98
Troubleshooting	Plant and Machine Operators and Assemblers	-0.84	0.08
Judgment and Decision Making	Managers	-0.84	0.23
Reading Comprehension	Clerical Support Workers	-0.85	-0.74
Negotiation	Service and Sales Workers	-0.85	0.57
Learning Strategies	Craft and Related Trades Workers	-0.85	-0.38
Service Orientation	Service and Sales Workers	-0.85	0.04
Operations Analysis	Professionals	-0.86	0.74
Complex Problem Solving	Service and Sales Workers	-0.86	0.39
Critical Thinking	Clerical Support Workers	-0.86	-0.27
Speaking	Service and Sales Workers	-0.87	0.11
Programming	Elementary Occupations	-0.87	1.04
Equipment Selection	Craft and Related Trades Workers	-0.87	0.41
Persuasion	Managers	-0.87	0.59
Systems Evaluation	Craft and Related Trades Workers	-0.88	0.37
Monitoring	Managers	-0.89	0.90
Writing	Clerical Support Workers	-0.89	-0.18
Systems Evaluation	Technicians and Associate Professionals	-0.89	0.51
Mathematics	Professionals	-0.89	0.46
Operation Monitoring	Technicians and Associate Professionals	-0.90	0.83
Writing	Technicians and Associate Professionals	-0.91	-0.35
Critical Thinking	Service and Sales Workers	-0.91	-0.13
Active Listening	Technicians and Associate Professionals	-0.91	-0.83
Management of Material Resources	Managers	-0.92	1.26
Systems Analysis	Craft and Related Trades Workers	-0.94	-0.05
Learning Strategies	Technicians and Associate Professionals	-0.94	-0.25
Active Learning	Professionals	-0.95	0.29
Service Orientation	Technicians and Associate Professionals	-0.95	0.35
Persuasion	Plant and Machine Operators and Assemblers	-0.95	0.51
Persuasion	Clerical Support Workers	-0.96	0.34

Skills group	Occupation (1-digit KBJI)	Difference importance	Difference level
Speaking	Clerical Support Workers	-0.96	-0.32
Coordination	Managers	-0.96	0.97
Active Learning	Clerical Support Workers	-0.96	-0.19
Complex Problem Solving	Technicians and Associate Professionals	-0.97	0.10
Monitoring	Technicians and Associate Professionals	-0.98	0.61
Active Listening	Clerical Support Workers	-0.98	-0.70
Instructing	Elementary Occupations	-0.99	-0.30
Judgment and Decision Making	Clerical Support Workers	-0.99	-0.27
Active Listening	Managers	-0.99	-0.27
Critical Thinking	Managers	-0.99	-0.22
Reading Comprehension	Managers	-0.99	-0.43
Speaking	Technicians and Associate Professionals	-0.99	-0.05
Judgment and Decision Making	Plant and Machine Operators and Assemblers	-1.00	-0.33
Active Listening	Elementary Occupations	-1.01	-1.34
Technology Design	Elementary Occupations	-1.01	1.30
Persuasion	Professionals	-1.02	0.38
Active Learning	Technicians and Associate Professionals	-1.02	0.28
Operation and Control	Craft and Related Trades Workers	-1.02	-0.48
Quality Control Analysis	Elementary Occupations	-1.03	0.33
Writing	Craft and Related Trades Workers	-1.04	-0.65
Repairing	Elementary Occupations	-1.04	0.44
Writing	Managers	-1.04	-0.54
Active Listening	Professionals	-1.05	-0.40
Complex Problem Solving	Plant and Machine Operators and Assemblers	-1.05	-0.18
Science	Elementary Occupations	-1.06	0.74
Speaking	Professionals	-1.07	-0.12
Systems Analysis	Managers	-1.08	0.13
Judgment and Decision Making	Technicians and Associate Professionals	-1.08	-0.13
Systems Evaluation	Professionals	-1.08	0.08
Time Management	Craft and Related Trades Workers	-1.08	-0.53

Skills group	Occupation (1-digit KBJI)	Difference importance	Difference level
Writing	Professionals	-1.09	-0.35
Systems Analysis	Technicians and Associate Professionals	-1.10	0.17
Complex Problem Solving	Professionals	-1.10	-0.38
Active Learning	Managers	-1.10	0.36
Persuasion	Technicians and Associate Professionals	-1.11	0.15
Systems Analysis	Professionals	-1.11	-0.30
Service Orientation	Elementary Occupations	-1.11	-0.93
Negotiation	Craft and Related Trades Workers	-1.12	-0.05
Operation Monitoring	Plant and Machine Operators and Assemblers	-1.12	-0.32
Critical Thinking	Professionals	-1.13	-0.40
Negotiation	Elementary Occupations	-1.14	-0.39
Monitoring	Plant and Machine Operators and Assemblers	-1.14	0.73
Management of Material Resources	Elementary Occupations	-1.14	1.11
Science	Craft and Related Trades Workers	-1.15	0.51
Operation and Control	Plant and Machine Operators and Assemblers	-1.15	-0.08
Social Perceptiveness	Clerical Support Workers	-1.19	-0.53
Active Learning	Craft and Related Trades Workers	-1.19	-0.51
Management of Personnel Resources	Elementary Occupations	-1.20	-0.03
Repairing	Craft and Related Trades Workers	-1.21	0.79
Critical Thinking	Plant and Machine Operators and Assemblers	-1.23	-0.36
Judgment and Decision Making	Professionals	-1.23	-0.53
Troubleshooting	Craft and Related Trades Workers	-1.24	-0.46
Active Learning	Elementary Occupations	-1.25	-0.20
Time Management	Elementary Occupations	-1.26	-0.67
Service Orientation	Clerical Support Workers	-1.27	-0.03
Social Perceptiveness	Professionals	-1.28	-0.32
Complex Problem Solving	Craft and Related Trades Workers	-1.29	-0.93
Coordination	Elementary Occupations	-1.29	-0.51
Social Perceptiveness	Service and Sales Workers	-1.30	-0.77
Speaking	Elementary Occupations	-1.32	-0.83

Skills group	Occupation (1-digit KBJI)	Difference importance	Difference level
Learning Strategies	Elementary Occupations	-1.33	-0.90
Active Listening	Craft and Related Trades Workers	-1.36	-1.84
Systems Evaluation	Elementary Occupations	-1.37	0.38
Critical Thinking	Technicians and Associate Professionals	-1.38	-0.64
Service Orientation	Craft and Related Trades Workers	-1.42	-0.46
Systems Analysis	Elementary Occupations	-1.42	0.26
Social Perceptiveness	Plant and Machine Operators and Assemblers	-1.44	-0.58
Social Perceptiveness	Technicians and Associate Professionals	-1.45	-0.56
Social Perceptiveness	Managers	-1.46	-0.45
Monitoring	Elementary Occupations	-1.52	-0.09
Operation Monitoring	Craft and Related Trades Workers	-1.55	-0.77
Complex Problem Solving	Elementary Occupations	-1.56	-0.90
Troubleshooting	Elementary Occupations	-1.57	0.25
Speaking	Craft and Related Trades Workers	-1.58	-1.00
Persuasion	Elementary Occupations	-1.59	-0.04
Persuasion	Craft and Related Trades Workers	-1.60	-0.13
Judgment and Decision Making	Craft and Related Trades Workers	-1.61	-0.79
Monitoring	Craft and Related Trades Workers	-1.62	-0.02
Social Perceptiveness	Elementary Occupations	-1.65	-1.27
Judgment and Decision Making	Elementary Occupations	-1.67	-0.94
Critical Thinking	Elementary Occupations	-1.70	-0.59
Critical Thinking	Craft and Related Trades Workers	-1.78	-1.30
Operation and Control	Elementary Occupations	-1.79	-0.80
Social Perceptiveness	Craft and Related Trades Workers	-1.84	-0.95
Persuasion	Service and Sales Workers	-1.85	0.01
Operation Monitoring	Elementary Occupations	-1.90	-0.82

Appendix H.
Reliability

Table H1. Indicator 2: Inter-rater agreement indicator

KBJI Code	KBJI Title	Importance		Level	
		Median of SD	Median of SEM	Median of SD	Median of SEM
1219	Business services and administration managers not elsewhere classified	0.9	0.2	1.5	0.3
1221	Sales and marketing managers	1.1	0.2	1.6	0.4
1323	Construction managers	0.8	0.2	1.2	0.3
1324	Supply, distribution, and related managers	0.9	0.2	1.6	0.4
1346	Financial and insurance services managers	0.9	0.2	1.3	0.3
2141	Industrial and production engineers	0.8	0.2	1.3	0.3
2142	Civil engineers	1.0	0.3	1.4	0.4
2143	Environmental engineers	0.0	0.0	0.7	0.5
2144	Mechanical engineers	0.8	0.2	1.3	0.3
2149	Engineering professionals not elsewhere classified	1.1	0.3	1.3	0.4
2161	Building architects	1.0	0.3	1.1	0.3
2166	Graphic and multimedia designers	0.8	0.2	1.6	0.4
2263	Environmental and occupational health and hygiene professionals	0.8	0.2	1.2	0.3
2413	Financial analysts	0.8	0.2	1.3	0.4
2431	Advertising and marketing professionals	1.0	0.2	1.6	0.4
2512	Software developers	0.9	0.3	1.4	0.5
2642	Journalists	1.0	0.3	1.7	0.5
3111	Chemical and physical science technicians	0.8	0.2	1.4	0.4
3112	Civil engineering technicians	1.0	0.3	1.3	0.4
3115	Mechanical engineering technicians	1.0	0.2	1.4	0.4
3118	Draftspersons	1.1	0.3	1.8	0.5
3122	Manufacturing supervisors	0.9	0.2	1.5	0.3
3123	Construction supervisors	0.8	0.2	1.5	0.4
3131	Power production plant operators	0.7	0.2	1.3	0.4
3257	Environmental and occupational health inspectors and associates	0.9	0.2	1.4	0.4

KBJI Code	KBJI Title	Importance		Level	
		Median of SD	Median of SEM	Median of SD	Median of SEM
3322	Commercial sales representatives	0.9	0.3	1.5	0.5
3323	Buyers	1.0	0.2	1.6	0.4
3331	Clearing and forwarding agents	1.1	0.3	1.5	0.4
3341	Office supervisors	1.0	0.2	1.6	0.3
3513	Computer network and systems technicians	0.9	0.2	1.7	0.3
4110	General office clerks	1.0	0.2	1.5	0.3
4120	Secretaries (general)	1.0	0.2	1.5	0.4
4132	Data entry clerks	1.0	0.2	1.6	0.4
4214	Debt-collectors and related workers	1.0	0.2	1.5	0.3
4222	Contact center information clerks	1.0	0.3	1.5	0.4
4416	Human resource clerical	0.9	0.2	1.5	0.4
5151	Cleaners supervisors	0.9	0.2	1.5	0.4
5243	Traveling salesman	1.0	0.2	1.5	0.4
5244	Contact center salespersons	1.0	0.3	1.5	0.4
5249	Sales workers not elsewhere classified	1.0	0.3	1.7	0.4
7233	Agricultural and industrial machinery mechanics and repairers	0.9	0.2	1.3	0.3
7318	Handicraft workers in textile, leather, and related materials	1.0	0.3	1.5	0.4
7412	Electrical mechanics and fitters	1.0	0.3	1.3	0.4
8131	Chemical products plant and machine operators	1.0	0.2	1.3	0.4
8141	Rubber products machine operators	0.8	0.2	1.6	0.5
8211	Mechanical machinery assemblers	0.8	0.3	1.3	0.4
8322	Car, taxi, and van drivers	1.2	0.2	1.5	0.3
8344	Lifting truck operators	1.1	0.2	1.5	0.4
9214	Garden and horticultural laborers	1.1	0.3	1.3	0.4
9329	Manufacturing laborers not elsewhere classified	1.2	0.2	1.4	0.3
9334	Shelf fillers	1.1	0.3	1.7	0.4
9621	Messengers, package deliverers and luggage porters	1.2	0.3	2.0	0.5

Source: World Bank, based on Indotask.
Note: The numbers were obtained by calculating the median of standard deviation (SD) and median of standard error (SEM) of each occupation. The number above is calculated using Indotask data of 944 respondents from 51 high-demanded occupations with number of respondent per each occupation as the weight.

Table H2. Indicator 3: Inter-rater reliability coefficient for importance and level

Reliability coefficient representing consistency of importance and level ratings across skills for each occupation.

KBJI Code	KBJI Title	Importance ICC	Level ICC
1219	Business services and administration managers not elsewhere classified	0.69	0.73
1221	Sales and marketing managers	0.88	0.63
1323	Construction managers	0.52	0.61
1324	Supply, distribution, and related managers	0.40	0.75
1346	Financial and insurance services managers	0.40	0.30
2141	Industrial and production engineers	0.49	0.18
2142	Civil engineers	0.56	0.78
2143	Environmental engineers	0.31	0.89
2144	Mechanical engineers	0.50	0.22
2149	Engineering professionals not elsewhere classified	0.67	0.61
2161	Building architects	0.76	0.76
2165	Cartographers and surveyors	0.76	0.76
2166	Graphic and multimedia designers	0.51	0.41
2263	Environmental and occupational health and hygiene professionals	0.36	0.51
2413	Financial analysts	0.65	0.52
2431	Advertising and marketing professionals	0.75	0.67
2512	Software developers	0.44	0.55
2642	Journalists	0.72	0.78
3111	Chemical and physical science technicians	0.47	0.39
3112	Civil engineering technicians	0.05	0.53
3115	Mechanical engineering technicians	0.59	0.21
3118	Draughts persons	0.52	0.27
3122	Manufacturing supervisors	0.52	0.73
3123	Construction supervisors	0.32	0.54
3131	Power production plant operators	0.31	0.35
3257	Environmental and occupational health inspectors and associates	0.41	0.10
3322	Commercial sales representatives	0.61	0.26
3323	Buyers	0.83	0.53
3331	Clearing and forwarding agents	0.64	0.55

KBJI Code	KBJI Title	Importance ICC	Level ICC
3341	Office supervisors	0.67	0.04
3513	Computer network and systems technicians	0.24	0.65
4110	General office clerks	0.26	0.77
4120	Secretaries (general)	0.79	0.76
4132	Data entry clerks	0.71	0.78
4214	Debt-collectors and related workers	0.71	0.71
4222	Contact center information clerks	0.69	0.38
4416	Human resource clerical	0.13	0.67
5151	Cleaners supervisors	0.48	0.63
5243	Traveling salesman	0.80	0.51
5244	Contact center salespersons	0.80	0.21
5249	Sales workers not elsewhere classified	0.84	0.51
7127	Air conditioning and refrigeration mechanics	0.84	0.51
7233	Agricultural and industrial machinery mechanics and repairers	0.44	0.72
7318	Handicraft workers in textile, leather, and related materials	0.75	0.48
7412	Electrical mechanics and fitters	0.61	0.50
8131	Chemical products plant and machine operators	0.08	0.60
8141	Rubber products machine operators	0.71	0.56
8211	Mechanical machinery assemblers	0.49	0.62
8322	Car, taxi, and van drivers	0.49	0.31
8344	Lifting truck operators	0.83	0.64
9214	Garden and horticultural laborers	0.11	0.46
9329	Manufacturing laborers not elsewhere classified	0.34	0.46
9334	Shelf fillers	0.79	0.58
9621	Messengers, package deliverers and luggage porters	0.84	0.10

Source: World Bank, based on Indotask.
Note: The numbers were obtained by calculating the ICC using Indotask data of 944 respondents from 51 high-demanded occupations with number of respondents per each occupation as the weight.

Table H3. Difference in inter-rater agreement and ICC, by group of respondents

		Experts vs Incumbents			Gender of respondent			Experts with and without work experience		
		Experts	Incumbent	p-value	Women	Men	p-value	Experienced	Inexperienced	p-value
Importance	Median of SD	0.957	0.956	0.089	0.894	0.941	0.477	0.707	0.894	0.420
	Median of SEM	0.374	0.288	5.180	0.408	0.274	4.807	0.500	0.408	0.031
	ICC	0.563	0.633	0.147	0.360	0.678	7.612	0.476	0.000	4.162
Level	Median of SD	1.286	1.525	0.000	1.414	1.455	0.038	0.707	0.894	0.020
	Median of SM	0.577	0.476	0.000	0.595	0.441	1.348	0.500	0.408	0.573
	ICC	0.351	0.501	0.007	0.207	0.462	7.464	0.226	0.000	0.459

Endnotes

[1] World Bank and CMEA, 2020.

[2] World Bank and Bappenas, forthcoming.

[3] See World Bank (2021)

[4] See Box 2.1 for examples and consult https://www.onetcenter.org/overview.html#applications for the list of studies and tools that use of O*NET.

[5] See World Bank (2016 and 2018) for a summary of recent evidence.

[6] Comparative advantage in production means that the factor with the lowest economic cost of performing a task is assigned that task. Economic cost in turn reflects both a factor's technological capability and its opportunity cost.

[7] Results from round 1 and 3 of Indonesia HiFy Surveys to monitor COVID-19 impacts (World Bank, 2020a), an initiative of 5 rounds of high-frequency phone interviews of about 4,000 households carried out every 3-4 weeks for the first three months and every 3 months for the following next 6 months.

[8]The STEP housheold survey includes a direct reading assessment as well as an indirect assessment (self-reported) of a other competencies and job-relevant and behavioral skills (Pierre et al., 2014). A few STEP household surveys in the initial phases delivered tests administered by Educational Testing Service (ETS) to measure skills, but those efforts proved to be too costly to carry out on a large scale across countries.

[9] Two previous international initiatives aimed at measuring adult skills in 22 OECD countries: The International Adult Literacy Survey, carried out between 1994 and 1998, and the Adult Literacy and Life Skills Survey (ALL), carried out between 2003 and 2008. Based on these surveys, UNESCO began the Literacy Assessment and Monitoring Programme in 2003, which aimed at measuring the literacy and numeracy skills of youth and adults in developing countries (OECD,2016b). See Appendix A for details on all surveys.

[10] Pierre et al., 2014.

[11] Hatayama, Viollaz, and Winkler (2020) and Garrote Sanchez et al. (2020), among others, use PIAAC and STEP to explore the flexibility of work arrangements and work needs to work from home during the COVID-19 pandemic.

[12] OECD 2016b and 2019; World Bank, 2018.

[13] For example, the components on Technology Skills and Tools come from big data analyses, and the Occupational Profiles and Labor Market Information data come from data collected by the Bureau of Labor Statistics.

[14] For more details see https://www.onetcenter.org/content.html.

[15] For more details, see World Bank, Pathways to Middle-class Jobs in Indonesia (forthcoming).

[16] O*NET questionnaires are publicly available at onetcenter.org/questionnaires

[17] For details on how these skills were selected for inclusion in O*NET model see Chapter 5, "Basic and Cross-functional Skills," in Peterson et al. (1999).

[18] O*NET also organizes the 35 skills into the following higher-order skills categories: Basic or Content Skills (e.g., Writing, Speaking), Process Skills (e.g., Critical Thinking, Active Learning), Service Orientation Skills (e.g., Negotiation, Instructing), System Skills (e.g., Systems Analysis, Management of Personnel Resources), and Technical Skills (e.g., Equipment Maintenance, Troubleshooting) (Tsacoumis and Van Iddekinge, 2006).

[19] Dierdorff and Norton (2011).

[20] Moroz, Nguyen and Chu (2020) conducted a one-week workshop to explore incumbents' interpretation of the skills and tasks modules in Vietnam and adapted the skills module by adding plain statements to the skills definitions.

[21] Starting mid-March 2020, the Government of Indonesia implemented several regulations to avoid the spread of the virus, including safety measures at firms, nonessential workplace closures, school closures, and public gatherings and social restrictions. During July-September 2020, Indonesia was under relaxed mobility restrictions.

[22] According to the World Bank Hify Survey, about 10 percent of workers employed in February 2020 were not working in August of the same year. About 25 percent of workers employed in February were not working in May, and 70 percent of them returned to their original jobs. For more details see World Bank, Indonesia High-frequency Monitoring of Covid-19 Impacts, Round 3.

[23] The two other attempts to implement O*NET worldwide have been in Vietnam (Moroz, Nguyen and Chu, 2019) and Uruguay.

[24] A reservation list of 7 additional occupation was prepared, of which the 1 occupation was finally surveyed and completed to avoid delays in the process in case not all the target respondents answered on time.

[25] Those excluded were clerical support workers not elsewhere classified, assemblers not elsewhere classified, and air conditioning and refrigeration mechanics.

[26] World Bank and CMEA, 2020.

[27] These results will be presented in World Bank (forthcoming (b)).

[28] However, analysts were preferred for practical considerations (i.e., time, costs, and convenience) (Tsacoumis and Van Iddekinge, 2006).

[29] O*NET minimum acceptable sample size per occupation is 10, although it varies widely depending on the questionnaire and respondent type. For example, the skills data have a sample of 8 analysts across all occupations, while the tasks data have a range of sample sizes, from occupations answered by 3 experts to occupations answered by 247 job incumbents.

[30] See Box 1.1 for details on the OEVS project. OEVS survey had a representative sample of three economic groups in Indonesia: (i) the high value-added services; (ii) the low value-added services that are strategic for Indonesia's growth; and (iii) the manufacturing industry.

[31] O*NET also uses this firm-level method although at a larger scale and with random samples.

[32] Occupations' 1-digit KBJI code determines the skill level: high-skilled occupations are managers, professionals, technicians, and associate professionals (codes 1—3); semi-skilled occupations 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 (codes 4—8); and low-skilled occupations are elementary workers (code 9).

[33] Assuming that the 17% of respondents who did not answer the question have the same sex distribution.

[34] As can be seen in Table C1 of Appendix C, high-skilled occupations tend to have more respondents, who are also more educated.

[35] The 394 tasks were categorized into 40 generalized tasks, since none of them fit into "Developing Objectives and Strategies."

[36] Supplemental tasks are those less relevant and/or important to the occupation, measured by (a) having less than 67% of respondents assessing them as relevant and having at least 3.0 score on importance, and (b) tasks rated with at most 67% on relevance, regardless of mean importance.

[37] World Economic Forum, 2020.

[38] Ibid.

[39] An alternative explanation is that the skills needed for technology adoption are found in job titles in these occupations that are not in the sample or in occupations that are in high-demand and hence outside the Indotask sample.

[40] The WEF interviews mostly global/foreign companies. Indotask interviewed only 6 percent foreign companies.

[41] The skills taxonomy and categorization is also different. This pilot for Indonesia uses the same list of O*NET. WEF employed an abridged version of the "Worker Characteristics" and "Worker Requirement" classifications of O*NET resulting in more than 35 skills.

[42] For each country, we calculate the standardized average rating (by subtracting the mean and dividing by the standard error). We then aggregate by skills or occupation category.

[43] See https://www.onetcenter.org/research.html for a complete list of online reports.

[44] This number is derived from the following calculation: 1.00/1.96 = 0.51.

[45] The sample of ratings results from evaluating 35 skills for 50 occupations, generating 1,750 skill-occupation ratings.

[46] The SD for the importance ICC is 0.21 and for level ICCs is 0.25.

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