

Indonesia's Critical Occupations List 2018

Occupation Profiles

January 2020



COORDINATING MINISTRY FOR
ECONOMIC AFFAIRS OF THE
REPUBLIC OF INDONESIA



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Introduction

1 Occupations are the unit of the analysis of the COL since, besides following the work of the U.K. Migration Advisory Committee, they can produce comparable results between the top-down and the bottom-up data, while ensuring a sufficient level of disaggregation with enough sample size to generate robust statistics. More specifically, the COL utilizes the Indonesian Standard Classification of Occupations (Klasifikasi Baku Jenis Pekerjaan Indonesia, KBJI) at the 4-digit KBJI code level, which is the national tool organizing jobs into clearly defined groups according to the tasks and duties undertaken in the job.

2 The term Job Family and Occupation refer to the name assigned by the 4-digit KBJI code and are interchangeable. However, the term Job Family is preferred in the Occupation Profiles report to stress the fact that they encompass many Job Titles (that may or may not be in shortage). The term Job Titles refers specifically to positions that workers perform.

3 While 4-digit KBJI occupations are useful to reconcile evidence from the top-down and the bottom-up, job titles are more useful to address needs from employers.

The 2018 Critical Occupations List (COL) is a list of 35 occupations that were identified as being in shortage and of strategic importance to the Indonesian economy. The applied methodology relies on international best practices and requires analyzing high-level information on occupations from both top-down and bottom-up sources following an iterative process.¹ First, the top-down approach analyzes national labor market indicators to determine which occupations are in shortage. At the same time, the bottom-up approach collects qualitative data from employers to identify which occupations are in high demand and are strategic for Indonesian economic growth and development. Then, the “dovetailing” process produces a preliminary short list of occupations based on the strength of evidence generated in previous steps. This preliminary list is then validated with employers and other key stakeholders, who provide additional information on specific job titles within the short-listed occupations. With this last input

in mind, a final analysis produces the 2018 COL for Indonesia. The 35 occupations in the COL are neither the result of the top-down (SAKERNAS data) nor bottom-up (inputs from employers) analyses in isolation. These 35 occupations result from several rounds of analyses and validations that use the top-down and bottom-up evidence as inputs to reach the final list. More detailed information on methodology of the COL development process are provided in the “Technical Report: Indonesia’s Critical Occupation List 2018”.

In order to provide more granular information for users of the COL, the Occupation Profiles summarize key information drawn from different complementary data sources on each of the 35 occupations in shortage.² By doing so, the Occupation Profiles provide further insights on specific job titles in shortage within each of the 35 COL occupations.³ The Occupation Profiles are organized as follow:

A Specific job titles in shortage and what employers said about them

This section includes specific job titles in shortage within each occupation and information related to their vacancies (i.e., required qualifications, skills, level of experience, and average time to fill them), why employers consider them in shortage, strategies they have implemented to address the shortage, and other details about the job titles (e.g., workers’ field of study, certifications needed, etc.).

The information in this section comes from qualitative data gathered through the bottom-up approach from both the Call for Evidence (CfE) survey and the consultations.

The CfE is an online survey that asks employers to nominate occupations for which they believe there is a shortage of qualified candidates. For each occupation that employers nominate the survey collects job titles, employers’ best guess of the 4-digit KBJI code (Indonesian official classification of occupations) and information related to hiring needs, recruitment practices, and the impact of the shortage. The CfE survey was distributed through different channels to en-

sure maximum reach out and 905 companies from different sectors participated in it.

The Consultations are 90-minute semi-structured discussions with employers. A particular emphasis was placed on evaluating the strategic importance of the occupation in both today’s economic context and evaluating the future possibility of task automation. Through the consultations, participants can nominate occupations that they would like to see included in the COL, and provide qualitative data on skills needs and hiring challenges. In addition, the consultations provide details on whether shortages are limited to one specific job title or to several titles within a single 4-digit KBJI occupation code. In total, 34 companies from 12 economic sectors participated in the consultations.

While evidence from the bottom-up approach provides more granular information on labor shortages, neither the CfE survey nor the Consultations can be generalizable to the whole Indonesian labor market. The instruments were not designed to be a

representative survey but to gather information from employers who are experiencing shortages. Thus, this section may represent the view of a minority of employers—those

who were willing to participate in the analysis—and it may be biased to certain type of companies and sectors that experience recruitment challenges.

B What the market says about the job titles

This section presents average salaries, based on online sources, for each job title in shortage within the 35 occupations listed in the COL. Currently, the only nationally representative survey collecting data on workers’ wages by occupation is the National Labor Force Survey (SAKERNAS). However, SAKERNAS collects data at the job family level (4-digit KBJI code), not at the job title level. Thus, to provide more accurate information on job titles this section reports on wages drawn from online job portals.

After exploring a wide variety of data sources, the preferred source for compensation data was the Global Salary Calculator (GSC), powered by the Economic Research Institute (ERI).⁴ GSC is an online database reporting gross annual salary based on job positions (among 45,000+ titles) and locations. Salaries are reported in the local currency and only cover mandatory payments. Available information per job position for Indonesia includes the mean and the 10th, 25th, 75th and 90th percentiles along with the job description. In addition, although the tool does not report sample sizes per job position, it does report how reliable ERI considers the statistics using a reliability scale.⁵ In most cases, salaries

are updated daily and are a result of time series analysis within the past three years. Data sources include participant data (i.e., employer-provided and employee-provided data through online surveys), third-party salary survey data, and government salary data, among others.

In an effort to provide consistent data throughout the Occupation Profiles, this source was preferred to others since it provides compensation data for almost all job titles in shortage, whereas other online job portals and reports provide information for some, but not all, job titles.

There are two important caveats to consider when interpreting this section. First, it is very likely that these job portals collect information primarily from formal and large firms.⁶ If this is the case, reported wages will be biased toward the upper part of the distribution and only represent the upper end of the Indonesian job market. Second, none of the compensation sources taken into consideration provided extensive methodological background on data sources and how wages/statistics are calculated. Thus, caution must be taken when generalizing these results to employees working on these positions.

C Job family and what national statistics say about it

This section presents information about the job family associated with the identified job titles in shortage. The job family name, occupation description, and related tasks were obtained from the Indonesian Standard Classification of Occupations (*Klasifikasi Baku Jenis Pekerjaan Indonesia*, KBJI) Handbook, which provides information

on occupations disaggregated at a 4-digit level.⁷ Therefore, an important caveat to consider when reading this section is that all information in it does not refer specifically to the job title in shortage but to occupations in a higher level of aggregation that contains the job title.⁸ As a result, this section may not accurately reflect the current state of the job in shortage.

⁴ Other online portals and reports considered for compensation data include Salary Expert, Salary Explorer, Michael Page Salary Guide Report, Kelly Salary Guide Report, Robert Walters (ASEAN) Salary Guide Survey, and online vacancy portals – including Job Street, Glassdoor, Urbanhire, Tech in Asia, Jobsinjakarta, Kalibr, bestjobindonesia, Jobindo.com, jobs.smartrecruiters.com, Monster, and Indeed.

⁵ The reliability scale is as follow: 0 – 5 salaries show high variability and are being validated through additional research; 5 – 6 salaries are dependable with greater variability within this labor market; 6 – 8 salaries are consistent with variability in this labor market; 8 – 9 salaries are consistent with low variability in this labor market; 9 – 10 salaries show the highest level of consistency in this labor market

⁶ According to SAKERNAS, only 50 percent of workers in Indonesia have formal jobs.

⁷ Indonesian Standard Classification of Occupations (*Klasifikasi Baku Jenis Pekerjaan Indonesia*, KBJI) Handbook of Statistics Indonesia (*Badan Pusat Statistik*, BPS).

⁸ For example, information in this section will contain occupation description and national statistics for the job family “Computer Programmers” instead of information specifically for the identified job titles (i.e., Apps Developer; Backend Developer; Web Developer; Software Engineer; Programmer; Mobile App Developer).

The section also presents national statistics of the job family (or 4-digit KBJI occupation code) using the National Labor Force Survey (SAKERNAS) data from 2015 to 2017.⁹ Statistics include net wage distributions, workers’ main characteristics (i.e., education and field of study, age, years of experience), working hours, most common sector of employment, and provinces where most workers in the job family live. The main advantage of using SAKERNAS is that the data are nationally representative and cover workers employed in both the formal and informal sectors, as well as in all firm sizes.¹⁰ As a result, wages based on SAKERNAS data are likely to be lower than those estimated from other sources that only cover formal large firms—as it is the case of online job portals.

Since statistics presented in this section require a higher level of disaggregation, for example, by occupation and education level, it is important to ensure that statistics shown in the occupation profiles are statistically representative. For this reason, statistics with less than 30 observations are either not presented or flagged along the occupation profiles.¹¹

Reasons for wage discrepancies between SAKERNAS and online portals. There are several reasons why wages calculated with SAKERNAS may be lower to those from online job portals. First, while online job portals are likely to collect vacancies and wages from large firms hiring formal and full-time workers, SAKERNAS data are representa-

tive of the whole population, including formal and informal employees working part- or full-time in all type of firms. Given the limitation of sample size, it is not possible to obtain robust wage statistics when conditioning by all these variables. However, it is likely that wages for job titles in shortage fall within the upper part of their respective job family wage distribution, since employers may keep wages high in order to attract employees to these job titles. Second, collected wages from online job portals are for the specific job titles in shortage, which are highly skilled and require high educational qualifications, while, as mentioned before, SAKERNAS collects wages at the job family level. Finally, online job portals tend to present gross wages as advertised by employers, while SAKERNAS data collect net wages.¹²

Reason for education discrepancies between SAKERNAS and bottom-up evidence. The bottom-up analysis suggests that job titles in shortage are highly skilled, most require highly qualified workers with specific technical skills, and some require certifications and relevant work experience. Thus, the workers in demand are not likely the average worker in Indonesia within the job family, which is why the education levels in demand may be different from those displayed in the national statistics section. However, an important caveat to consider is that firms that participated in the consultations are likely to be large and formal companies, and usually demand more qualified workers than smaller firms.

⁹ Something important to take into account is that when the top-down analysis does not provide evidence that an occupation is in shortage this does not mean that the statistics from SAKERNAS cannot be used for the occupation profiles. While the top-down analysis is an exercise based on SAKERNAS and aimed at identifying potential indications of labor shortages, the occupation profiles (based in part on SAKERNAS) aim to provide basic information on certain occupations irrespective of whether they are in shortage or not.

¹⁰ SAKERNAS was the only data source available at the time that was nationally representative and had sufficient information at the 4-digit KBJI level.

¹¹ For statistical analysis, 30 observations are considered the boundary between small and large samples (Tanis, Elliot and Robert V. Hogg, 2005. Probability and Statistical Inference. NJ: Pearson Prentice Hall).

¹² In an effort to make wages from SAKERNAS and the online sources comparable, the occupation profiles present both gross wages and an estimation of net wages. Net wages were calculated applying the personal income tax rate in steps without any deduction (link to tax table).

Sample Occupation Profile

Specific Job Titles in Shortage	List of specific job titles in shortage within identified occupation/job family.
What did employers tell us about these job titles?	<p>This section presents information on the job titles from the employers' perspective, including details on vacancies—i.e., required qualifications, skills, level of experience, and average time to fill the positions—why employers consider these job titles in shortage, strategies firms have implemented to address the shortage, and additional details about the job titles (e.g., workers' field of study, certifications needed, specific industry needs, etc.).</p> <p><i>Data source: Bottom-up data from Call for Evidence and Consultations</i></p> <p><i>Information in this section cannot be generalizable to the whole Indonesian labor market. The data collection instruments were not designed to be representative surveys but to only gather information from employers who were experiencing shortages.</i></p>
What does the market say about these job titles?	<p>This section presents average wages for each job title in shortage within the identified occupation.</p> <p><i>Data source: Global Salary Calculator – Economic Research Institute (ERI)</i></p> <p><i>Online data on wages usually are based on formal jobs at large firms. Thus, data in this section may be biased towards the upper part of the distribution and only represent the upper end of the Indonesian job market.</i></p>
Job family according to the Indonesian official classification of occupations	<p>KBJI code and title:</p> <hr/> <p>KBJI Code – Occupation name</p> <hr/> <p>Description:</p> <hr/> <p><i>This section describes the main activities performed as part of the occupation. The description is obtained from Indonesian Standard Classification of Occupations (Klasifikasi Baku Jabatan Indonesia, KBJI) Handbook of Statistics Indonesia (Badan Pusat Statistik, BPS).</i></p>
What do national statistics say about this job family?	<p>This section presents national statistics on the Job Family (or 4-digit KBJI code) associated with the identified job titles in shortage, using National Labor Force Survey (SAKERNAS) data from August 2015 to 2017. When sample size allows, statistics include:</p> <hr/> <p><i>Wage distributions: A graph presents net monthly wage distributions of four groups of employees: all employees, inexperienced and experienced employees, and employees with the most common education level achieved within the job family. In some cases, workers' most common education level does not coincide with the one that firms highlighted in shortage during the bottom-up analysis. For these cases, sample size permitting, the graph also includes wage distributions of employees with the educational level in shortage according to the bottom-up approach. All wages are in 2017 values.</i></p> <hr/> <p><i>Workers' most common education achieved along with diplomas' and vocational high-school graduates' most common field of study.</i></p> <hr/> <p><i>Occupation outlook: average and percentiles 10 and 99 of years of experience, weekly working hours, and workers' age.</i></p> <hr/> <p><i>Most common sector of employment.</i></p> <hr/> <p><i>Provinces where most workers in the job family live.</i></p> <hr/> <p><i>Data source: National Labor Force Survey (SAKERNAS) data from August 2015 to 2017 unless otherwise noted.</i></p> <hr/> <p><i>Statistics in this section require different levels of disaggregation. For robustness, statistics produced with less than 30 observations are either flagged or not present.</i></p>

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Agriculture and Plantation Managers

The specific job title in shortage within the **Production and Operations Department Managers in Agriculture, Hunting, Forestry, and Fishing** job family is shown below. Discussions with employers suggest that the workers in demand are highly skilled, and require specific technical skills and relevant work experience. However, SAKERNAS data show that most workers in this job family tend to have lower education levels and, hence, lower wages than those reported by employers through the bottom-up analysis and online job portals. An important caveat to consider is that firms that participated in the consultations are likely to be large and formal companies that tend to demand more qualified workers than smaller firms.

Specific Job Titles in Shortage

Project Manager in Agriculture and Plantation

What did employers tell us about these job titles?

About vacancies:

Most positions required a bachelor's degree with more than 5 years of experience.

Most firms needed 3 to 6 months to fill these positions, while one firm needed less than 3 months.

Reason for shortage:

Lack of both technical and non-technical skills.

Lack of candidates who possess both specialized farming knowledge and project management skills.

Lack of sector attractiveness to young candidates despite sector's growth (one firm).

Strategies implemented to address the shortage:

Expanded recruitment processes.

Intensified worker training programs.

Partnered with education institutions and training providers to recruit recent graduates.

Other highlighted details:

There is a particular emphasis on attracting younger talent to the agriculture sector.

Companies primarily nominated middle-management positions for palm oil and rice farming. Workers in these positions effect both downstream and upstream business units, and needed skills include market research, forecasting, supervising, and mentoring.

* Data source: *Bottom-up Call for Evidence and Consultations*. 3 employers indicated shortages for these job titles.

Monthly earnings according to online sources:

Job Titles	Monthly Wages (in IDR)	
	Gross	Estimated Net*
Project Manager in Agriculture and Plantation*	9,739,037	9,252,085

Notes: * Estimated net wages were calculated applying the personal income tax rate in steps without any deduction. * Salary corresponds to an Agriculture Operator & Manager due to unavailable job title. An alternative job title could also be Agricultural Manager, who earn on average IDR 17,156,816 a month.

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

Job family according to the Indonesian official classification of occupations

KBJI code and title:

1221 – Production and Operations Department Managers in Agriculture, Hunting, Forestry, and Fishing

What workers in this occupation do:

Workers in this group plan, direct, and coordinate agricultural activities related to the production of goods under the guidance of the president and executive leadership, and in consultation with managers from other sections

Role and tasks include

Plan, direct, and coordinate activities regarding the production of goods.

Guarantee the use of natural resources and the fulfillment of an efficient amount of production.

Plan and direct daily implementation.

Check expenses; establish and direct the implementation of administrative procedures.

Supervise the implementation of work safety procedures.

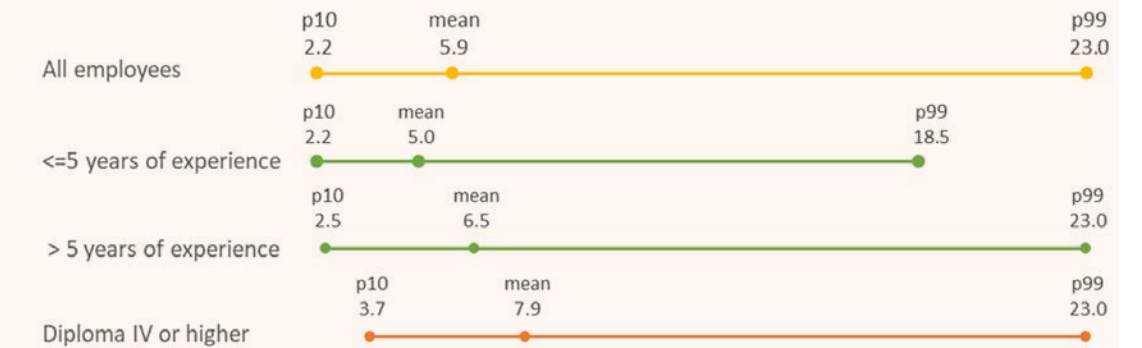
Oversee the selection, training, and performance of employees.

Represent production and operations matters to other parts of the company or with external bodies.

Supervise other workforce needs.

What do national statistics say about this job family?

Monthly wage distribution, IDR (million)



Most common education achieved:

Diploma IV/University or higher 27%

General high school 22%

Elementary school 22%

Most common fields of study for Diplomas and higher:

Agriculture, Agricultural Science and Technology *

Occupation outlook:

	Mean	Percentile 10th to 99th	
Experience (yrs)	11	1	45
Hrs worked (wk)	38	14	91
Age	43	26	79

Most common sectors of employment:

Agriculture, forestry, livestock and fisheries (71%)

Manufacturing (16%)

Community, social and personal services (9%)

Provinces where most workers in this job family live:

South Sumatra (11%)

Central Java (10%)

Riau (10%)

* Small sample for this level of disaggregation. As such these numbers should be interpreted with caution.

** Data source: SAKERNAS (2015–17)

Biotechnology and Biochemistry Professionals in Manufacturing

The specific job titles in shortage within the [Production and Operations Department Managers in Manufacturing](#) job family are shown below. Discussions with employers suggest that the workers in demand are highly skilled, and require specific technical skills and relevant work experience. However, SAKERNAS data show that most workers in this job family tend to have lower education levels and, hence, lower wages than those reported by employers through the bottom-up analysis and online job portals. An important caveat to consider is that firms that participated in the consultations are likely to be large and formal companies that tend to demand more qualified workers than smaller firms.

Specific Job Titles in Shortage

Head of Chemical Manufacturing Control (CMC); Biochemistry Supervisor; Microbiology Supervisor; Physiochemistry Supervisor; Quality Assurance Document Control Supervisor; Qualification, Validation, and Calibration Supervisor; Environmental Management Manager

What did employers tell us about these job titles?

About vacancies:

Most positions required a bachelor's degree.

Work experience varied between less than 2 years to 4 years.

One position required a PhD with 10 years of experience.

Most firms needed 2-3 months to fill these positions, while some firms needed more than 6 months.

Reason for shortage:

Lack of certifications, relevant work experience, and technical skills.

Lack of soft skills (less relevant).

Strategies implemented to address the shortage:

Hired lower-skilled employees and provided skills training.

Raised wages.

Outsourced job function.

Established partnerships with education institutions.

Offered delayed retirement.

Hired international candidates (three firms).

Other highlighted details:

Firms also predicted that there will be more demand for these positions in the future.

* Data source: Bottom-up Call for Evidence and Consultations. 12 employers indicated shortages for these job titles.

What does the market say about these job titles?

Monthly earnings according to online sources:

Job Titles	Monthly Wages (in IDR)	
	Gross	Estimated Net [*]
Head of Chemical Manufacturing Control (CMC)*	16,683,549	15,849,372
Biochemistry Supervisor **	23,228,222	22,066,811
Microbiology Supervisor ***	10,205,935	9,695,638
Physiochemistry Supervisor ****	16,929,364	16,082,896
Quality Assurance Document Control Supervisor	18,956,954	18,009,106
Qualification, Validation, and Calibration Supervisor *****	18,278,684	17,364,750
Environmental Management Manager*****	15,480,660	14,706,627

Notes: ^{*} Estimated net wages were calculated applying the personal income tax rate in steps without any deduction. ^{*} Salary corresponds to a Chemist Quality Control due to unavailable job title. ^{**} Salary corresponds to a Biochemistry Technologist due to unavailable job title. ^{***} Salary corresponds to a Microbiology Quality Control Technologist due to unavailable job title. An alternative job title could also be Microbiology Technologist, who earn on average IDR 15,990,406 a month. ^{****} Salary corresponds to a Chemistry Supervisor due to unavailable job title. ^{*****} Salary corresponds to a Chemist Quality Control due to unavailable job title. ^{*****} Salary corresponds to a Quality Control Inspection & Testing Supervisor and to a Quality Assurance Calibrator due to unavailable job title. ^{*****} Salary corresponds to a Environmental Manager due to unavailable job title. An alternative job title could also be Environmental Manager Engineering, who earn on average IDR 26,172,649 a month.

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

Job family according to the Indonesian official classification of occupations

KBJI code and title

1222 – Production and Operations Department Managers in Manufacturing

What workers in this occupation do

Plan, direct, and coordinate company activities related to the production of goods. They work under the guidance of the president, director, and executive leadership and in consultation with managers from other departments.

Role and tasks include

Plan, direct, and coordinate activities regarding industrial goods or solid mineral extraction from underground, surface mining, and quarrying.

Plan and direct activities regarding the production and distribution of electricity, gas, and water.

Guarantee the use of natural resources and fulfill set production amounts.

Plan and direct the implementation of daily production.

Check expenses, establish and direct administrative procedures.

Supervise the application of work safety procedures.

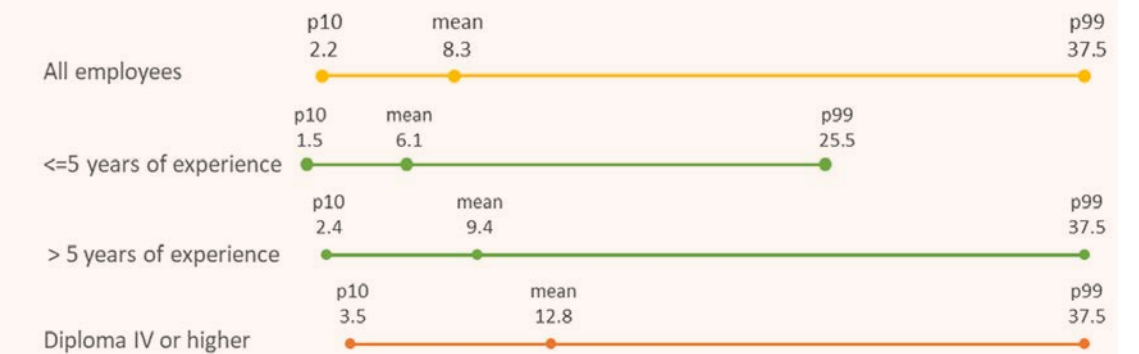
Oversee the selection, training, and performance evaluation of employees.

Represent their section's work to other parts of the company or with external bodies.

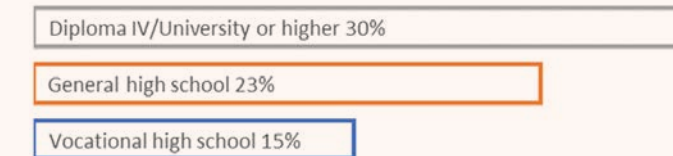
Carry out related tasks, supervise other workforce activities.

What do national statistics say about this job family?

Monthly wage distribution, IDR (million)



Most common education achieved:



Most common fields of study for Diplomas and higher:

Engineering Studies (i.e., Industrial Engineering, Technology, Environmental Sciences and Mineral Technology) (39%)
Social Science (i.e., Economics and Management) (30%)

Occupation outlook:

	Mean	Percentile 10th to 99th	
Experience (yrs)	11	2	35
Hours worked (wk)	43	25	75
Age	43	31	72

Most common sectors of employment:

Manufacturing (92%)

Provinces where most workers in this job family live:

West Java (42%)
Central Java (14%)
Banten (13%)

** Data source: SAKERNAS (2015-17)

Construction Project Leader and Managers

The specific job titles in shortage within the **Managers in Construction** job family are shown below. Discussions with employers suggest that the workers in demand are highly skilled, and require specific technical skills. However, SAKERNAS data show that most workers in this job family tend to have lower education levels and, hence, lower wages than those reported by employers through the bottom-up analysis and online job portals. An important caveat to consider is that firms that participated in the consultations are likely to be large and formal companies that tend to demand more qualified workers than smaller firms.

Specific Job Titles in Shortage

Construction Project Leader and Manager

What did employers tell us about these job titles?

About vacancies:

Positions required high level of skills.

Most positions required a bachelor's degree.

Positions require less than 2 years of work experience.

Firm needed 2 months to fill these positions.

Reason for shortage:

Lack of certifications, relevant work experience, and technical skills.

Lack of soft skills (less relevant).

Strategies implemented to address the shortage:

Hired lower-skilled employees and provided skills training.

Raised wages.

Outsourced job function.

Established partnerships with education institutions.

Offered delayed retirement.

Hired international candidates (three firms).

Other highlighted details:

Firms also predicted that there will be more demand for these positions in the future.

* Data source: Bottom-up Call for Evidence and Consultations. 12 employers indicated shortages for these job titles.

What does the market say about these job titles?

Monthly earnings according to online sources:

Job Titles	Monthly Wages (in IDR)	
	Gross	Estimated Net ^o
Construction Project Leader and Manager	21,134,323	20,077,607

Notes: ^o Estimated net wages were calculated applying the personal income tax rate in steps without any deduction.

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

Job family according to the Indonesian official classification of occupations

KBJI code and title

1223 – Managers in Construction

What workers in this occupation do

Workers in this group plan, direct, and coordinate a company's construction activities. They work under the guidance of the president, director, and executive leadership and in consultation with managers from other departments.

Role and tasks include

Plan, direct, and coordinate activities regarding construction work.

Guarantee the use of natural resources and an efficient production level.

Plan and direct daily work.

Check expenses; establish and direct administrative procedures.

Supervise the application of work safety procedures.

Oversee the selection, training, and performance of employees. Represent their section's work to other parts of the company or with external bodies.

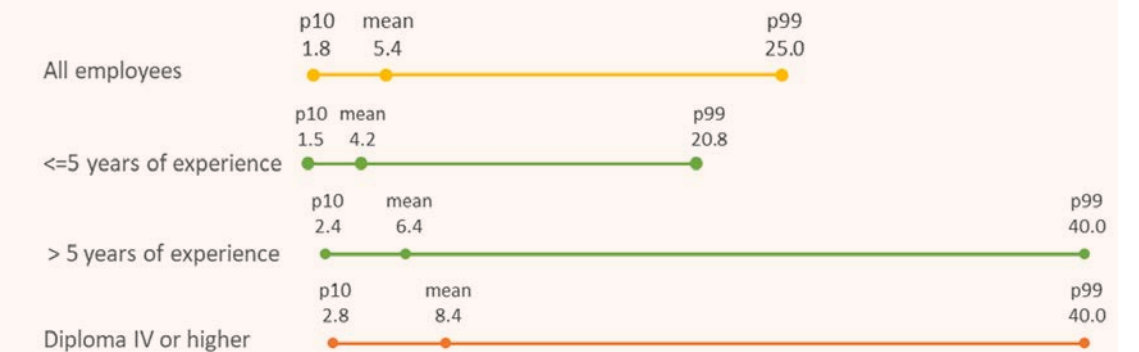
Carry out tasks related to their section and oversee other workforce needs.

present their section's work to other parts of the company or with external bodies.

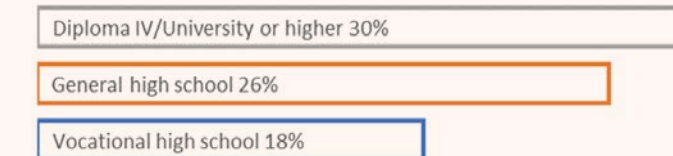
Carry out related tasks, supervise other workforce activities.

What do national statistics say about this job family?

Monthly wage distribution, IDR (million)



Most common education achieved:



Most common fields of study for Diplomas and higher:

Engineering Studies (e.g., Civil Engineering) (51%)
 Social Science (e.g., Economics) (23%)
 Other Social and Political Sciences (6%)

Most common fields of study for Vocational high school:

Building Techniques

Occupation outlook:

	Mean	Percentile 10th to 99th	
Experience (yrs)	10	1	34
Hours worked (wk)	44	24	84
Age	43	29	67

Most common sectors of employment:

Construction (89%)
 Community, social and personal services (5%)
 Finance, insurance, real estate and business services (3%)

Provinces where most workers in this job family live:

West Java (18%)
 East Java (10%)
 Central Java (10%)

** Data source: SAKERNAS (2015-17)

Logistics Managers and Customs Managers

The specific job titles in shortage within the **Production and Operations Department Managers in Transport, Storage, and Communication** job family are shown below. Discussions with employers suggest that the workers in demand are highly skilled, and require certifications, specific skills and relevant work experience. However, SAKERNAS data show that most workers in this job family tend to have lower education levels and, hence, lower wages than those reported by employers through the bottom-up analysis and online job portals. An important caveat to consider is that firms that participated in the consultations are likely to be large and formal companies that tend to demand more qualified workers than smaller firms.

Specific Job Titles in Shortage

Warehouse Manager; Gateway Manager; Customs Clearance Manager

What did employers tell us about these job titles?

About vacancies:

All positions were mid- and high level.

All positions required at least a bachelor's degree with 2 to 5 years of work experience.

Most firms needed 3 months to fill these positions.

Reason for shortage:

Lack of specialized education and skills among job applicants (e.g., specific knowledge and technical skills to operate a safe and efficient warehouse).

One of the firms require employees to possess a customs qualification in international logistics business.

Shortages related to customs and excise, in part, may be due to certification laws.

Strategies implemented to address the shortage:

Intensified local recruitment.

Offered internal training to existing employees.

Other highlighted details:

Certification laws such as Ministerial Regulation No. 65/2007 and Director General of Customs and Excise Regulation No. 24/2007 state that only persons with an agency-certified PPJK (Pengusaha Pengurusan Jasa Kepabeanan) or custom service provision certification (Badan Pendidikan dan Pelatihan Keuangan, BPPK) may work as a Customs Specialist or in the export and import industry. Obtaining this certification is relatively costly and requires a four-month course, which may limit talent availability.

* Data source: Bottom-up Call for Evidence and Consultations. 12 employers indicated shortages for these job titles.

What does the market say about these job titles?

Monthly earnings according to online sources:

Job Titles	Monthly Wages (in IDR)	
	Gross	Estimated Net*
Warehouse Manager	17,545,639	16,668,357
Gateway Manager*	12,709,652	12,074,169
Customs Clearance Manager**	11,812,732	11,222,095

Notes: * Estimated net wages were calculated applying the personal income tax rate in steps without any deduction. * Salary corresponds to a Dispatch Manager due to unavailable job title. ** Salary corresponds to a Customs Clearance Agent due to unavailable job title.

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

Job family according to the Indonesian official classification of occupations

KBJI code and title

1226 – Production and Operations Department Managers in Transport, Storage, and Communication

What workers in this occupation do

Workers in this group plan, direct, and coordinate a company's activities related to the provision of appropriate services. They work under the guidance of the president, director, and executive leadership and in consultation with managers from other sections.

Role and tasks include

Plan, direct, and coordinate activities regarding the provision of appropriate services.

Guarantee the use of resources to deliver efficient services.

Plan and direct daily services.

Check expenses, and establish and direct administrative procedures.

Supervise the application of worker safety procedures.

Oversee the selection, training, and performance of employees.

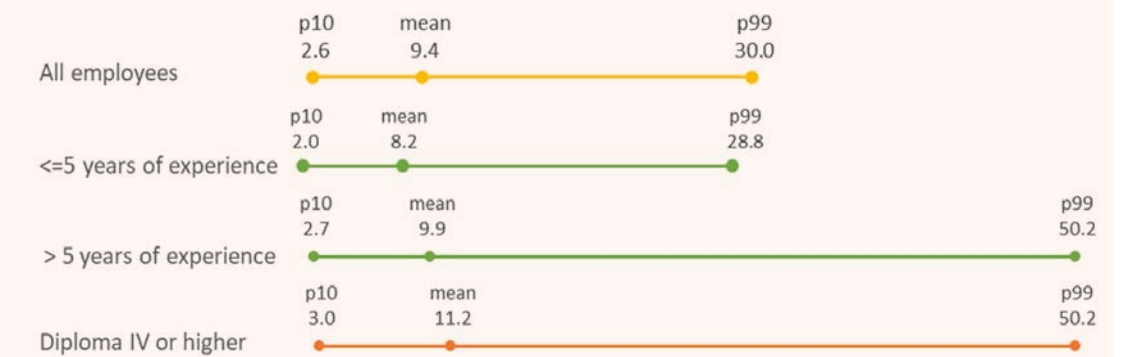
Represent their sector to other parts of the company and external bodies.

Carry out tasks related to their section.

Oversee other workforce activities.

What do national statistics say about this job family?

Monthly wage distribution, IDR (million)



Most common education achieved:



Most common fields of study for Diplomas and higher:

Engineering Studies (e.g., Electrical Engineering) (48%)

Occupation outlook:

	Mean	Percentile 10th to 99th	
Experience (yrs)	11	2	32
Hours worked (wk)	46	35	90
Age	40	27	65

Most common sectors of employment:

Transportation, storage and communications (60%)

Community, social and personal services (14%)

Provinces where most workers in this job family live:

West Java (33%)

DKI Jakarta (16%)

** Data source: SAKERNAS (2015-17)

Area Managers, Branch Managers and Regional Managers in Retail

The specific job titles in shortage within the [Production and Operations Manager Not Elsewhere Classified](#) job family are shown below. Discussions with employers suggest that the workers in demand are highly skilled, and require specific soft and technical skills and relevant work experience. However, SAKERNAS data show that most workers in this job family tend to have lower education levels and, hence, lower wages than those reported by employers through the bottom-up analysis and online job portals. An important caveat to consider is that firms that participated in the consultations are likely to be large and formal companies that tend to demand more qualified workers than smaller firms.

Specific Job Titles in Shortage

Area Manager, Branch Manager and Regional Manager in Retail

What did employers tell us about these job titles?

About vacancies:

Small- and medium-sized enterprises tend to accept candidates with a secondary school degree, while medium and large firms require candidates to possess a bachelor's degree.

Almost all firms required less than 2 years of work experience expect for high-level positions that require 4 years of experience.

Most firms needed more than 6 months to fill these positions.

Reason for shortage:

Lack of relevant work experience, soft skills, and technical skills.

Strategies implemented to address the shortage:

Hired less-qualified candidates.

Provided training (including on-the-job training).

Conducted campus-hiring.

Other highlighted details:

Job responsibilities under this occupation include store supervision (including overseeing sales goals, profits and loss analysis, purchasing control, and inventory reporting); and managing businesses in regional branches or field offices.

* Data source: *Bottom-up Call for Evidence and Consultations*. 12 employers indicated shortages for these job titles.

What does the market say about these job titles?

Monthly earnings according to online sources:

Job Titles	Monthly Wages (in IDR)	
	Gross	Estimated Net*
Retail Area Manager	23,961,219	22,763,158
Retail Branch Manager	12,272,226	11,658,615
Retail Regional Manager	30,314,223	28,798,512

Notes: * Estimated net wages were calculated applying the personal income tax rate in steps without any deduction.

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

Job family according to the Indonesian official classification of occupations

KBJI code and title

1227 – Production and Operations Manager Not Elsewhere Classified

What workers in this occupation do

Workers in this group plan, direct, and coordinate a company's activities related to the provision of external company services. They work under the guidance of the president, director, and executive leadership and in consultation with managers from other parts of the company.

Role and tasks include

Plan, direct, and coordinate activities regarding the provision of external corporate services, such as banking, insurance, real estate, data processing, market research, accounting, architecture, mechanical engineering, building cleanliness, technical testing and analysis, and advertising or packaging; ensure efficient use of resources to execute company plans.

Plan and direct daily workstreams; check expenses; establish and direct administrative procedures. Supervise the application of work safety procedures.

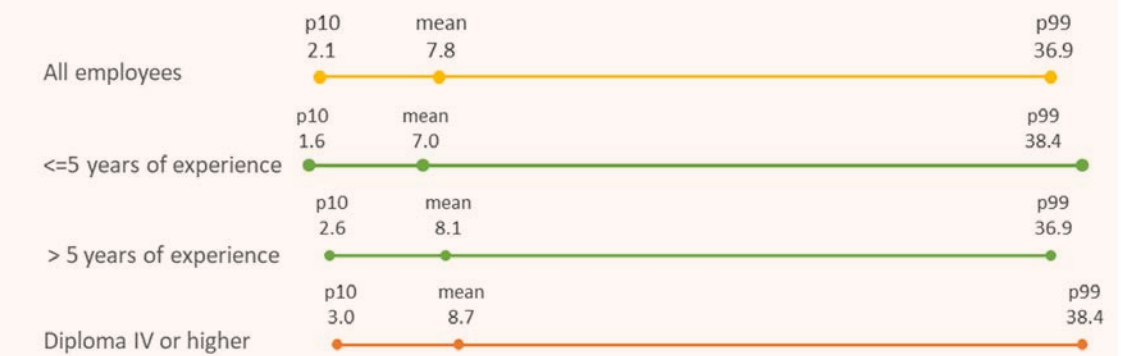
Oversee the selection, training, and performance of employees.

Represent their section to other parts of the company and external bodies.

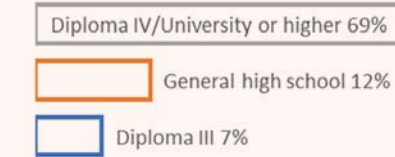
Carry out tasks related to their section; oversee other workforce activities.

What do national statistics say about this job family?

Monthly wage distribution, IDR (million)



Most common education achieved:



Occupation outlook:

	Mean	Percentile 10th to 99th	
Experience (yrs)	12	2	35
Hours worked (wk)	42	31	70
Age	42	28	64

Most common sectors of employment:

Community, social and personal services (39%)
 Finance, insurance, real estate and business services (36%)
 Manufacturing (9%)

Most common fields of study for Diplomas and higher:

Social Science (i.e., Economics and Management) (55%)
 Engineering Studies (i.e., Industrial Engineering, Technology, Environmental Sciences and Mineral Technology) (13%)
 Other Social and Political Science (9%)

Provinces where most workers in this job family live:

West Java (24%)
 DKI Jakarta (11%)
 Banten (10%)

** Data source: *SAKERNAS (2015-17)*

Human Resources Managers

The specific job titles in shortage within the [Personnel and Industrial Relations Department Managers](#) job family are shown below. Discussions with employers suggest that the workers in demand are highly skilled, and require high qualifications and relevant work experience. However, SAKERNAS data show that most workers in this job family tend to have lower education levels and, hence, lower wages than those reported by employers through the bottom-up analysis and online job portals. An important caveat to consider is that firms that participated in the consultations are likely to be large and formal companies that tend to demand more qualified workers than smaller firms.

Specific Job Titles in Shortage

Human Resources Manager (all levels)

What did employers tell us about these job titles?

About vacancies:

Most positions required a bachelor's degree.

Level of work experience ranged from entry, mid- and high level.

Most firms needed 1-3 months to fill these positions, while one firm reported that longer times were needed.

Reason for shortage:

Lack of required technical and non-technical skills.

One international-facing firm reported a lack of English-language skills and abilities to interface with international clients.

Strategies implemented to address the shortage:

No information on strategies to address occupation shortage was collected.

Other highlighted details:

Job responsibilities under this occupation include store supervision (including overseeing sales goals, profits and loss analysis, purchasing control, and inventory reporting); and managing businesses in regional branches or field offices.

* Data source: *Bottom-up Call for Evidence and Consultations*. 4 employers indicated shortages for these job titles.

What does the market say about these job titles?

Monthly earnings according to online sources:

Job Titles	Monthly Wages (in IDR)	
	Gross	Estimated Net*
Human Resources Manager*	25,638,018	24,356,117

Notes: * Estimated net wages were calculated applying the personal income tax rate in steps without any deduction. * Salary for senior position is unavailable but should be expected to be higher.

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

Job family according to the Indonesian official classification of occupations

KBJI code and title

1232 – Personnel and Industrial Relations Department Managers

What workers in this occupation do

Workers in this group plan, direct, and coordinate policies related to personnel and industry related activities. They work under the guidance of the president, director, and executive leadership and in consultation with managers from other sections.

Role and tasks include

Plan, direct, and coordinate policies regarding staffing activities and industrial relations.

Plan and organize procedures to obtain, train, improve, and determine salary structures.

Negotiate salary.

Connect and negotiate with workers on related employment issues.

Supervise safety and health activities with the participation of all relevant stakeholders.

Examine expenditures and ensure efficient use of resources.

Establish and direct operational and administrative procedures.

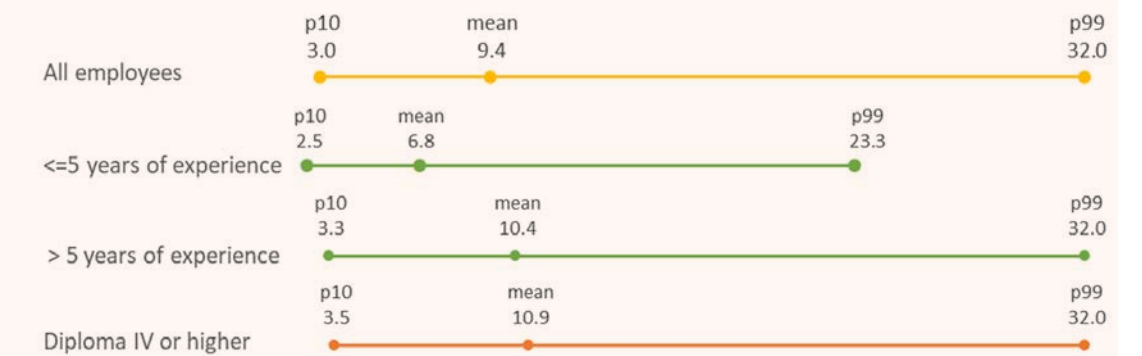
Plan and direct daily activities; oversee the selection, training, and performance of employees.

Represent their section to other parts of the organization and with external bodies.

Carry out tasks related to their section; oversee other workforce activities.

What do national statistics say about this job family?

Monthly wage distribution, IDR (million)



Most common education achieved:

Diploma IV/University or higher (68%)

Most common fields of study for Diplomas and higher:

Social Science (i.e., Economics and Management) (45%)

Occupation outlook:

	Mean	Percentile 10th to 99th	
Experience (yrs)	12	1	33
Hours worked (wk)	43	38	65
Age	43	29	65

Most common sectors of employment:

Community, social and personal services (34%)

Manufacturing (25%)

Finance, insurance, real estate and business services (18%)

Provinces where most workers in this job family live:

West Java (25%)

Banten (19%)

East Java (13%)

** Data source: *SAKERNAS (2015-17)*

Relationship Managers, Brand Managers and Public Relations Managers

Specific Job Titles in Shortage

What did employers tell us about these job titles?

The specific job titles in shortage within the [Sales and Marketing Department Managers](#) job family are shown below. Discussions with employers suggest that the workers in demand are highly skilled, and require specific technical skills and relevant work experience. However, SAKERNAS data show that most workers in this job family tend to have lower education levels and, hence, lower wages than those reported by employers through the bottom-up analysis and online job portals. An important caveat to consider is that firms that participated in the consultations are likely to be large and formal companies that tend to demand more qualified workers than smaller firms.

Relationship Manager; Brand Manager; Public Relations Manager

About vacancies:

Occupations were highly skilled and required a bachelor-level degree and/or relevant vocational training.

The majority of vacancies required a minimum of 2 years of work experience, while higher-level positions required more than 4 years of experience.

Most firms need more than 5 months to fill these positions.

Reason for shortage:

Lack of technical and non-technical skills (e.g., higher-up positions require an advanced set of skills, such as planning and marketing; branding managers require competencies in a widerange of tasks that are based on unique consumer behaviors).

Lack of relevant work experience.

Lack of credentials/certification.

Compensation and benefits between companies are highly competitive, making it difficult to some firms to meet the market rate.

Strategies implemented to address the shortage:

Intensified local recruitment.

Increased training and explored partnerships with educational institutions.

Hired temporary and contract workers.

Other highlighted details:

This occupation requires a specific skillset, analytical skills to conduct market research, an ability to sell products based on unique customer preferences, and an ability to maintain long-term relationships with clients.

Employers in the validation phase (four associations from the television, food, and beverages sectors) reported that soft skills are also needed.

* Data source: Bottom-up Call for Evidence and Consultations. 18 employers indicated shortages for these job titles.

Monthly earnings according to online sources:

Job Titles	Monthly Wages (in IDR)	
	Gross	Estimated Net*
Relationship Manager	18,882,218	17,938,107
Brand Manager	25,964,046	24,665,844
Public Relations Manager	24,690,262	23,455,749

Notes: * Estimated net wages were calculated applying the personal income tax rate in steps without any deduction.

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

Job family according to the Indonesian official classification of occupations

What do national statistics say about this job family?

KBJI code and title

1233 – Sales and Marketing Department Managers

What workers in this occupation do

Workers in this group plan, direct, and coordinate sales and marketing activities for a company or organization. They work under the guidance of the president, director, and executive leadership and in consultation with managers from other sections.

Role and tasks include

Plan, direct and coordinate sales and marketing activities.

Plan and organize specific sales and marketing programs based on market sales and valuation records.

Determine price lists, price cuts, and those relating to delivery, sales promotion funds, sales methods, special incentives, and special campaigns.

Examine expenditures and ensure efficient use of resources.

Establish and direct operational and administrative procedures.

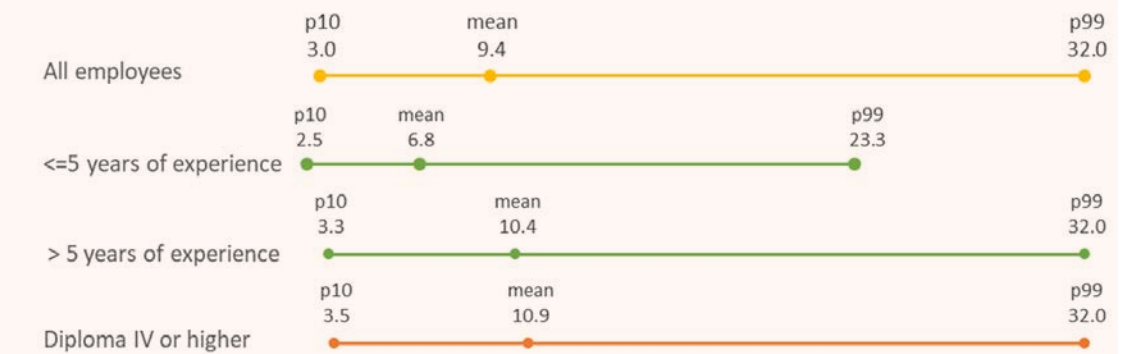
Plan and direct daily activities.

Oversee the selection, training, and performance of employees.

Represent their section to other parts of the company and with external bodies.

Carry out tasks related to their sections; oversee other workforce activities.

Monthly wage distribution, IDR (million)



Most common education achieved:

Diploma IV/University or higher (68%)

Most common sectors of employment:

Community, social and personal services (34%)

Manufacturing (25%)

Finance, insurance, real estate and business services (18%)

Most common fields of study for Diplomas and higher:

Social Science (i.e., Economics and Management) (45%)

Provinces where most workers in this job family live:

West Java (25%)

Banten (19%)

East Java (13%)

Occupation outlook:

	Mean	Percentile 10th to 99th	
Experience (yrs)	12	1	33
Hours worked (wk)	43	38	65
Age	43	29	65

** Data source: SAKERNAS (2015-17)

PPIC Managers and Merchandising Managers

The specific job titles in shortage within the [Supply and Distribution Department Managers](#) job family are shown below. Discussions with employers suggest that the workers in demand are highly skilled, and require high qualifications, specific technical skills and relevant work experience. However, SAKERNAS data show that most workers in this job family tend to have lower education levels and, hence, lower wages than those reported by employers through the bottom-up analysis and online job portals. An important caveat to consider is that firms that participated in the consultations are likely to be large and formal companies that tend to demand more qualified workers than smaller firms.

Specific Job Titles in Shortage

Production Planning and Inventory Control (PPIC) Manager; Merchandising Manager

What did employers tell us about these job titles?

About vacancies:

Most positions required a bachelor's degree.

Most positions required more than 4 years of experience.

Most firms need more than 6 months to fill these positions.

Reason for shortage:

Lack of technical and non-technical skills (i.e., negotiation and leadership skills).

Lack of relevant work experience.

Firms being unable to afford the market salary rate.

Strategies implemented to address the shortage:

Intensified local recruitment efforts through management trainee programs, campus hiring, and outsourcing to head-hunting companies.

Other highlighted details:

Positions under this occupation had a variety of job titles, such as Head of Warehouse, In-Store Logistics Manager, Production Planning and Inventory Control, Stock Inventory Manager, Supply Chain Manager, and Merchandising Manager.

It is critical and urgent for industries to have PPIC personnel with an adequate knowledge of supply chains, especially in light of the 4.0 industry revolution. Firms commonly provide short courses to train prospective employees since there is no specific education program that prepares candidates for this specific role. The Food and Beverage Association strongly agreed that PPIC is a fungible position. However, not many companies are willing to re-train candidates coming from different sectors.

* Data source: *Bottom-up Call for Evidence and Consultations*. 8 employers indicated shortages for these job titles.

What does the market say about these job titles?

Monthly earnings according to online sources:

Job Titles	Monthly Wages (in IDR)	
	Gross	Estimated Net*
Production Planning and Inventory Control (PPIC) Manager	21,919,898	20,823,903
Merchandising Manager	22,017,103	20,916,248

Notes: * Estimated net wages were calculated applying the personal income tax rate in steps without any deduction.

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

Job family according to the Indonesian official classification of occupations

KBJI code and title

1235 – Supply and Distribution Department Managers

What workers in this occupation do

Workers in this group plan, direct, and coordinate the supply and distribution activities of a company or organization. They work under the guidance of the president, director, and executive leadership and in consultation with managers from other sections.

Role and tasks include

Plan, direct, and coordinate supplies, warehousing, and distribution activities for companies or organizations.

Negotiate a purchase contract, agree on price matches with manufacturers, and guarantee the quality of purchased goods; plan and install systems for inventory monitoring.

Examine expenditures and ensure efficient use of resources.

Establish and direct operational and administrative procedures.

Plan and direct daily operations.

Oversee the selection, training and performance of employees.

Represent their section to other parts of the organization or with external bodies.

Carry out tasks related to their section; Oversee other workforce activities.

What do national statistics say about this job family?

Monthly wage distribution, IDR (million)



Most common education achieved:

Diploma IV/University or higher 45%

General high school 19%

Vocational high school 17%

Most common fields of study for Diplomas and higher:

Social Science (i.e., Economics and Management) (55%)

Occupation outlook:

	Mean	Percentile 10th to 99th	
Experience (yrs)	12	2	34
Hours worked (wk)	46	30	84
Age	42	28	68

Most common sectors of employment:

Manufacturing (32%)
Wholesale and retail trade, restaurants, and hotels (19%)

Provinces where most workers in this job family live:

West Java (19%)

** Data source: *SAKERNAS (2015-17)*

Research and Development Managers

The specific job titles in shortage within the [Research and Development Department Managers](#) job family are shown below. Discussions with employers suggest that the workers in demand are highly skilled, and require high qualifications, specific technical skills and relevant work experience. However, SAKERNAS data show that most workers in this job family tend to have lower education levels and, hence, lower wages than those reported by employers through the bottom-up analysis and online job portals. An important caveat to consider is that firms that participated in the consultations are likely to be large and formal companies that tend to demand more qualified workers than smaller firms.

Specific Job Titles in Shortage

Research and Development Manager; Quality Assurance & Quality Control Manager; Sustainability Manager; Continuous Improvement Manager; Corporate Planning Manager

What did employers tell us about these job titles?

About vacancies:

Positions required a high level of skills and qualifications.

Two companies in the chemical and pharmaceutical industry reported that their R&D Manager positions require a master's or PhD degree in addition to more than 5 years of experience with clinical trial or experiments. Other positions, including QA & QC Manager, Sustainability Manager, Continuous Improvement Manager, and Corporate Planning Manager require at least a bachelor's degree and various levels of work experience (from 2 to more than 4 years).

Most firms need 2–6 months to fill these positions.

Reason for shortage:

Skill-based shortage in the labor market, with candidates' credential or certifications, technical skills, and relevant experience not meeting demand.

Low number of applicants (two firms).

Strategies implemented to address the shortage:

Intensified local recruitment efforts.

Provided training programs, including management trainee programs, internships, referral programs, and soliciting the services of head-hunting companies.

Hired international talent (one firm).

Other highlighted details:

Job Titles mentioned during data collection include two types of research and development tasks: research and development in company planning; and research and product development in manufacturing.

Firms nominated a different variety of job titles, each of them requiring various levels of qualifications. For instance, Research and Development Managers in manufacturing firms require education qualification in Engineering or Applied Science while other positions require degree in Social Science. Common field of studies also included Pharmaceutical, Biotechnology, Biochemistry, and Related Life Sciences.

* Data source: *Bottom-up Call for Evidence and Consultations*. 6 employers indicated shortages for these job titles.

Monthly earnings according to online sources:

Job Titles	Monthly Wages (in IDR)	
	Gross	Estimated Net*
Research and Development Manager	35,452,227	33,679,616
Quality Assurance & Quality Control Manager	24,325,740	23,109,453
Sustainability Manager	17,521,337	16,645,270
Continuous Improvement Manager	23,693,903	22,509,208
Corporate Planning Manager*	20,409,814	19,389,323

Notes: * Estimated net wages were calculated applying the personal income tax rate in steps without any deduction. * Salary corresponds to a Financial Planning Manager due to unavailable job title. An alternative job title could also be Corporate Manager, who earn on average IDR 29,238,400 a month.

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

Job family according to the Indonesian official classification of occupations

KBJI code and title

1237 – Research and Development Department Managers

What workers in this occupation do

Workers in this group plan, direct, and coordinate research and development activities for a company or organization. They work under the guidance of the president and executive leadership and in consultation with managers from other sections.

Role and tasks include

Plan, direct, and coordinate research and development activities related to research inside or outside the company.

Develop techniques for processing and production, or the use of new or improved materials.

Plan development program by determining objectives and budget needs.

Examine expenditures and ensure the efficient use of resources.

Determine and direct administrative procedures.

Plan and direct daily tasks.

Oversee the selection, training, and performance of employees.

Represent their section the other parts of the organization or with external bodies.

Carry out tasks related to their section.

Oversee other workforce activities.

What do national statistics say about this job family?

Monthly wage distribution, IDR (million)



Most common education achieved:

Diploma IV/University or higher (84%)

Most common fields of study for Diplomas and higher:

Engineering Studies (i.e., Industrial Engineering, Technology, Environmental Sciences and Mineral Technology) *

Occupation outlook:

	Mean	Percentile 10th to 99th	
Experience (yrs)	15	4	34
Hours worked (wk)	41	35	75
Age	43	33	60

Most common sectors of employment:

Manufacturing *

Provinces where most workers in this job family live:

West Java *

* Small sample for this level of disaggregation. As such these numbers should be interpreted with caution.

** Data source: SAKERNAS (2015–17)

Actuaries and Underwriters

The specific job titles in shortage within the [Mathematicians, Actuaries, and Statisticians](#) job family are shown below. Discussions with employers suggest that the workers in demand are highly skilled, and require specific technical skills, certificates and relevant work experience. However, SAKERNAS data show that most workers in this job family tend to have lower education levels and, hence, lower wages than those reported by employers through the bottom-up analysis and online job portals. An important caveat to consider is that firms that participated in the consultations are likely to be large and formal companies that tend to demand more qualified workers than smaller firms.

Specific Job Titles in Shortage

Actuary; Underwriter

What did employers tell us about these job titles?

About vacancies:

Most firms required a minimum of a bachelor's degree related to actuarial competencies.

Firms are flexible with years of experience since the certification process provides assurance of a candidate's competencies.

Most firms need more than 2 months to fill these positions.

Reason for shortage:

Lack of certifications (e.g., actuarial certification the government requires workers the Fellow Society of Actuary of Indonesia (FSAI) certification).

Lack of work experience and technical skills.

Low number of applicants.

Strategies implemented to address the shortage:

Intensified local recruitment.

Trained existing employees and explored partnerships with educational institutions.

Increased wages based on certifications in order to retain employees.

Other highlighted details:

This occupation has a wide range of responsibilities, which can be summarized as: (i) to conduct a series of risk analyses; (ii) to ensure that business analysis and actuarial reports are in line with the company's objectives and government regulations; and (iii) to provide risk consultancy to customers and underwrite functions that can be used to improve risk management. Strong statistical and analytical skills are required.

Employers indicated that Actuary and Underwriter positions are crucial to the finance and insurance industry.

** Data source: Bottom-up Call for Evidence and Consultations. 21 employers indicated shortages for these job titles.*

Monthly earnings according to online sources:

Job Titles	Monthly Wages (in IDR)	
	Gross	Estimated Net*
Actuary	32,950,785	31,303,246
Underwriter	22,273,422	21,159,751

*Notes: * Estimated net wages were calculated applying the personal income tax rate in steps without any deduction.*

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

Job family according to the Indonesian official classification of occupations

KBJI code and title

2121 – Mathematicians, Actuaries, and Statisticians

What workers in this occupation do

Workers in this group conduct research to improve or develop concepts, theories, methods, and operational techniques related to mathematics and actuarial science. They also provide guidance on the application of mathematics and actuarial science in fields such as engineering, business, medicine, natural science, social science, and life science.

Role and tasks include

Study, improve, and develop mathematical and actuarial theories and techniques.

Provide guidance on the application of principles, models, and techniques in a number of fields such as engineering, agronomy, medicine, and the natural, social, or life sciences.

Conduct logical analysis of management problems, especially in relation to input-output effectiveness, and formulate mathematical models for each problem by programming and solving problems with computers.

Design and implement life insurance, social health systems, and other types of insurance systems; prepare scientific papers and reports.

Complete tasks related to their section of work. Oversee other workforce activities.

Check expenses, establish and direct administrative procedures.

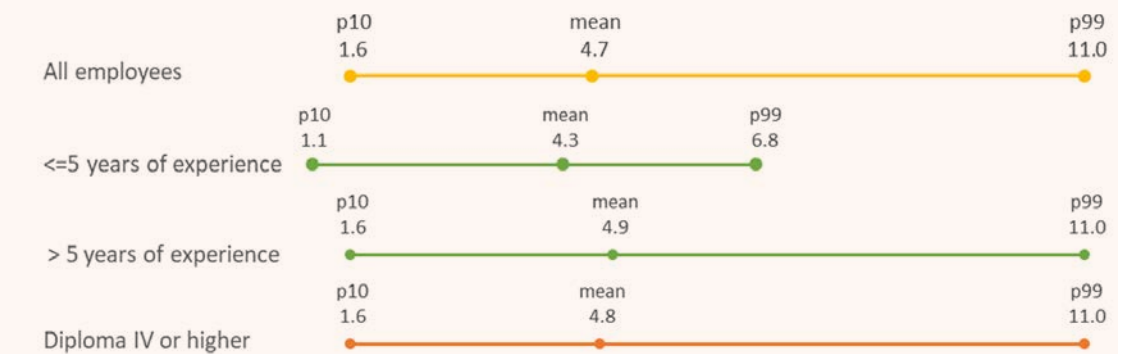
Supervise the implementation of work safety procedures.

Oversee the selection, training, and performance of employees.

Represent their section to other parts of the company or with external bodies.

What do national statistics say about this job family?

Monthly wage distribution, IDR (million)



Most common education achieved:

Diploma IV/University or higher (87%)

Most common sectors of employment:

Community, social and personal services (84%)

Most common fields of study for Diplomas and higher:

Mathematics (57%)

Provinces where most workers in this job family live:

Central Java *

Occupation outlook:

	Mean	Percentile 10th to 99th	
Experience (yrs)	11	1	33
Hours worked (wk)	39	30	56
Age	37	24	63

** Small sample for this level of disaggregation. As such these numbers should be interpreted with caution.*

*** Data source: SAKERNAS (2015-17)*

Professionals in Business Intelligence

The specific job titles in shortage within the [Computer Systems Designers and Analysts](#) job family are shown below. Discussions with employers suggest that the workers in demand are highly skilled, and require specific technical skills and relevant work experience. However, SAKERNAS data show that most workers in this job family tend to have lower education levels and, hence, lower wages than those reported by employers through the bottom-up analysis and online job portals. An important caveat to consider is that firms that participated in the consultations are likely to be large and formal companies that tend to demand more qualified workers than smaller firms.

Specific Job Titles in Shortage

Data Management Expert; Data Scientist; Dev Ops Engineer; Big Data Engineer; Network Engineer; System Analyst; Business Intelligence Analyst

What did employers tell us about these job titles?

About vacancies:

Most firms required a bachelor's degree and a high level of skills.

Work experience requirement varied but most positions required 2 to 4 years.

Most firms needed 1-3 months to fill these positions, while some firms needed up to 6 months.

Reason for shortage:

Lack of technical skills, credentials or certification.

Low number of applicants.

Lack of relevant work experience.

Lack of non-technical skills.

Strategies implemented to address the shortage:

Expanded local recruitment efforts.

Increased training and expanded educational partnerships.

Raised wages.

Outsourced job function and expanded international recruitments.

Hired less-qualified applicants.

Other highlighted details:

Half of employers reported no change in the ease of hiring compared to previous years, and half said that hiring has become more difficult.

The Indonesian government has also addressed this shortage through the e-commerce development initiative.

Most common fields of study included Computer Science and Mathematics.

As digitalization increases, this occupation is becoming more critical to companies and also in shortage. During consultations, firms from the financial and insurance sector (commercial banking sub-sector) shared that they require 2,000 data analytics, data engineers, and data scientists. However, they have only identified 700 qualified candidates.

* Data source: *Bottom-up Call for Evidence and Consultations*. 21 employers indicated shortages for these job titles.

Monthly earnings according to online sources:

Job Titles	Monthly Wages (in IDR)	
	Gross	Estimated Net*
Data Management Expert*	12,867,760	12,224,372
Data Scientist	27,503,942	26,128,745
DevOps Engineer	24,685,376	23,451,107
Big Data Engineer	32,679,064	31,045,111
Network Engineer	27,976,010	26,577,210
System Analyst	24,590,138	23,360,631
Business Intelligence Analyst	25,516,997	24,241,147

Notes: * Estimated net wages were calculated applying the personal income tax rate in steps without any deduction. * Salary corresponds to a Data Management Information Technology Specialist due to unavailable job title.

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

Job family according to the Indonesian official classification of occupations

KBJI code and title

2131 – Computer Systems Designers and Analysts

What workers in this occupation do

Workers in this group conduct research to improve or develop computer operational concepts and their respective applications.

Role and tasks include

Conduct research on the principles and operational methods of computers and computer-based systems for communication and information processing, planning, design, and control processes and production.

Develop and maintain computer software, data structures, databases, algorithms, artificial intelligence, and robotic machines.

Maintain a data dictionary and database management system to ensure data validity and security.

Contribute to and complete the technical development of computers, computer equipment, computer methods, and software, and note these equipment's capabilities and limitations.

Analyze computer user requirements to determine appropriate hardware and software configurations.

Write programming specifications, technical reports, and instruction manuals that explain proper operation and maintenance of computer hardware and software.

Design, write, maintain, and update software by checking the overall functions of a computer.

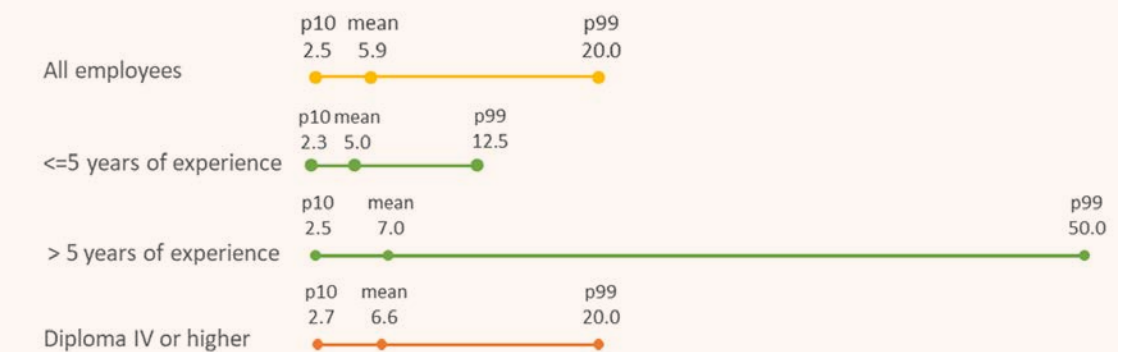
Design and implement communication networks between different computer installations.

Develop computer methods and equipment, including computer languages for writing, documentation, and maintenance of computer software.

Prepare technical papers, scientific reports, documentation, and manuals; do other related tasks.

What do national statistics say about this job family?

Monthly wage distribution, IDR (million)



Most common education achieved:

Diploma IV/University or higher (68%)

Most common fields of study for Diplomas and higher:

Engineering Studies (e.g., Technology, Computer Science) (46%)

Occupation outlook:

	Mean	Percentile 10th to 99th	
Experience (yrs)	7	0	26
Hours worked (wk)	42	35	72
Age	35	22	58

Most common sectors of employment:

Finance, insurance, real estate, and business services (37%)

Provinces where most workers in this job family live:

West Java *

* Small sample for this level of disaggregation. As such these numbers should be interpreted with caution.

** Data source: SAKERNAS (2015-17)

Apps and System Developers

The specific job titles in shortage within the **Computer Programmer** job family are shown below. Discussions with employers suggest that the workers in demand are highly skilled, and require specific technical skills and relevant work experience. However, SAKERNAS data show that most workers in this job family tend to have lower education levels and, hence, lower wages than those reported by employers through the bottom-up analysis and online job portals. An important caveat to consider is that firms that participated in the consultations are likely to be large and formal companies that tend to demand more qualified workers than smaller firms.

Specific Job Titles in Shortage

Apps Developer; Backend Developer; Web Developer; Software Engineer; Programmer; Mobile App Developer

What did employers tell us about these job titles?

About vacancies:

Positions were highly skilled.

Most positions required a bachelor's degree and/or relevant vocational training in computer science or a related subject.

Work experience requirements varied from 2 years to mid- and high-level experience.

On average firms needed more than 5 months to fill these vacancies.

Reason for shortage:

Lack of skills and experience.

Low number of applicants.

Sector has rapidly expanded, especially for start-ups and e-commerce businesses, increasing the demand for workers.

Compensation and benefits between companies are highly competitive, making it difficult to some firms to meet the market rate.

Strategies implemented to address the shortage:

Intensified local recruitment efforts (headhunting, internal referral system, engaging professional communities).

Explored partnerships with education institutions.

Outsourced job function.

Other highlighted details:

Most workers in this occupation usually have studied Computer Science, Mathematics, and Informatics.

During the consultation phase, firms indicated that long-term planning (5 or 10 years) amongst start-up and e-commerce companies is nearly impossible due to industry-specific short-term vulnerabilities and changes. Therefore, these firms need talent that can adapt alongside fast-changing technology and operate the newest technological tools.

* Data source: Bottom-up Call for Evidence and Consultations. 34 employers indicated shortages for these job titles.

What does the market say about these job titles?

Monthly earnings according to online sources:

Job Titles	Monthly Wages (in IDR)	
	Gross	Estimated Net ^o
Apps Developer	25,600,618	24,320,587
Backend Developer*	21,285,907	20,221,612
Web Developer	24,760,377	23,522,358
Software Engineer	25,600,618	24,320,587
Programmer	24,382,067	23,162,964
Mobile App Developer**	25,600,618	24,320,587

Notes: ^o Estimated net wages were calculated applying the personal income tax rate in steps without any deduction. * Salary corresponds to a Front End Developer due to unavailable job title. ** Salary corresponds to an App Developer due to unavailable job title.

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

Job family according to the Indonesian official classification of occupations

KBJI code and title

2132 – Computer Programmer

What workers in this occupation do

Workers in this group conduct research to improve or develop computer operational concepts and methods, and they provide guidance on related applications.

Role and tasks include

Write, test, and maintain computer programs to meet the needs of computer system users.

Study program intentions, desired results, and sources of data input.

Perform needed internal checks and controls in consultation with a Computer System Designer, Analyst, and Subject Matter Expert.

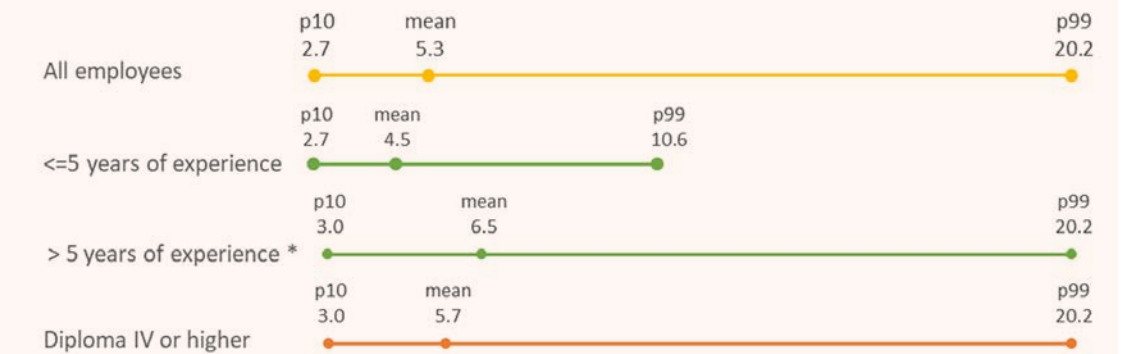
Prepare a detailed workflow chart and diagram to logically establish a series of steps for data input and computer processing operations.

Write and provide detailed computer program documentation in machine codes, assemblers/high-level languages such as PL/1, Cobol, Fortran, Pascal, Basic or C.

Rest programs to reduce errors; Maintain computer programs and documentation to monitor input or output specifications or changes in software configurations.

What do national statistics say about this job family?

Monthly wage distribution, IDR (million)



Most common education achieved:

Diploma IV/University or higher (76%)

Most common fields of study for Diplomas and higher:

Engineering Studies (e.g., Technology, Computer Science) *

Occupation outlook:

	Mean	Percentile 10th to 99th
Experience (yrs)	5	0 21
Hours worked (wk)	41	31 56
Age	32	23 51

Most common sectors of employment:

Finance, insurance, real estate, and business services (52%)

Provinces where most workers in this job family live:

DKI Jakarta *

* Small sample for this level of disaggregation. As such these numbers should be interpreted with caution.

** Data source: SAKERNAS (2015-17)

Cloud Solution Architects and UI/UX Designers

The specific job titles in shortage within the [Computing Professionals Not Elsewhere Classified](#) job family are shown below. Discussions with employers suggest that the workers in demand are highly skilled, and require high qualifications, specific technical skills and relevant work experience. However, SAKERNAS data show that most workers in this job family tend to have lower education levels and, hence, lower wages than those reported by employers through the bottom-up analysis and online job portals. An important caveat to consider is that firms that participated in the consultations are likely to be large and formal companies that tend to demand more qualified workers than smaller firms.

Specific Job Titles in Shortage

Cloud Solution Architect; UI/UX Designer

What did employers tell us about these job titles?

About vacancies:

Most firms required a bachelor's degree, while only one firm accepted vocational high school graduates.

Most positions required 2-4 years of work experience, few firms accepted less than 2 years, and one firm required more than 4 years.

Most firms needed more than 5-6 months to fill these positions, while some firms needed 1-3 months.

Reason for shortage:

Lack of technical skills.

Low number of applicants.

Lack of relevant work experience.

Candidates expect compensation above current market rates (that are unaffordable).

Strategies implemented to address the shortage:

Intensified training offerings.

Outsourced job function.

Increased working hours.

Expanded local recruitment.

Hired less-qualified candidates.

Hired internationally (two information and communication firms, one of which is a multinational company).

Other highlighted details:

The main responsibilities for these positions include designing and managing a computing-based system that combines several technologies.

* Data source: Bottom-up Call for Evidence and Consultations. 8 employers indicated shortages for these job titles.

What does the market say about these job titles?

Monthly earnings according to online sources:

Job Titles	Monthly Wages (in IDR)	
	Gross	Estimated Net*
Cloud Solution Architect	28,312,881	26,897,237
UI/UX Designer – User Experience	21,431,251	20,359,688
UI/UX Designer – Web Interface	24,760,377	23,522,358

Notes: * Estimated net wages were calculated applying the personal income tax rate in steps without any deduction.

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

Job family according to the Indonesian official classification of occupations

KBJI code and title

2139 – Computing Professionals Not Elsewhere Classified

What workers in this occupation do

Workers in this group conduct research to improve or develop computer operational concepts and methods, and they provide guidance on the practical application of these concepts. This group includes computer experts who are not classified elsewhere. For example, workers in this category have a general knowledge of hardware, software, or both hardware and computer software.

Role and tasks include

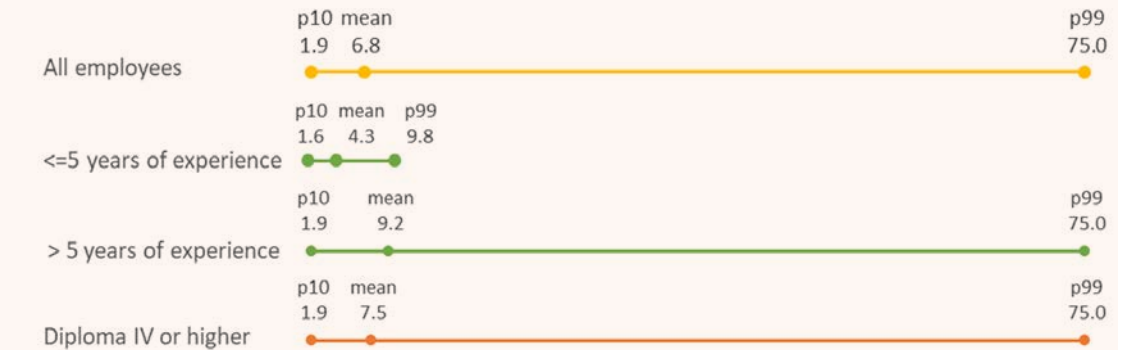
Design and implement computer software applications and computer operating systems.

Maintain and repair computer software applications and computer operating systems.

Assemble computers and make diagnoses on computer hardware; perform other related tasks.

What do national statistics say about this job family?

Monthly wage distribution, IDR (million)



Most common education achieved:

Diploma IV/University or higher (60%)

Most common sectors of employment:

Finance, insurance, real estate, and business services (46%)

Most common fields of study for Diplomas and higher:

Engineering Studies (e.g., Technology, Computer Science) *

Provinces where most workers in this job family live:

West Java *

Occupation outlook:

	Mean	Percentile 10th to 99th	
Experience (yrs)	6	1	30
Hours worked (wk)	46	35	82
Age	33	23	50

* Small sample for this level of disaggregation. As such these numbers should be interpreted with caution.

** Data source: SAKERNAS (2015-17)

Civil Engineers

The specific job titles in shortage within the [Civil Engineer](#) job family are shown below. Discussions with employers suggest that the workers in demand are highly skilled, and require high qualifications, specific technical skills and relevant work experience. However, SA-KERNAS data show that most workers in this job family tend to have lower education levels and, hence, lower wages than those reported by employers through the bottom-up analysis and online job portals. An important caveat to consider is that firms that participated in the consultations are likely to be large and formal companies that tend to demand more qualified workers than smaller firms.

Specific Job Titles in Shortage

Road Engineer; Drainage Engineer; Sanitary Engineer; Waste Experts

What did employers tell us about these job titles?

About vacancies:

Positions were highly skilled.

Most firm required a bachelor's degree and more than 10 years of work experience.

Some positions required specific professional certifications in road construction, drainage, sanitary, or waste management.

Reason for shortage:

Lack of technical skills

One company reported that this occupation requires employees to be able to adapt to fast-changing technology, and not all existing employees are able to keep up with technological change.

There are also strict government regulations on construction-related activities.

Strategies implemented to address the shortage:

Outsourced job function.

Increased job training and collaborated with education institutions.

** Data source: Bottom-up Call for Evidence and Consultations. 2 employers indicated shortages for these job titles.*

What does the market say about these job titles?

Monthly earnings according to online sources:

Job Titles	Monthly Wages (in IDR)	
	Gross	Estimated Net*
Road Engineer	19,873,820	18,880,129
Drainage Engineer	19,141,627	18,184,546
Sanitary Engineer	24,911,701	23,666,116
Waste Experts*	28,032,757	26,631,119

Notes: * Estimated net wages were calculated applying the personal income tax rate in steps without any deduction. * Salary corresponds to a Waste Management Engineer due to unavailable job title.

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

Job family according to the Indonesian official classification of occupations

KBJI code and title

2142 – Civil Engineer

What workers in this occupation do

Workers in this group conduct research, and guide, design, and lead the development, implementation, and maintenance of civil engineering structures. They also study and provide guidance on the technological aspects of certain materials.

Role and tasks include

Conduct research and develop new theories and methods related to civil engineering.

Provide guidance and design building structures such as bridges, dams, docks, highways, airports, railways, canals, pipelines, flood control and drainage systems, industrial buildings, and other large buildings. Determine construction methods, materials, and quality standards for projects.

Direct construction work; establish a control system to ensure efficient structural functioning and safety and environmental protection; and determine the place and correct usage of fail-safes.

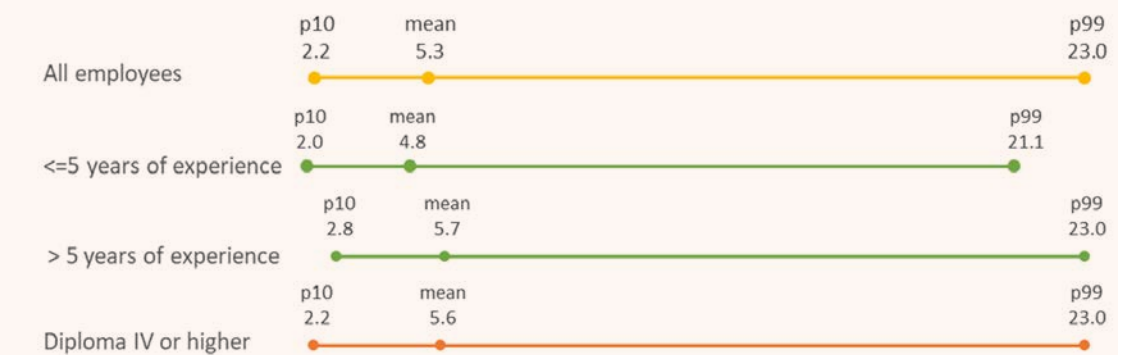
Regulate and direct the maintenance and repair of existing structures.

Study and give instructions on the technological aspects of certain materials.

Maintain technical relations with other relevant specialists; prepare scientific papers and reports.

What do national statistics say about this job family?

Monthly wage distribution, IDR (million)



Most common education achieved:

Diploma IV/University or higher 70%

Diploma III 17%

Most common fields of study for Diplomas and higher:

Engineering Studies (e.g., Civil Engineering) (97%)

Occupation outlook:

	Mean	Percentile 10th to 99th	
Experience (yrs)	5	0	21
Hours worked (wk)	41	31	56
Age	32	23	51

Most common sectors of employment:

Construction (50%)
Finance, insurance, real estate and business services (25%)
Community, social and personal services (20%)

Provinces where most workers in this job family live:

West Java (31%)

** Data source: SAKERNAS (2015-17)

Chemical Engineers

The specific job titles in shortage within the **Chemical Engineers** job family are shown below. Discussions with employers suggest that the workers in demand are highly skilled, and require high qualifications, specific technical skills and relevant work experience. However, SA-KERNAS data show that most workers in this job family tend to have lower education levels and, hence, lower wages than those reported by employers through the bottom-up analysis and online job portals. An important caveat to consider is that firms that participated in the consultations are likely to be large and formal companies that tend to demand more qualified workers than smaller firms.

Specific Job Titles in Shortage

Food Technologist; Food Engineering Technician; Chemical Engineer; Research and Development Engineer

What did employers tell us about these job titles?

About vacancies:

Most positions required a bachelor's degree.

Work experience requirements varied between less than 2 years to more than 2 years.

Most firms needed 3 months to fill these vacancies and the recruitment process may take up to 6 months.

Reason for shortage:

Lack of relevant experience and technical skills among applicants.

Low number of applicants.

Candidates expect compensation above current market rates (that are unaffordable).

Strategies implemented to address the shortage:

Intensified local recruitment efforts.

Recruited international talent.

Some firms provided skills training and/or looked into actively cooperating with education or training institutions.

Some firms considered hiring contractual workers or outsourcing.

Other highlighted details:

Technical skills are required for these positions, as they are essential to enhancing product efficiency, ensuring quality control in line with safety and health codes, and conducting research and providing insight to management team.

One firm said this job function may become automated, which will help overcome talent shortage.

** Data source: Bottom-up Call for Evidence and Consultations. 6 employers indicated shortages for these job titles.*

What does the market say about these job titles?

Monthly earnings according to online sources:

Job Titles	Monthly Wages (in IDR)	
	Gross	Estimated Net [°]
Food Technologist	18,083,209	17,179,049
Food Engineering Technician*	10,875,558	10,331,780
Chemical Engineer	26,620,459	25,289,436
Research and Development Engineer	26,254,362	24,941,644

Notes: [°] Estimated net wages were calculated applying the personal income tax rate in steps without any deduction. * Salary corresponds to a Food Science Technician due to unavailable job title.

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

Job family according to the Indonesian official classification of occupations

KBJI code and title

2146 – Chemical Engineers

What workers in this occupation do

Workers in this group carry out research. They develop, instruct, and direct the chemical processes trade and the production of various chemical substances, such as crude oil, fuel, food and beverage products, drugs or synthetic materials. Workers also carry out maintenance and repairs from industrial plants and study and provide instructions on the technological aspects of certain materials, goods, or processes.

Role and tasks include

Conduct research and suggest trade-scale chemical processes for refining crude oil and other liquids or gases, and to produce substances and goods such as fuel, explosives, food and beverage products, medicines or artificial materials; specify relevant aspects of chemical plant construction.

Specify production methods, materials, and quality standards to ensure that they are in accordance with relevant regulations.

Determine standard controls and procedures to ensure safety and efficiency of production work; place and correct usage failures.

Organize and carry out maintenance and repairs of existing equipment.

Study technological aspects of certain materials, products, and processes.

Maintain technical connections and negotiate with relevant experts.

Prepare scientific papers and reports.

What do national statistics say about this job family?

Monthly wage distribution, IDR (million)



Most common education achieved:

Diploma IV/University or higher *

Most common fields of study for Diplomas and higher:

Engineering Studies *

Occupation outlook:

	Mean	Percentile 10th to 99th	
Experience (yrs)	14	2	34
Hours worked (wk)	45	35	76
Age	37	23	54

Most common sectors of employment:

Manufacturing *

Provinces where most workers in this job family live:

West Java *

** Small sample for this level of disaggregation. As such these numbers should be interpreted with caution.*

*** Data source: SAKERNAS (2015-17)*

Environmental Engineers, Production Engineers and Process Engineers

The specific job titles in shortage within the [Architects, Engineers, and Related Professionals Not Elsewhere Classified](#) job family are shown below. Discussions with employers suggest that the workers in demand are highly skilled, and require specific technical skills and relevant work experience. However, SAKERNAS data show that most workers in this job family tend to have lower education levels and, hence, lower wages than those reported by employers through the bottom-up analysis and online job portals. An important caveat to consider is that firms that participated in the consultations are likely to be large and formal companies that tend to demand more qualified workers than smaller firms.

Specific Job Titles in Shortage

Environmental Engineer; Production Engineer; Process Engineer

What did employers tell us about these job titles?

About vacancies:

Most position required at least a 3-year diploma, while some companies required a bachelor's degree.

Work experience requirements varied ranging from entry-level positions (less than 2 years) to senior-level positions (more than 4 years).

Most firms needed 3-7 months to fill these positions.

Reason for shortage:

Lack of technical skills and relevant work experience.

Strategies implemented to address the shortage:

Increased wages.

Hired less-qualified workers.

Increased training.

Outsourced job function.

Other highlighted details (Jobs within this occupation include contract engineers, production engineers, and environmental engineers. Specific job descriptions varied):

Contract engineers: work included ensuring that construction work meets contractual rules.

Engineer: work included designing the construction of small and large vehicles such as buses exterior, interior, electrical and pneumatic systems in retail and reparation of motor vehicles.

Environmental engineer: work required environmental impact analysis (write up and present health and safety plan).

* Data source: Bottom-up Call for Evidence and Consultations. 7 employers indicated shortages for these job titles.

What does the market say about these job titles?

Monthly earnings according to online sources:

Job Titles	Monthly Wages (in IDR)	
	Gross	Estimated Net ^o
Environmental Engineer	21,285,907	20,221,612
Production Engineer	23,037,941	21,886,044
Process Engineer	21,730,453	20,643,930

Notes: ^o Estimated net wages were calculated applying the personal income tax rate in steps without any deduction.

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

Job family according to the Indonesian official classification of occupations

KBJI code and title

2149 – Architects, Engineers, and Related Professionals Not Elsewhere Classified

What workers in this occupation do

This group includes architects, engineers, and other experts who are not classified elsewhere in Sub-group 214: Architecture, Engineers and Experts. For example, workers in this classification include those who take part in research, give instructions or develop

procedures regarding the efficiency of production or work organizations, conduct quantity research, and study and give instructions on technological aspects of certain materials, products and industrial processes.

Role and tasks include

Consult with leaders and staff supervisors and provide instructions on how to plan and produce a material.

Consult with leaders and staff supervisors, and provide instructions on ways to improve efficiency, safety, and use of economic resources from personnel, materials, and equipment.

Make recommendations regarding work methods and oversee their implementation.

Make recommendations and oversee aspects of time and motion of a work organization.

Advise land planning, identify potential hazards.

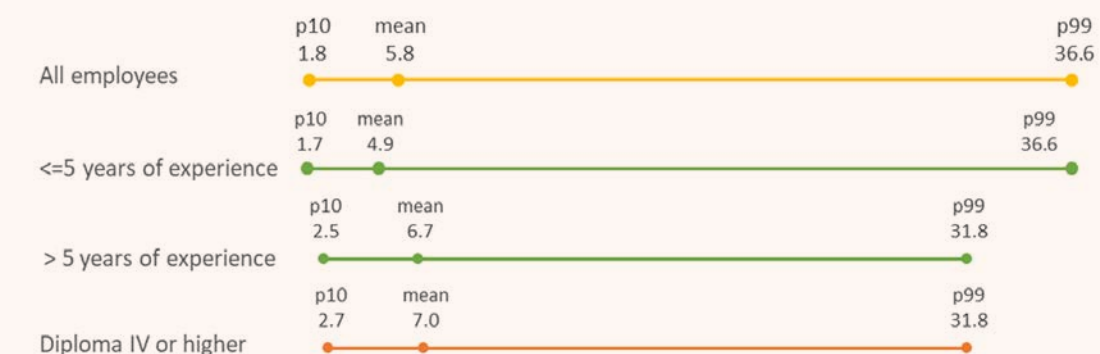
Prepare and supervise estimates of costs and bills for architectural and construction work.

Study and advise on technological aspects of certain industrial processes, such as those related to glass, ceramics, textiles, leather products, wood and printing.

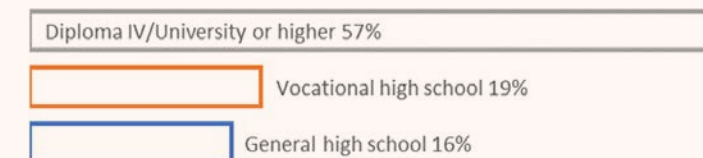
Prepare scientific papers and reports.

What do national statistics say about this job family?

Monthly wage distribution, IDR (million)



Most common education achieved:



Occupation outlook:

	Mean	Percentile 10th to 99th	
Experience (yrs)	8	2	29
Hours worked (wk)	44	35	84
Age	38	23	69

Most common sectors of employment:

Manufacturing (34%)
Construction (24%)
Finance, insurance, real estate and business services (21%)

Most common fields of study for Diplomas and higher:

Engineering Studies (i.e., Industrial Engineering, Technology, Environmental Sciences and Mineral Technology) (60%)

Provinces where most workers in this job family live:

West Java (29%)
DKI Jakarta (18%)

** Data source: SAKERNAS (2015-17)

Biochemical Researchers and Bioscientists

The specific job titles in shortage within the **Biologists, Botanists, Zoologists, and Related Professionals** job family are shown below. Discussions with employers suggest that the workers in demand are highly skilled, and require high qualifications, specific technical skills and relevant work experience. However, SAKERNAS data show that most workers in this job family tend to have lower education levels and, hence, lower wages than those reported by employers through the bottom-up analysis and online job portals. An important caveat to consider is that firms that participated in the consultations are likely to be large and formal companies that tend to demand more qualified workers than smaller firms.

Specific Job Titles in Shortage

Biochemical Researcher; Bioscientist

What did employers tell us about these job titles?

About vacancies:

Most positions required a bachelor's degree, while others required a three-year diploma, a master's degree, or a PhD.

Work experience requirements varied from entry level (requiring less than 2 years) to more experienced levels (more than 4 years).

Most firms needed 5 months to fill these positions.

Reason for shortage:

Lack of credentials/certifications.

Lack of relevant work experience.

Lack of technical skills (one firm).

One biopharmaceutical company stated that their sub-sector is new to Indonesia, making it harder to find candidates who possess the necessary certifications.

Another company reported retention difficulties for entry-level biologists, who leave for post-graduate study, which does not necessarily point to critical skills gaps.

Strategies implemented to address the shortage:

Increased worker training.

Hired less well-qualified workers.

Expanded recruitment both nationally and internationally (two firms).

Other highlighted details:

Most common fields of study included Pharmacy, Apothecary, Biology, Microbiology, and Biotechnology.

Evidence suggests that there are significant shortages at the expert level, while there are some hiring difficulties at the entry-level due to worker turnover. Further research into the nature and impact of this occupation's shortage may be needed, however, as certification challenges and new pharmaceutical activities may also be primary drivers.

* Data source: *Bottom-up Call for Evidence and Consultations. 5 employers indicated shortages for these job titles.*

What does the market say about these job titles?

Monthly earnings according to online sources:

Job Titles	Monthly Wages (in IDR)	
	Gross	Estimated Net*
Biochemical Researcher*	21,835,052	20,743,299
Bioscientist	17,468,042	16,594,640

Notes: * Estimated net wages were calculated applying the personal income tax rate in steps without any deduction.* Salary corresponds to a Biochemical R&D Technician due to unavailable job title.

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

Job family according to the Indonesian official classification of occupations

KBJI code and title

2211 – Biologists, Botanists, Zoologists, and Related Professionals

What workers in this occupation do

Workers in this group conduct research, improve, or develop concepts, theories and operational methods, and recommend specific applications of science related to biology, microbiology, bacteriology, cytology, genetics, zoology, botany, anatomy, biochemistry,

biophysics, physiology, pathology, or pharmacology in several fields such as medicine, agriculture, or industry.

Role and tasks include

Conduct research, improve, or develop the concepts, theories, and operational methods of their respective field.

Study and experiment with the shape, structure, and other anatomical characteristics of living organisms.

Study and conduct experiments on the chemical composition and life processes.

Study and conduct experiments concerning the process and function of human life, animals or plant organs, tissues, cells, glands and systems under normal, abnormal, or extraordinary conditions.

Study and carry out experiments concerning the nature, causes, and development of diseases and chaos of humans, animals, and plants.

Study and conduct experiments on the effects of drugs and other substances on tissues, organs, and physiological processes of human and animal bodies to improve existing drugs or develop new drugs.

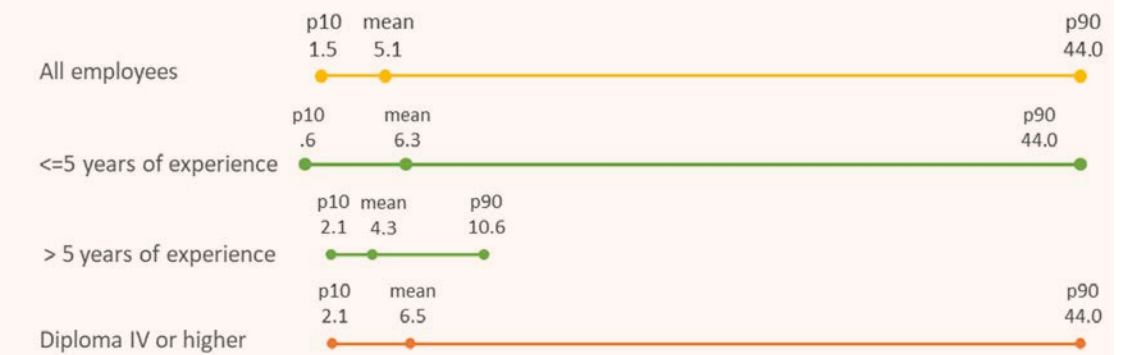
Develop potential biological applications in industry, medicine, and other sciences.

Prepare scientific papers and reports.

Perform other related tasks; oversee other workforce activities.

What do national statistics say about this job family?

Monthly wage distribution, IDR (million)



Most common education achieved:

Diploma IV/University or higher 60%

Diploma III 17%

Most common fields of study for Diplomas and higher:

Engineering Studies (i.e., Industrial Engineering, Technology, Environmental Sciences and Mineral Technology) *

Occupation outlook:

	Mean	Percentile 10th to 99th	
Experience (yrs)	12	1	35
Hours worked (wk)	41	33	72
Age	39	23	58

Most common sectors of employment:

Community, social and personal services (82%)

Provinces where most workers in this job family live:

West Java (21%)

* Small sample for this level of disaggregation. As such these numbers should be interpreted with caution.

** Data source: SAKERNAS (2015-17)

Specialist Doctors

The specific job titles in shortage within the **Medical Doctors** job family are shown below. Discussions with employers suggest that the workers in demand are highly skilled, and require high qualifications, specific technical skills and relevant work experience. However, SA-KERNAS data show that most workers in this job family tend to have lower education levels and, hence, lower wages than those reported by employers through the bottom-up analysis and online job portals. An important caveat to consider is that firms that participated in the consultations are likely to be large and formal companies that tend to demand more qualified workers than smaller firms.

Specific Job Titles in Shortage

Anesthesiologist; Clinical Pathology Specialist; Pediatrician; Surgeon; Neurologist

What did employers tell us about these job titles?

About vacancies:

All positions required a minimum of a bachelor's degree and for specialist positions a master's degree.

Work experience requirements varied: most positions were entry-level (requiring less than 2 years of experience), while others required 2-4 years or more than 4 years of experience.

Most firms needed more than 6 months to fill these positions.

Reason for shortage:

Low number of applicants.

Candidates expect compensation above current market rates (that are unaffordable).

Lack of credentials, certifications, and technical skills.

Strategies implemented to address the shortage:

Intensified local recruitment efforts.

Hired temporary employees.

Expanded partnerships with universities.

* Data source: Bottom-up Call for Evidence and Consultations. 9 employers indicated shortages for these job titles.

What does the market say about these job titles?

Monthly earnings according to online sources:

Job Titles	Monthly Wages (in IDR)	
	Gross	Estimated Net*
Anesthesiologist	91,131,926	82,462,137
Clinical Pathology Specialist*	12,881,449	12,237,377
Pediatrician	55,542,098	52,210,783
Surgeon	89,510,641	81,084,045
Neurologist	69,296,873	63,902,342

Notes: * Estimated net wages were calculated applying the personal income tax rate in steps without any deduction. * Salary corresponds to a Pathology Technician due to unavailable job title.

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

Job family according to the Indonesian official classification of occupations

KBJI code and title

2221 – Medical Doctors

What workers in this occupation do

Workers in this group conduct research, improve and develop operational concepts, theories, and methods, and apply prevention or treatment methods.

Role and tasks include

Conduct research on human diseases and prevention and healing methods.

Carry out medical examinations and make diagnoses.

Prescribe and provide treatment measures for a diagnosed illness or paralysis.

Provide special treatment or surgery for certain types of illnesses or disorders.

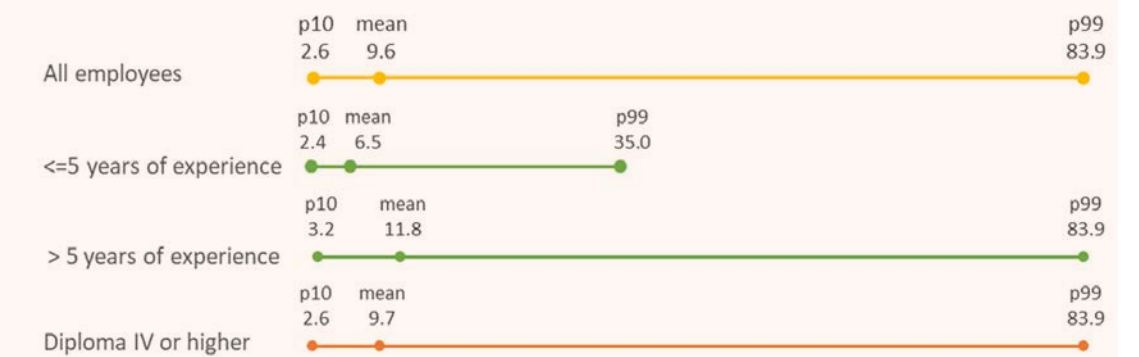
Provide advice about and implement prevention and treatment methods.

Participate in the development and implementation of public health laws and laws for the protection and improvement of public health.

Prepare scientific papers and reports.

What do national statistics say about this job family?

Monthly wage distribution, IDR (million)



Most common education achieved:

Diploma IV/University or higher (99%)

Most common sectors of employment:

Community, social and personal services (92%)

Most common fields of study for Diplomas and higher:

Medical, Dentistry & Specialist (97%)

Provinces where most workers in this job family live:

DKI Jakarta (19%);

West Java (18%);

East Java (15%)

Occupation outlook:

	Mean	Percentile 10th to 99th
Experience (yrs)	10	1 42
Hours worked (wk)	42	24 91
Age	40	27 73

** Data source: SAKERNAS (2015-17)

Education Method Specialists

The specific job titles in shortage within the **Education Method Specialists** job family are shown below. Discussions with employers suggest that the workers in demand are highly skilled, and require high qualifications, specific technical skills and relevant work experience. However, SAKERNAS data shows that most workers in this job family tend to have lower education levels and, hence, lower wages than those reported by employers through the bottom-up analysis and online job portals. An important caveat to consider is that firms that participated in the consultations are likely to be large and formal companies that tend to demand more qualified workers than smaller firms.

Specific Job Titles in Shortage

Curriculum Planner

What did employers tell us about these job titles?

About vacancies:

Positions were highly skilled requiring mostly a bachelor's degree (one firm required a PhD.).

Required work experience varied from entry-level (<2 years) to senior-level (> 4 years).

Most firms needed more than 5 months to fill these positions.

Reason for shortage:

Lack of technical and non-technical skills.

Applicants demand salaries higher than what the institutions can afford.

Low number of applicants.

Strategies implemented to address the shortage:

Hired less-qualified applicants.

Increased wages.

Increased worker training and expanded partnerships with training providers.

Outsourced job function.

Other highlighted details:

Specific nominated jobs titles include Curriculum Planner and Subject-Content Coordinator. Tasks for these positions include analyzing education market needs, developing curriculums to improve life skills and character building, and developing syllabi learning tools and resources. The Subject-Content Coordinator role is a niche profession in the IT tertiary education field and is likely unique to the nominating institution.

* Data source: Bottom-up Call for Evidence and Consultations. 3 employers indicated shortages for these job titles.

What does the market say about these job titles?

Monthly earnings according to online sources:

Job Titles	Monthly Wages (in IDR)	
	Gross	Estimated Net*
Curriculum Planner	20,083,018	19,078,867

Notes: * Estimated net wages were calculated applying the personal income tax rate in steps without any deduction.

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

Job family according to the Indonesian official classification of occupations

KBJI code and title

2461 – Education Method Specialists

What workers in this occupation do

Workers in this group conduct research and develop or give instructions on teaching methods and demonstrations.

Role and tasks include

Conduct research on new curriculum developments.

Teach other educational methods and exercises.

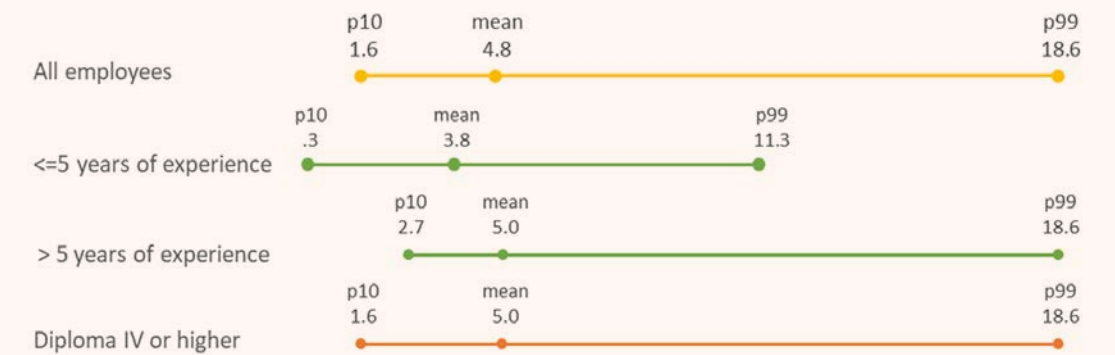
Provide advice on necessary curriculum changes and possible improvements.

Give instructions on course contents and testing methods.

Conduct research on teaching aids, provide advice, plan, and organize an introduction in education establishments, and prepare reports.

What do national statistics say about this job family?

Monthly wage distribution, IDR (million)



Most common education achieved:

Diploma IV/University or higher (88%)

Most common fields of study for Diplomas and higher:

Education & Teacher Training (e.g., Language Education, Social Studies Education) (63%)

Occupation outlook:

	Mean	Percentile 10th to 99th	
Experience (yrs)	18	3	36
Hours worked (wk)	38	28	84
Age	48	33	60

Most common sectors of employment:

Community, social and personal services (96%)

Provinces where most workers in this job family live:

West Java (20%)

** Data source: SAKERNAS (2015-17)

Senior Legal Officers and General Affairs Manager Assistants

The specific job titles in shortage within the [Legal Professionals Not Elsewhere Classified](#) job family are shown below. Discussions with employers suggest that the workers in demand are highly skilled, and require high qualifications, specific technical skills and relevant work experience. However, SAKERNAS data show that most workers in this job family tend to have lower education levels and, hence, lower wages than those reported by employers through the bottom-up analysis and online job portals. An important caveat to consider is that firms that participated in the consultations are likely to be large and formal companies that tend to demand more qualified workers than smaller firms.

Specific Job Titles in Shortage

Senior Legal Officer; General Affairs Manager Assistant

What did employers tell us about these job titles?

About vacancies:

Positions were professional-level skills. Educational requirements varied from a 3-year diploma to a master's degree.

Work experience requirements varied from less than 2 years to more than 4 years.

Most firms needed more than 6 months to fill these positions.

Reason for shortage:

Lack of relevant work experience and a lack of credentials and certification.

Candidates expect compensation above current market rates (that are unaffordable).

Strategies implemented to address the shortage:

Used local recruitment, network recommendations, and referral programs.

Other highlighted details:

There is demand for workers who can handle legal documents and execute legal functions, specifically related to corporate law, litigation, and foreign worker documents.

Job descriptions for nominated job titles varied:

Senior Legal Officers: tasks included to handle legal paperwork and maintain legal activities, especially for corporate law and litigation.

General Affairs Manager Assistants: tasks included to manage a company's legal documents and foreign workers.

** Data source: Bottom-up Call for Evidence and Consultations. 6 employers indicated shortages for these job titles.*

What does the market say about these job titles?

Monthly earnings according to online sources:

Job Titles	Monthly Wages (in IDR)	
	Gross	Estimated Net*
Senior Legal Officer*	24,192,912	22,983,266
General Affairs Manager Assistant**	13,829,540	13,138,063

Notes: * Estimated net wages were calculated applying the personal income tax rate in steps without any deduction. * Salary corresponds to a Legal Officer due to unavailable job title. An alternative job title could also be Top Legal Officer, who earn on average IDR 41,493,189 a month. ** Salary corresponds to a Legal Office Assistant due to unavailable job title.

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

Job family according to the Indonesian official classification of occupations

KBJI code and title

2519 – Legal Professionals Not Elsewhere Classified

What workers in this occupation do

Workers in this group include legal experts who are not classified elsewhere in Subgroup 251: Legal Experts. For example, this category includes workers who specialize in legal tasks other than defense, prosecution, and court work leadership.

Role and tasks include

Provide advice on the legal aspects of various types of staffing, business, and administrative matters.

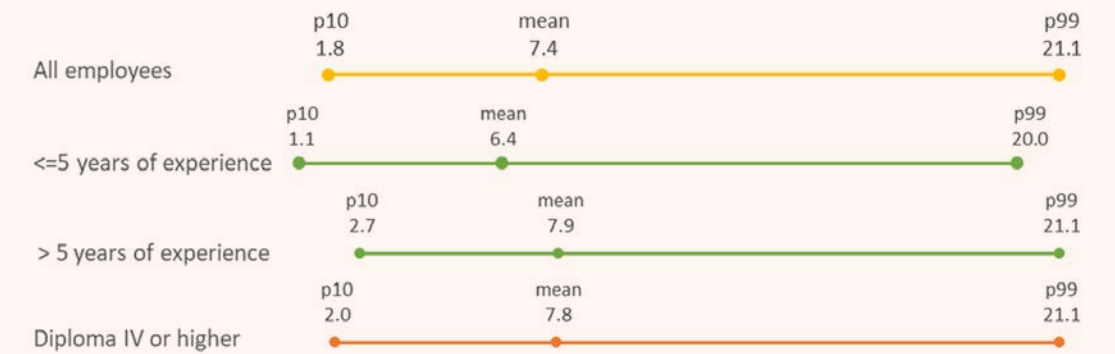
Compile legal contracts and arrange transfers of rights.

Determine by examination why the cause of death is unclear.

Carry out other related tasks, and oversee other workforce activities.

What do national statistics say about this job family?

Monthly wage distribution, IDR (million)



Most common education achieved:

Diploma IV/University or higher (93%)

Most common fields of study for Diplomas and higher:

Law (72%) – Specific majors include Legal studies (i.e. Notary, Judicial Administration)

Other Social and Political Sciences (19%)

Most common sectors of employment:

Finance, insurance, real estate, and business services (76%)

Community, social and personal services (22%)

Provinces where most workers in this job family live:

Banten (21%)

West Java (17%)

Occupation outlook:

	Mean	Percentile 10th to 99th	
Experience (yrs)	12	2	33
Hours worked (wk)	40	32	60
Age	41	26	62

** Data source: SAKERNAS (2015–17)

Professionals in Business Management

The specific job titles in shortage within the **Business Professionals not elsewhere classified** job family are shown below. Discussions with employers suggest that the workers in demand are highly skilled, and require high qualifications, specific technical skills and relevant work experience. However, SAKERNAS data show that most workers in this job family tend to have lower education levels and, hence, lower wages than those reported by employers through the bottom-up analysis and online job portals. An important caveat to consider is that firms that participated in the consultations are likely to be large and formal companies that tend to demand more qualified workers than smaller firms.

Specific Job Titles in Shortage

Research and Development Specialist; Medical Scientific Liaison; Digital Marketing Specialist; License Officer; Business Development Specialist

What did employers tell us about these job titles?

About vacancies:

Almost all positions required a bachelor's degree and preferred candidates with strong communication skills and product knowledge with additional qualification in digital technology.

Work experience requirements varied, although half were entry level.

Most firms needed more than 3 months to fill these positions.

Reason for shortage:

Low number of applicants.

Lack of technical skills and work experience.

Candidates expect compensation above current market rates (that are unaffordable), but companies have not increased wages.

Some companies expect labor market tightness to improve, and some expect it to worsen in the future.

Strategies implemented to address the shortage:

Increased training and formed partnerships with education and training providers.

Hired less-qualified applicants.

Expanded recruitment efforts.

Other highlighted details (Common nominations included professionals involved in marketing, enterprise data management and analysis, planning for operations and technical activities across a variety of sectors, design, quality assurance, and product management. In details, job descriptions are as follows):

Research and Development Specialist: providing references on product development or innovation, including market research to identify competitors.

Medical Scientific Liaison: building partnership with external stakeholders, including communicating technical and developmental issues related to company's product.

Digital Marketing Specialist: identifying client's unique preferences on products and overseeing online marketing strategy, including digital campaigns and social media.

License Officer: handling all company licenses for manufacturing, trading, e-commerce, distributors and export import business.

Business Development Specialist: building long-term relationships with new and existing clients, analyzing company's sales and revenue, and providing after-sales trustworthy feedback.

* Data source: Bottom-up Call for Evidence and Consultations. 31 employers indicated shortages for these job titles.

Monthly earnings according to online sources:

Job Titles	Monthly Wages (in IDR)	
	Gross	Estimated Net*
Research and Development Specialist*	14,017,923	13,317,027
Medical Scientific Liaison	33,131,750	31,475,163
Digital Marketing Specialist	15,775,519	14,986,743
License Officer**	14,936,678	14,189,844
Business Development Specialist	18,273,458	17,359,785

Notes: * Estimated net wages were calculated applying the personal income tax rate in steps without any deduction. * Salary corresponds to a Research and Development Technician due to unavailable job title. ** Salary corresponds to a Import/Export License & Compliance Specialist due to unavailable job title.

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

Job family according to the Indonesian official classification of occupations

KBJI code and title

2619 – Business Professionals Not Elsewhere Classified

What workers in this occupation do

This category includes business professionals who are not classified elsewhere in Sub-Group 261: Company Experts. For example, here are classified those who take part in studying, give instructions, and applying operational methods related to various aspects

of business ventures, such as marketing, advertising, public relations, patent regulations, and company operations.

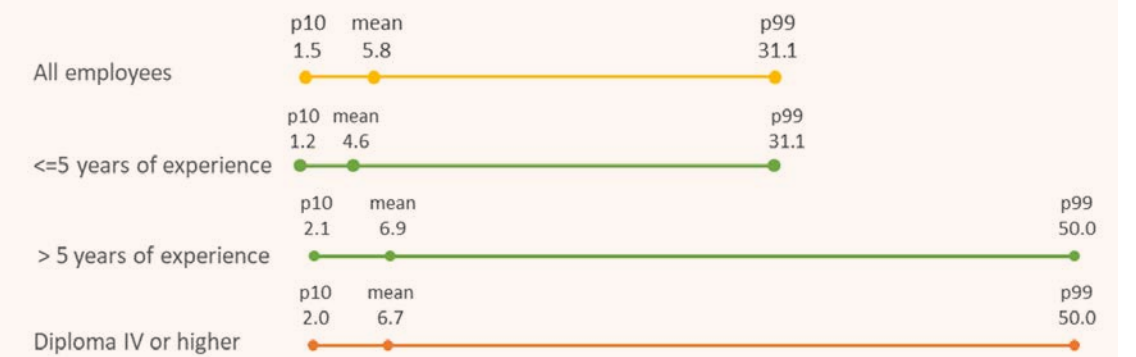
Role and tasks include

Carry out research and determine or suggest the existence of sales levels for certain products or services. estimate potential profitable markets.

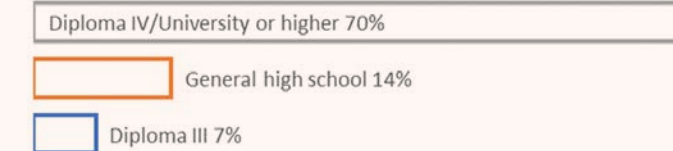
Perform related tasks and oversee other workforce activities.

What do national statistics say about this job family?

Monthly wage distribution, IDR (million)



Most common education achieved:



Most common fields of study for Diplomas and higher:

Social Science (e.g. Economics, Accounting) (48%)
 Other Social and Political Sciences (11%)
 Education & Teacher Training (10%)
 Engineering Studies (9%)

Occupation outlook:

	Mean	Percentile 10th to 99th	
Experience (yrs)	9	1	33
Hours worked (wk)	41	30	70
Age	37	25	59

Most common sectors of employment:

Community, social and personal services (40%)
 Finance, insurance, real estate and business services (33%)
 Manufacturing (10%)

Provinces where most workers in this job family live:

West Java (24%)
 DKI Jakarta (12%)
 East Java (11%)

** Data source: SAKERNAS (2015-17)

Surveyors

The specific job titles in shortage within the **Civil Engineering Technicians** job family are shown below. Discussions with employers suggest that the workers in demand are highly skilled, and require specific technical skills and relevant work experience. However, SAKERNAS data show that most workers in this job family tend to have lower education levels and, hence, lower wages than those reported by employers through the bottom-up analysis and online job portals. An important caveat to consider is that firms that participated in the consultations are likely to be large and formal companies that tend to demand more qualified workers than smaller firms.

Specific Job Titles in Shortage

Surveyor

What did employers tell us about these job titles?

About vacancies:

Most positions required a vocational high school certification.

Work experience requirements varied from 2 to 4 years.

Firm needed more than 6 months to fill these positions.

Reason for shortage:

Lack of non-technical skills.

Difficulties paying the market wage.

Low number of applicants.

The firm found that this position has become harder to fill over the past year.

Strategies implemented to address the shortage:

Hired temporary or contract workers.

Hired less well-qualified applicants.

Expanded recruitment efforts.

* Data source: Bottom-up Call for Evidence and Consultations. 31 employers indicated shortages for these job titles.

What does the market say about these job titles?

Monthly earnings according to online sources:

Job Titles	Monthly Wages (in IDR)	
	Gross	Estimated Net*
Surveyor	15,914,673	15,118,939

Notes: * Estimated net wages were calculated applying the personal income tax rate in steps without any deduction.

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

Job family according to the Indonesian official classification of occupations

KBJI code and title

3112 – Civil Engineering Technicians

What workers in this occupation do

Workers in this group carry out technical tasks related to the research of civil engineering experts, design, construction, operation, and the maintenance and repair of buildings and other structures such as water supply and disposal systems, bridges, highways, dams, and airfields.

Role and tasks include

Implement or assist in conducting field or laboratory tests on land and building materials.

Provide technical assistance related to the establishment of buildings and other structures, as well as with surveys or preparation of survey reporting.

Represent building architects and civil engineering experts in the building to ensure the fulfillment of design specifications and maintain proper standards.

Apply technical principles and practices of civil engineering and building to solve related work problems.

Help prepare the estimated amount and cost of materials and labor needed for the execution of the work in accordance with the specifications given.

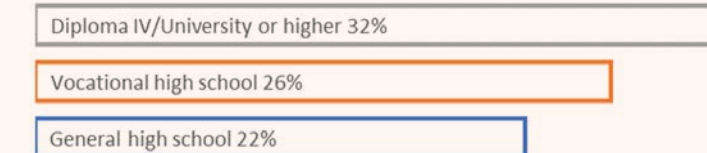
Regulate maintenance and repair.

What do national statistics say about this job family?

Monthly wage distribution, IDR (million)



Most common education achieved:



Most common fields of study for Diplomas and higher:

Engineering Studies (e.g., Civil Engineering, Architecture) (84%)

Most common fields of study for Vocational high school:

Building Techniques

Occupation outlook:

	Mean	Percentile 10th to 99th	
Experience (yrs)	10	1	34
Hours worked (wk)	45	35	84
Age	41	24	66

Most common sectors of employment:

Construction (61%)

Community, social and personal services (18%)

Finance, insurance, real estate and business services (8%)

Provinces where most workers in this job family live:

West Java (16%)

East Java (13%)

Central Java (10%)

** Data source: SAKERNAS (2015-17)

Mechanical Engineering Technicians

The specific job titles in shortage within the [Mechanical Engineering Technicians](#) job family are shown below. Discussions with employers suggest that the workers in demand are highly skilled, and require specific technical skills and relevant work experience. However, SA-KERNAS data show that most workers in this job family tend to have lower education levels and, hence, lower wages than those reported by employers through the bottom-up analysis and online job portals. An important caveat to consider is that firms that participated in the consultations are likely to be large and formal companies that tend to demand more qualified workers than smaller firms.

Specific Job Titles in Shortage

Metal Graphical Engineering Technician. Production Technician. Seamer/Assembly Technician

What did employers tell us about these job titles?

About vacancies:

Most positions required a bachelor's degree or equivalent, while some firms accepted high school graduates with additional training.

Work experience requirements varied between less than 2 years and more than 2 years.

Most firms needed more than 2 months to fill these positions.

Reason for shortage:

Lack of required technical skills.

Low number of applicants.

Lack of required professional experience.

Lack of soft skills (two firms).

Strategies implemented to address the shortage:

Increased wages.

Expanded local recruitment.

Increased training for existing workers.

Hired less-qualified applicants.

Other: offered temporary and contract work (two firms), established partnerships with education institution (one firm), and increased working hours (one firm).

Other highlighted details:

Typical job descriptions include tasks related to fixing and maintaining production machines, designing and monitoring the development of production technology, and troubleshooting.

* Data source: Bottom-up Call for Evidence and Consultations. 7 employers indicated shortages for these job titles.

What does the market say about these job titles?

Monthly earnings according to online sources:

Job Titles	Monthly Wages (in IDR)	
	Gross	Estimated Net*
Metal Graphical Engineering Technician*	15,325,524	14,559,248
Production Technician	10,138,225	9,631,314
Seamer/Assembly Technician	8,548,675	8,121,241

Notes: * Estimated net wages were calculated applying the personal income tax rate in steps without any deduction. * Salary corresponds to a Technician Metallurgical Engineering due to unavailable job title.

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

Job family according to the Indonesian official classification of occupations

KBJI code and title

3115 – Mechanical Engineering Technicians

What workers in this occupation do

Workers in this group carry out technical tasks related to mechanical engineering research. They also assist with the design, assembly, construction, installation, operation, maintenance, and repair of machinery.

Role and tasks include

Provide technical guidance related to research and development of machinery and their installations, facilities, and components, or model testing; design and prepare the machinery for installation, facilities, and components according to the specifications provided.

Prepare a detailed estimate for material and labor costs as needed by the plant, and install according to the specifications given.

Provide technical supervision at the plant; use, maintain, and repair machinery and related installations, facilities, and components; apply technical knowledge from machines and the principles and practices of mechanical engineers by recognizing and solving problems that arise.

Develop and supervise the implementation of safety standards and procedures for marine survey work in relation to ship hulls, equipment, and cargo ships.

Coordinate and supervise the activities of workers who are included in the dry dock/land ship to clean, paint, and repair.

What do national statistics say about this job family?

Monthly wage distribution, IDR (million)



Most common education achieved:

Vocational high school 56%

General high school 20%

Diploma IV/University or higher 9%

Most common fields of study for Diplomas and higher:

Engineering Studies (67%)

Most common fields of study for Vocational high school:

Mechanical Engineering

Occupation outlook:

	Mean	Percentile 10th to 99th	
Experience (yrs)	8	1	31
Hours worked (wk)	46	39	84
Age	35	21	64

Most common sectors of employment:

Manufacturing (39%)

Community, social and personal services (23%)

Wholesale and retail trade, restaurants, and hotels (11%)

Provinces where most workers in this job family live:

West Java (24%)

East Java (13%)

Central Java (13%)

** Data source: SAKERNAS (2015-17)

Draughts Persons: Drafters

The specific job titles in shortage within the **Draughts Persons** job family are shown below. Discussions with employers suggest that the workers in demand are highly skilled, and require specific technical skills and relevant work experience. However, SAKERNAS data shows that most workers in this job family tend to have lower education levels and, hence, lower wages than those reported by employers through the bottom-up analysis and online job portals. An important caveat to consider is that firms that participated in the consultations are likely to be large and formal companies that tend to demand more qualified workers than smaller firms.

Specific Job Titles in Shortage

Drafter

What did employers tell us about these job titles?

About vacancies:

All positions required a 3-year diploma and less than 4 years of work experience.

Most firms needed more than 1-3 months to fill these positions.

Reason for shortage:

Lack of technical skills.

Candidates expect compensation above current market rates (that are unaffordable).

Technical skills related to the use of advanced technology are especially needed.

Strategies implemented to address the shortage:

Expanded local recruitment efforts.

Partnered with education institutions.

* Data source: Bottom-up Call for Evidence and Consultations. 2 employers indicated shortages for these job titles.

What does the market say about these job titles?

Monthly earnings according to online sources:

Job Titles	Monthly Wages (in IDR)	
	Gross	Estimated Net*
Drafter	17,410,229	16,539,718

Notes: * Estimated net wages were calculated applying the personal income tax rate in steps without any deduction. * Salary corresponds to a Technician Metallurgical Engineering due to unavailable job title.

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

Job family according to the Indonesian official classification of occupations

KBJI code and title

3118 – Draughts Persons

What workers in this occupation do

Workers in this group prepare technical drawings, maps, and illustrations from sketches, measurements, and other data and copy pictures and paintings on the printing plate.

Role and tasks include

Prepare and improve working drawings from sketches and specifications prepared by engineers and design experts for installation modification, maintenance, and repair related to buildings, dams, bridges, roads, and other architectural projects and civil engineering projects.

Operate computer-aided drawing equipment to make, change, and create hard copies and digital images of drawing work.

Operate digital tables or similar equipment to move hard copy images from drawing work, maps, and other curves to digital forms.

Use stereo equipment to capture topographic data in its analogy or in numbers and use this data or other data to prepare and revise topographic, hydrographic, usage and other themed maps, prepare and refine illustrations for reference to work, brochures, and technical handles facing installation, operation, maintenance, and repair assemblies of machinery and equipment and other items.

Copy pictures and paintings into stones or metal plates to print.

What do national statistics say about this job family?

Monthly wage distribution, IDR (million)



Most common education achieved:

Diploma IV/University or higher 39%

Vocational high school 37%

Most common fields of study for Diplomas and higher:

Engineering Studies (i.e., Industrial Engineering, Technology, Environmental Sciences and Mineral Technology) (91%)

Occupation outlook:

	Mean	Percentile 10th to 99th	
Experience (yrs)	6	0	26
Hours worked (wk)	44	35	60
Age	32	20	59

Most common sectors of employment:

Construction (40%)
Manufacturing (26%)
Finance, insurance, real estate and business services (24%)

Provinces where most workers in this job family live:

West Java *

** Data source: SAKERNAS (2015-17)

Ship Technicians

The specific job titles in shortage within the **Ship Technician** job family are shown below. Discussions with employers suggest that the workers in demand are highly skilled, and require high qualifications, specific technical skills and relevant work experience. However, SA-KERNAS data show that most workers in this job family tend to have lower education levels and, hence, lower wages than those reported by employers through the bottom-up analysis and online job portals. An important caveat to consider is that firms that participated in the consultations are likely to be large and formal companies that tend to demand more qualified workers than smaller firms.

Specific Job Titles in Shortage

Ship Technical Specialist

What did employers tell us about these job titles?

About vacancies:

Position were high-level requiring a bachelor's degree with 2 to 4 years of experience.

Firm needed more than 6 months to fill these positions.

Reason for shortage:

Lack of technical skills and relevant work experience.

Candidates expect compensation above current market rates (that are unaffordable).

Strategies implemented to address the shortage:

Increased wages.

Hired temporary workers.

Outsourced job function.

Other highlighted details:

Positions required specific technical skills in ship engineering. Responsibilities included handling engine troubleshooting on-board a maritime vessel, monitoring routine maintenance of ship machinery, and ensuring that the machinery runs smoothly 24 hours a day.

* Data source: Bottom-up Call for Evidence and Consultations. 1 employers indicated shortages for these job titles.

What does the market say about these job titles?

Monthly earnings according to online sources:

Job Titles	Monthly Wages (in IDR)	
	Gross	Estimated Net*
Ship Technical Specialist*	15,804,128	15,013,922

Notes: * Estimated net wages were calculated applying the personal income tax rate in steps without any deduction. * Salary corresponds to a Ship Repair Technician due to unavailable job title.

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

Job family according to the Indonesian official classification of occupations

KBJI code and title

3141 – Ship Technician

What workers in this occupation do

Workers in this group supervise and participate in operations, maintenance, and repairs of mechanical, electrical, and electronic equipment and machinery on board or assisting the work of maritime facilities.

Role and tasks include

Supervise and participate in operations, maintenance, and repairs of mechanical, electrical and, electronic equipment and machinery on-board.

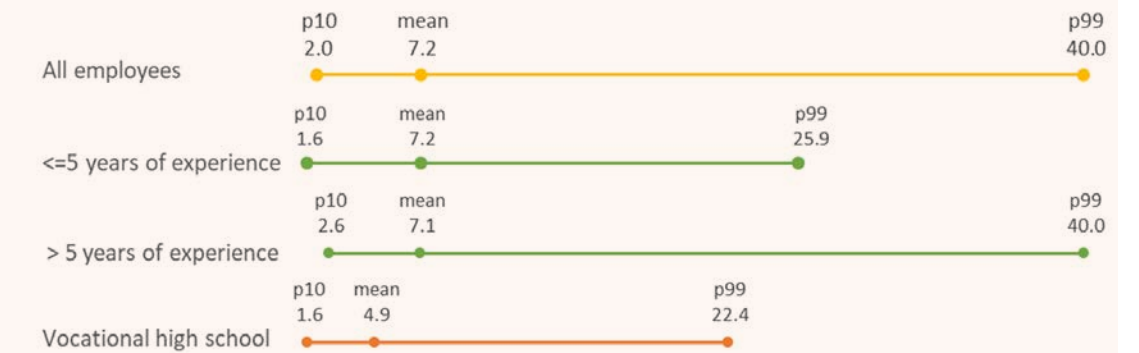
Order refueling and engine room "department stores" and maintain records of implementation.

Carry out technical supervision of the installation, maintenance, and repair of ship machinery and equipment. Ensure compliance with specifications and laws.

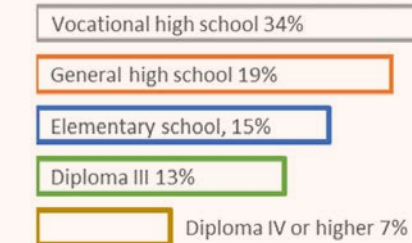
Apply knowledge of the principles and practices associated with machinery and equipment of ships by recognizing and solving problems that arise in their work; carry out related tasks.

What do national statistics say about this job family?

Monthly wage distribution, IDR (million)



Most common education achieved:



Most common fields of study for Diplomas and higher:

information not available due to sample size.

Occupation outlook:

	Mean	Percentile 10th to 99th	
Experience (yrs)	10	1	38
Hours worked (wk)	45	0	98
Age	40	27	65

Most common sectors of employment:

Transportation, storage and communications (53%)
Manufacturing (33%)

Provinces where most workers in this job family live:

Kep Riau *

* Small sample for this level of disaggregation. As such these numbers should be interpreted with caution.

** Data source: SAKERNAS (2015-17)

Safety, Health, and Quality Inspectors

The specific job titles in shortage within the **Safety, Health, and Quality Inspectors** job family are shown below. Discussions with employers suggest that the workers in demand are highly skilled, and require high qualifications, specific technical skills and relevant work experience. However, SAKERNAS data show that most workers in this job family tend to have lower education levels and, hence, lower wages than those reported by employers through the bottom-up analysis and online job portals. An important caveat to consider is that firms that participated in the consultations are likely to be large and formal companies that tend to demand more qualified workers than smaller firms.

Specific Job Titles in Shortage

Quality Controller; Quality Assurance; Occupational Health and Safety Specialist

What did employers tell us about these job titles?

About vacancies:

Highly skilled position.

Most required a bachelor's degree, while some a high school degreee.

Work experience requirements varied from entry-level to more than 2 years of experience. Some firms demanded highly-experienced workers.

Most firms needed 3 months to fill these positions, while some needed more than 6 months.

Reason for shortage:

No to low number of applicants.

Lack of technical skills and professional certifications (e.g. Occupational Health and Safety Assessment – OHSAS).

Lack of work experience (e.g., security services firm needed experienced workers with a senior-level aviation certification).

Strategies implemented to address the shortage:

Expanded recruitment efforts (referral program, multiple job adverts in various job-search platforms).

Partnered with education/training institutions (campus-hiring, contracting certification providers).

Hired less-qualified candidates and then provided training to close the skills/experience gap.

Other highlighted details (Specific qualification requirements varied):

Biosimilar firms required applicants to have graduated from a pharmacy, biotechnology, or another relevant program.

Construction firms required applicants to have graduated from a civil engineering program.

Manufacturing firms accepted senior high school candidates with 2-3 years of experience.

** Data source: Bottom-up Call for Evidence and Consultations. 1 employers indicated shortages for these job titles.*

Monthly earnings according to online sources:

Job Titles	Monthly Wages (in IDR)	
	Gross	Estimated Net*
Quality Controller	13,864,381	13,171,162
Quality Assurance	20,863,786	19,820,597
Occupational Health and Safety Specialist	15,756,603	14,968,773

*Notes: * Estimated net wages were calculated applying the personal income tax rate in steps without any deduction.*

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

Job family according to the Indonesian official classification of occupations

KBJI code and title

3152 – Safety, Health, and Quality Inspectors

What workers in this occupation do

Workers in this group work on safety on behalf of the government or other companies. They also guarantee compliance with health and environmental protection rules and laws, and ensure factory standards and specifications.

Role and tasks include

Advise representatives and workers on relevant government regulations and other laws regarding work safety and the work environment; inspect workplaces to ensure compliance with the rules, laws, and other government standards.

Examine the workplace by interviewing and observing to determine if it is fulfilling safety rules and laws. Examine the area of production, processing, transportation, maintenance, storage, and sale of products to ensure compatibility with government rules and regulations; check the final product or parts for compatibility with factory specifications and standards.

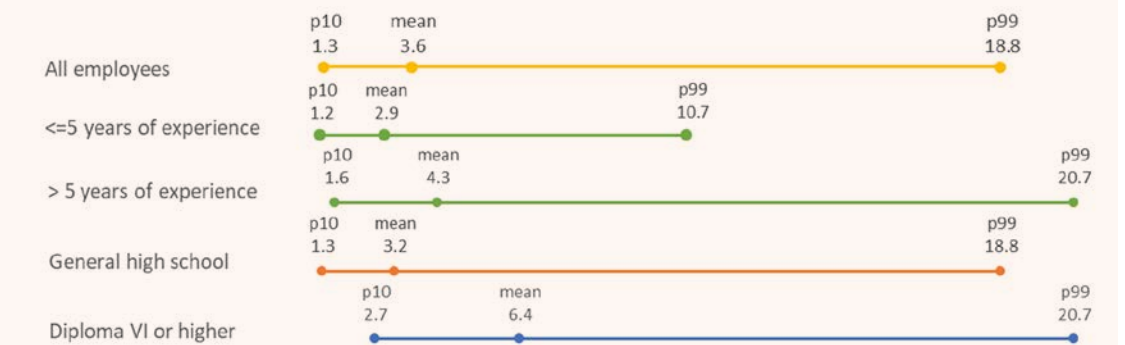
Advise companies on the implementation of government laws and regulations and others regarding cleanliness, sanitation, purity, and levels of key products, food, medicine, cosmetics, and similar items.

Provide advice to producers, operators, and regulators on the repair of aircrafts, cars, and other vehicles to be consistent with applicable rules and regulations.

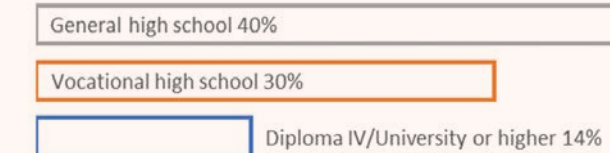
Inspect vehicles and places authorized to treat and repair vehicles to ensure that they meet government and other technical and regulatory standards; inspect companies to ensure that they comply with government regulations and other laws regarding the issuance of hazardous waste management and disposal materials.

What do national statistics say about this job family?

Monthly wage distribution, IDR (million)



Most common education achieved:



Occupation outlook:

	Mean	Percentile 10th to 99th	
Experience (yrs)	8	1	32
Hours worked (wk)	45	39	72
Age	35	22	64

Most common sectors of employment:

Manufacturing (70%)
Community, social and personal services (7%)
Wholesale and retail trade, restaurants, and hotels (7%)

Most common fields of study for Diplomas and higher:

Social Science (e.g., Management) (48%)

Most common fields of study for Diplomas and higher:

Mechanical Engineering

Provinces where most workers in this job family live:

West Java (37%)
Banten (15%)
East Java (12%)

*** Data source: SAKERNAS (2015-17)*

Treasurers (in Banking Industry)

The specific job titles in shortage within the **Securities and Finance Dealers and Brokers** job family are shown below. Discussions with employers suggest that the workers in demand are highly skilled, and require certifications, specific technical skills and relevant work experience. However, SAKERNAS data show that most workers in this job family tend to have lower education levels and, hence, lower wages than those reported by employers through the bottom-up analysis and online job portals. An important caveat to consider is that firms that participated in the consultations are likely to be large and formal companies that tend to demand more qualified workers than smaller firms.

Specific Job Titles in Shortage

Treasurer (in banking industry)

What did employers tell us about these job titles?

About vacancies:

High-skilled positions requiring a bachelor's degree and a certification in treasury.

Firms require 2 to 4 years of work experience.

Firm needed 3 months to fill these positions.

Reason for shortage:

Lack of technical skills.

Low number of applicants.

Strategies implemented to address the shortage:

Provided more training and established partnerships with education/training institutions.

Other highlighted details (Specific qualification requirements varied):

Position scope of work included to manage the company's investments and trades, assess risk management, and forecast cash flows.

* Data source: Bottom-up Call for Evidence and Consultations. 1 employers indicated shortages for these job titles.

What does the market say about these job titles?

Monthly earnings according to online sources:

Job Titles	Monthly Wages (in IDR)	
	Gross	Estimated Net*
Treasurer (in Banking Industry)	26,794,494	25,454,769

Notes: * Estimated net wages were calculated applying the personal income tax rate in steps without any deduction.

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

Job family according to the Indonesian official classification of occupations

KBJI code and title

3411 – Securities and Finance Dealers and Brokers

What workers in this occupation do

Workers in this group buy and sell securities, shares, bonds, and other financial instruments. They also conduct currency exchange transactions immediately or for future markets on their own behalf or for customers on a commission basis.

Role and tasks include

Gather information about the financial market for customers of a company where investments can be made.

Analyze market trends for securities, bonds, stocks, and other financial instruments including foreign exchange.

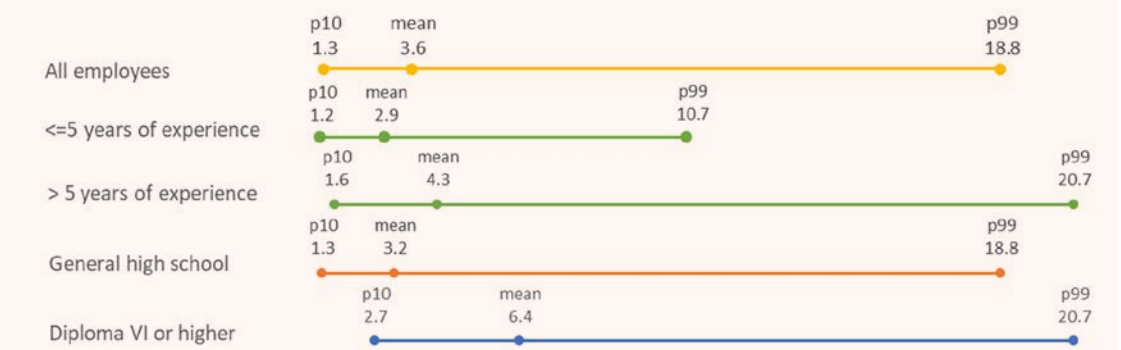
Provide information to potential customers about market conditions and possibilities.

Advise and participate in negotiations for the terms and organization of loans and placement of shares and bonds in financial markets to develop customer capital.

Record and continue to buy and sell orders for securities, shares, bonds, or other financial instruments.

What do national statistics say about this job family?

Monthly wage distribution, IDR (million)



Most common education achieved:

Diploma IV/University or higher (65%)

Most common fields of study for Diplomas and higher:

Social Science (i.e., Economics and Management) (62%)

Occupation outlook:

	Mean	Percentile 10th to 99th
Experience (yrs)	6	2 26
Hours worked (wk)	39	14 70
Age	38	26 74

Most common sectors of employment:

Finance, insurance, real estate, and business services (77%)

Provinces where most workers in this job family live:

West Java (31%)

** Data source: SAKERNAS (2015-17)

Natural Raw Material Buyers

The specific job titles in shortage within the **Buyers** job family are shown below. Discussions with employers suggest that the workers in demand are highly skilled, and require specific technical skills and relevant work experience. However, SAKERNAS data show that most workers in this job family tend to have lower education levels and, hence, lower wages than those reported by employers through the bottom-up analysis and online job portals. An important caveat to consider is that firms that participated in the consultations are likely to be large and formal companies that tend to demand more qualified workers than smaller firms.

Specific Job Titles in Shortage

Natural Raw Materials Buyers

What did employers tell us about these job titles?

About vacancies:

Educational requirements varied: half of the vacancies required a bachelor's degree, while the other half required less than a bachelor's degree.

All positions required between 2 to 8 years of work experience.

Most firms needed more than 1 to 6 months to fill these positions.

Reason for shortage:

Lack of technical and occupational skills .

Lack of relevant work experience.

Sector is not as attractive for buyers when compared to other sectors (one firm).

Strategies implemented to address the shortage:

Raised wages.

Automated tasks (two firms).

Hired less-qualified applicants.

Expanded recruitment and recruited from campuses in order to compete with employers from other sectors (one firm).

Increased worker training and explored partnerships with education/training providers.

Converted part-time workers to full-time.

Many firms selected 'other' diverse strategies.

* Data source: Bottom-up Call for Evidence and Consultations. 6 employers indicated shortages for these job titles.

What does the market say about these job titles?

Monthly earnings according to online sources:

Job Titles	Monthly Wages (in IDR)	
	Gross	Estimated Net*
Natural Raw Material Buyers	5,772,657	5,484,024

Notes: * Estimated net wages were calculated applying the personal income tax rate in steps without any deduction.

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

Job family according to the Indonesian official classification of occupations

KBJI code and title

3416 – Buyers

What workers in this occupation do

Workers in this group buy goods and services on behalf of industrial and commercial companies, or other organizations.

Role and tasks include

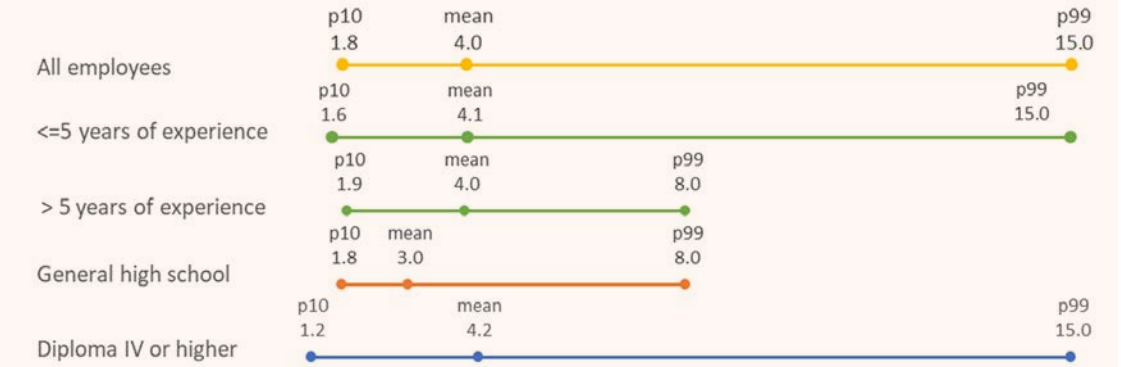
Negotiate the purchase of tools, raw materials, products, and supplies for industrial plants, utilities, government units, or other companies.

Buy merchandise for resale.

Acquire information about requirements and supplies and determine the quantity and quality to be purchased, fees, delivery dates, and other contract conditions.

What do national statistics say about this job family?

Monthly wage distribution, IDR (million)



Most common education achieved:

General high school 26%

Diploma IV/University or higher 21%

Elementary school 17%

Most common fields of study for Diplomas and higher:

Social Science (i.e., Economics and Management) *

Occupation outlook:

	Mean	Percentile 10th to 99th	
Experience (yrs)	8	2	32
Hours worked (wk)	42	25	84
Age	37	24	76

Most common sectors of employment:

Wholesale and retail trade, restaurants, and hotels (50%)

Manufacturing (22%)

Provinces where most workers in this job family live:

West Java (26%)

* Small sample for this level of disaggregation. As such these numbers should be interpreted with caution.

** Data source: SAKERNAS (2015-17)

Graphic Designers, Layout Designers and Animators

The specific job titles in shortage within the [Decorators and Commercial Designers](#) job family are shown below. Discussions with employers suggest that the workers in demand are highly skilled, and require specific technical skills and relevant work experience. However, SAKERNAS data show that most workers in this job family tend to have lower education levels and, hence, lower wages than those reported by employers through the bottom-up analysis and online job portals. An important caveat to consider is that firms that participated in the consultations are likely to be large and formal companies that tend to demand more qualified workers than smaller firms.

Specific Job Titles in Shortage

Graphic Designer; Animator; Layout Designer

What did employers tell us about these job titles?

About vacancies:

Most positions required a senior or vocational high school education with creative skills and more than 4 years of work experience.

Some positions also require specialized skills (e.g., Animator positions required strong mastery of both 2D and 3D arts).

Most firms needed more than 6 months to fill these positions, while some needed 1 to 2 months.

Reason for shortage:

Low number of applicants.

Lack of relevant work experience.

Lack of technical skills.

Strategies implemented to address the shortage:

Expanded existing training programs.

Expanded partnerships with education institutions.

Hired temporary workers.

* Data source: Bottom-up Call for Evidence and Consultations. 16 employers indicated shortages for these job titles.

What does the market say about these job titles?

Monthly earnings according to online sources:

Job Titles	Monthly Wages (in IDR)	
	Gross	Estimated Net ^o
Graphic Designer	17,118,519	16,262,593
Animator	12,540,970	11,913,922
Layout Designer	9,297,587	8,832,708

Notes: ^o Estimated net wages were calculated applying the personal income tax rate in steps without any deduction.

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

Job family according to the Indonesian official classification of occupations

KBJI code and title

3951 – Decorators and Commercial Designers

What workers in this occupation do

Workers in this group apply artistic techniques to design outcomes.

Role and tasks include

Design industrial and commercial production products, including the latest type of clothing and accessories based on aesthetic harmony and other technical requirements.

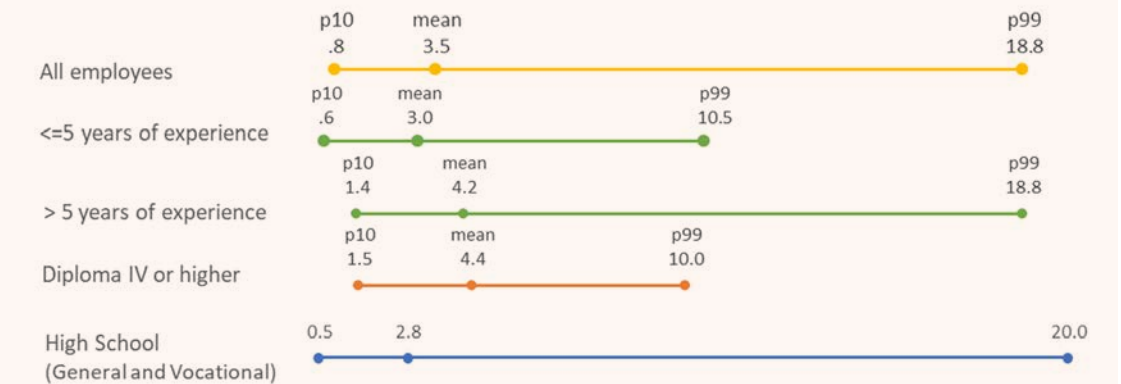
Design interior decoration schemes and plan furniture for housing, public buildings, ships, and other places.

Design and paint screens and stage decorations.

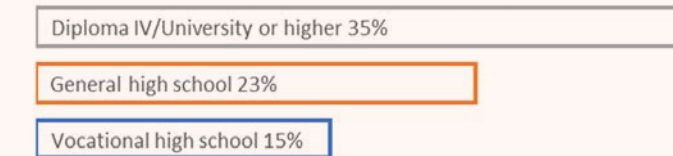
Create and issue artistic influences for screen use for digital display.

What do national statistics say about this job family?

Monthly wage distribution, IDR (million)



Most common education achieved:



Occupation outlook:

	Mean	Percentile 10th to 99th	
Experience (yrs)	7	1	34
Hours worked (wk)	40	16	91
Age	35	22	61

Most common sectors of employment:

Community, social and personal services (32%)
 Manufacturing (26%)
 Finance, insurance, real estate and business services (22%)

Most common fields of study for Diplomas and higher:

Art (48%). Specific majors include Design (i.e., Interior Design, Product Design, Visual Communication Design, Graphic Design, etc.)

Provinces where most workers in this job family live:

West Java (28%)
 East Java (17%)
 DKI Jakarta (14%)

** Data source: SAKERNAS (2015-17)

Skilled Farmers for Organic and Sustainable Farming

The specific job titles in shortage within the **Field Crop and Vegetable Growers** job family are shown below. Discussions with employers suggest that the workers in demand are highly skilled, and require specific technical skills. However, SAKERNAS data show that most workers in this job family tend to have lower education levels and, hence, lower wages than those reported by employers through the bottom-up analysis and online job portals. An important caveat to consider is that firms that participated in the consultations are likely to be large and formal companies that tend to demand more qualified workers than smaller firms.

Specific Job Titles in Shortage

Skilled farmers for organic and sustainable farming (in rice and horticulture)

What did employers tell us about these job titles?

About vacancies:

Education level varied from no formal education to high school education.

Positions required less than 2 years of experience.

Most firms needed less than 6 months to fill these positions.

Reason for shortage:

Low number of applicants.

Lack of sector attractiveness to young candidates.

Lack of technical skills.

Strategies implemented to address the shortage:

Increased internal training.

Raised wages.

Outsourced job function.

Other highlighted details:

Applicants should have strong and consistent attitude and technical skills and knowledge on organic farming (i.e., land preparation, maintenance, and harvesting) and sustainable farming.

Agriculture is one of the priority sectors in Indonesia.

** Data source: Bottom-up Call for Evidence and Consultations. 2 employers indicated shortages for these job titles.*

What does the market say about these job titles?

Monthly earnings according to online sources:

Job Titles	Monthly Wages (in IDR)	
	Gross	Estimated Net ^o
Skilled Farmers for Organic and Sustainable Farming	10,723,133	10,186,976

Notes: ^o Estimated net wages were calculated applying the personal income tax rate in steps without any deduction.

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

Job family according to the Indonesian official classification of occupations

KBJI code and title

6111 – Field Crop and Vegetable Growers

What workers in this occupation do

The workforce in this group plans and completes planting and harvesting activities for various types of grains, such as wheat, rice, beetroot, sugar cane, peanuts, tobacco, reeds, cabbage, and other field vegetables. These crops are then sold or sent to wholesalers, trade organizations, or markets.

Role and tasks include

Determine the type and amount of harvest, buy seeds, fertilizer, and other supplies; lease or invest in land and the development of land, buildings, animal workers, equipment, and machines.

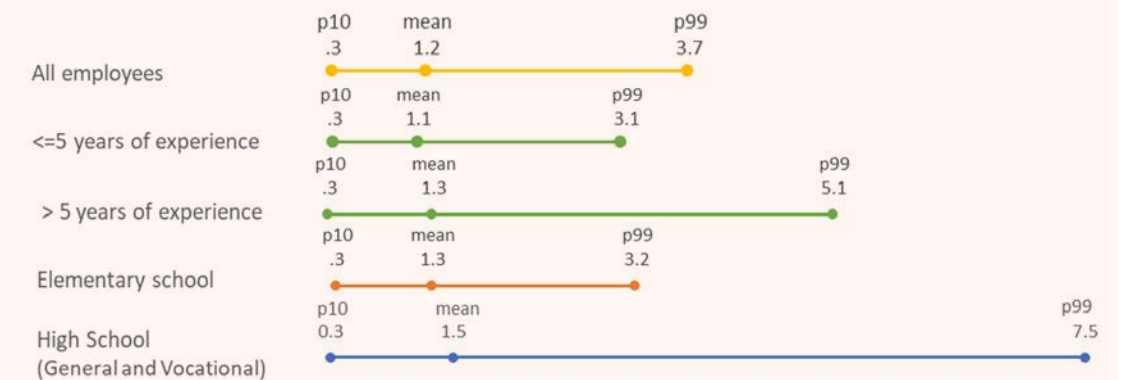
Carry out agricultural activities such as land preparation, seeding, planting, processing, and harvesting of tree products and vegetables; store and carry out some basic processing of crops.

Maintain animal workers and care for agricultural buildings, machinery, and equipment.

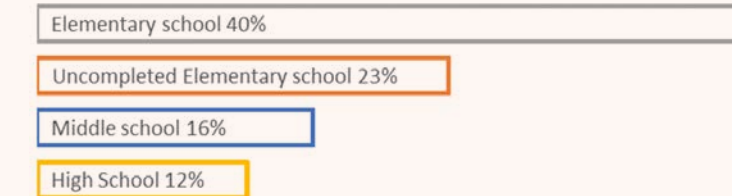
Send or market agricultural products.

What do national statistics say about this job family?

Monthly wage distribution, IDR (million)



Most common education achieved:



Occupation outlook:

	Mean	Percentile 10th to 99th	
Experience (yrs)	17	2	51
Hours worked (wk)	30	11	63
Age	47	26	78

Most common sectors of employment:

Agriculture, forestry, livestock and fisheries (100%)

Provinces where most workers in this job family live:

East Java (22%)
Central Java (19%)
West Java (9%)

** Small sample for this level of disaggregation. As such these numbers should be interpreted with caution.*

*** Data source: SAKERNAS (2015-17)*

Skilled Farmers for Palm Oil and Chocolate Plantation

The specific job titles in shortage within the [Tree and Shrub Crop Growers](#) job family are shown below. Discussions with employers suggest that the workers in demand are highly skilled, and require specific technical. However, SAKERNAS data show that most workers in this job family tend to have lower education levels and, hence, lower wages than those reported by employers through the bottom-up analysis and online job portals. An important caveat to consider is that firms that participated in the consultations are likely to be large and formal companies that tend to demand more qualified workers than smaller firms.

Specific Job Titles in Shortage

Skilled farmers for palm oil harvesting and sustainable chocolate plantation

What did employers tell us about these job titles?

About vacancies:

Education level varied from no formal education to high school education.

Positions required less than 2 years of experience.

Most firms needed less than 2 months to fill these positions.

Reason for shortage:

Low number of applicants.

Lack of sector attractiveness to young candidates.

Lack of technical skills.

Strategies implemented to address the shortage:

Increased internal training.

Raised wages.

Outsourced job function..

Other highlighted details:

Positions require specific skillsets. Harvesters for the palm oil farm must have a working knowledge of specific harvesting tools to protect the quality of the palm oil and harvest trees taller than 15 meters. The chocolate farm stated that workers need specific knowledge about organic and sustainable farming techniques, including a knowledge of proper chocolate harvesting and fermentation methods. Both firms look for specific work attitudes and patience amongst applicants.

Agriculture is one of the priority sectors in Indonesia.

** Data source: Bottom-up Call for Evidence and Consultations. 2 employers indicated shortages for these job titles.*

What does the market say about these job titles?

Monthly earnings according to online sources:

Job Titles	Monthly Wages (in IDR)	
	Gross	Estimated Net*
Skilled Farmers for Palm Oil and Chocolate Plantation*	7,253,884	6,891,190

Notes: * Estimated net wages were calculated applying the personal income tax rate in steps without any deduction. * Salary corresponds to a Farmer Tree Fruit & Nut Crops due to unavailable job title.

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

Job family according to the Indonesian official classification of occupations

KBJI code and title

6112 – Tree and Shrub Crop Growers

What workers in this occupation do

The workforce in this group plans and completes the work needed to plant and harvest trees and crops, such as fruit and nut trees, tea and coffee, vines, berries, cocoa trees, rubber trees, and sap collection for the sale or delivery to wholesalers, trade organizations, or markets.

Role and tasks include

Determine the type and number of crops that have grown, buy seeds, fertilizer, and other supplies.

Leasing or investing in land and developing land, buildings, animal workers, equipment, and machines.

Carrying out agricultural activities such as preparing land and nurseries, planting and caring for trees or reeds, and collecting sap and harvesting crops.

Store and carry out some basic crop processing; maintain animal workers and care for agricultural buildings, machinery, and equipment.

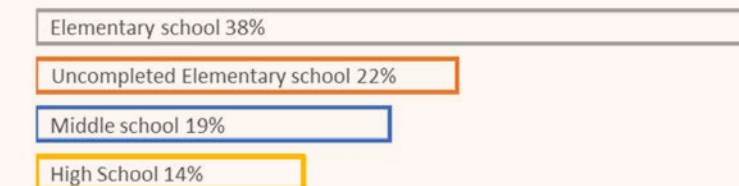
Send or market agricultural products.

What do national statistics say about this job family?

Monthly wage distribution, IDR (million)



Most common education achieved:



Occupation outlook:

	Mean	Percentile 10th to 99th	
Experience (yrs)	14	2	50
Hours worked (wk)	29	12	60
Age	43	24	76

Most common sectors of employment:

Agriculture, forestry, livestock and fisheries (100%)

Provinces where most workers in this job family live:

North Sumatra (11%)
South Sumatra (11%)
Lampung (9%)

** Small sample for this level of disaggregation. As such these numbers should be interpreted with caution.*

*** Data source: SAKERNAS (2015–17)*

Welders (for Underwater and Food Industry)

The specific job titles in shortage within the **Welders and Flame Cutter** job family are shown below. Discussions with employers suggest that the workers in demand are highly skilled, and require certifications, specific technical skills and relevant work experience. However, SAKERNAS data show that most workers in this job family tend to have lower education levels and, hence, lower wages than those reported by employers through the bottom-up analysis and online job portals. An important caveat to consider is that firms that participated in the consultations are likely to be large and formal companies that tend to demand more qualified workers than smaller firms.

Specific Job Titles in Shortage

Welder (for underwater welders and for food and beverage manufacturing)

What did employers tell us about these job titles?

About vacancies:

Educational requirement ranged from vocational high school to a bachelor's degree.

Positions required less than 2 years of experience.

Most firms needed more than 2 to 3 months to fill these positions.

Reason for shortage:

Lack of both technical and non-technical skills.

Candidates expect compensation above current market rates (that are unaffordable).

Lack of certified welders for client's health and food safety concerns (one firm).

Strategies implemented to address the shortage:

Hired temporary workers..

Other highlighted details:

This occupation requires welding certification. Certifications are based on Ministerial Regulation No. 02/Men/1982 and the related standardization (i.e., ISO 9606, ASME Sect IX or AWS D.11 or API 1104). The certification itself is provided by government training institutions, such as *Balai Besar Bahan dan Barang Teknik* (B4T), and published by the National Certification Agency (*Badan Nasional Sertifikasi Profesi*, BNSP) through the Indonesian Welders Association (*Asosiasi Pengelasan Indonesia*, API/IWS). Levelling certifications are also available, with specializations in steel construction, bridges, machinery, pipes, tank, kettle, etc. Certification trainings focus on safety and welding competencies.

Agriculture is one of the priority sectors in Indonesia.

* Data source: *Bottom-up Call for Evidence and Consultations. 2 employers indicated shortages for these job titles.*

What does the market say about these job titles?

Monthly earnings according to online sources:

Job Titles	Monthly Wages (in IDR)	
	Gross	Estimated Net*
Welders for Underwater	22,859,198	21,716,238

Notes: * Estimated net wages were calculated applying the personal income tax rate in steps without any deduction.

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

Job family according to the Indonesian official classification of occupations

KBJI code and title

7212 – Welders and Flame Cutter

What workers in this occupation do

Workers in this group weld and cut metal parts using gas flames or electric flares and melt and unify the metal.

Role and tasks include

Weld parts of metal using gas or electric flares, thermite compounds, or other methods.

Operate resistance welding machines.

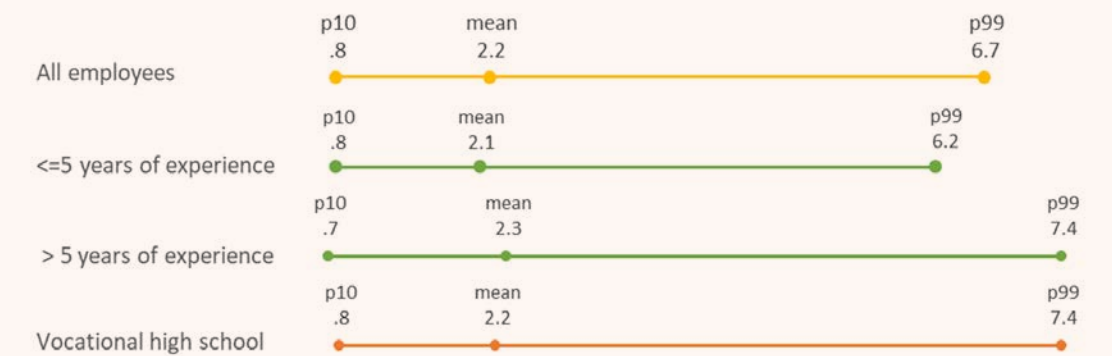
Use a welding torch to make and repair important layers, pipes, floors, and other equipment.

Solder metal parts, cut metal plates with fire or electric incandescent.

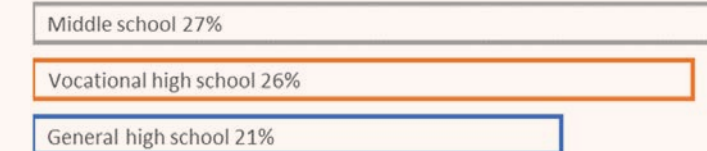
Combine metal parts with hand soldering.

What do national statistics say about this job family?

Monthly wage distribution, IDR (million)



Most common education achieved:



Most common fields of study for Vocational high school graduates:

Mechanical Engineering

Occupation outlook:

	Mean	Percentile 10th to 99th	
Experience (yrs)	7	0	33
Hours worked (wk)	46	34	70
Age	36	22	64

Most common sectors of employment:

Manufacturing (75%)
Community, social and personal services (13%)
Construction (10%)

Provinces where most workers in this job family live:

East Java (22%)
West Java (19%)
Central Java (12%)

* Small sample for this level of disaggregation. As such these numbers should be interpreted with caution.

** Data source: SAKERNAS (2015-17)

Weavers and Batik Artisans

The specific job titles in shortage within the [Handicraft Workers in Wood, Textile, Leather and Related Materials](#) job family are shown below. Discussions with employers suggest that the workers in demand are highly skilled, and require specific technical skills. However, SAKERNAS data show that most workers in this job family tend to have lower education levels and, hence, lower wages than those reported by employers through the bottom-up analysis and online job portals. An important caveat to consider is that firms that participated in the consultations are likely to be large and formal companies that tend to demand more qualified workers than smaller firms.

Specific Job Titles in Shortage

Weaver; Batik Artisans

What did employers tell us about these job titles?

About vacancies:

Firms are willing to hire secondary school graduates but increasing levels of education may be required if innovations with greater value added are introduced in upcoming years.

Reason for shortage:

Lack of technical skills and relevant work experience.

Inability to pay the market compensation rate.

Occupation is becoming harder to fill (three firms).

Strategies implemented to address the shortage:

Provided worker training programs.

Hired contract and temporary workers.

Other highlighted details:

Creative industries are becoming a priority sector in Indonesia. Agriculture is one of the priority sectors in Indonesia.

* Data source: *Bottom-up Call for Evidence and Consultations*. 2 employers indicated shortages for these job titles.

Monthly earnings according to online sources:

Job Titles	Monthly Wages (in IDR)	
	Gross	Estimated Net*
Weaver	7,947,748	7,550,361
Batik Artisan*	13,656,984	12,974,135

Notes: * Estimated net wages were calculated applying the personal income tax rate in steps without any deduction. * Salary corresponds to a Tie Dye Artisan due to unavailable job title.

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

Job family according to the Indonesian official classification of occupations

KBJI code and title

7212 – Welders and Flame Cutter

What workers in this occupation do

Workers in this group carry out tasks related to the making of batik cloth. This includes using textile materials such as mori, cotton, and synthetic materials. spinning and rolling weaving threads by hand. weaving material on hand looms. making tapestries using knitting techniques. and knitting hand woven clothes on hand-operated machines.

Role and tasks include

Create pattern drawings with canting tools on white cloth in accordance to the batik art model, . illustrate with night or liquid candles using a cap.

Move the cliché image to the cloth to obtain the image according to the screening provisions; scratch the candles by canting on the drawing pattern and forwarding the writing to the drawing thickness.

Process the result of batik by shoveling it in water with a mixture of solvent.

Refine the mori to be bitten.

Scrape the batons that have been given a basic color; remove all nights of batik by boiling in a bucket of water and starch; dip the mori cloth that is stamped or brodered.

Cook the finished fabric in the cooking tub; spin and roll the weaving thread by hand.

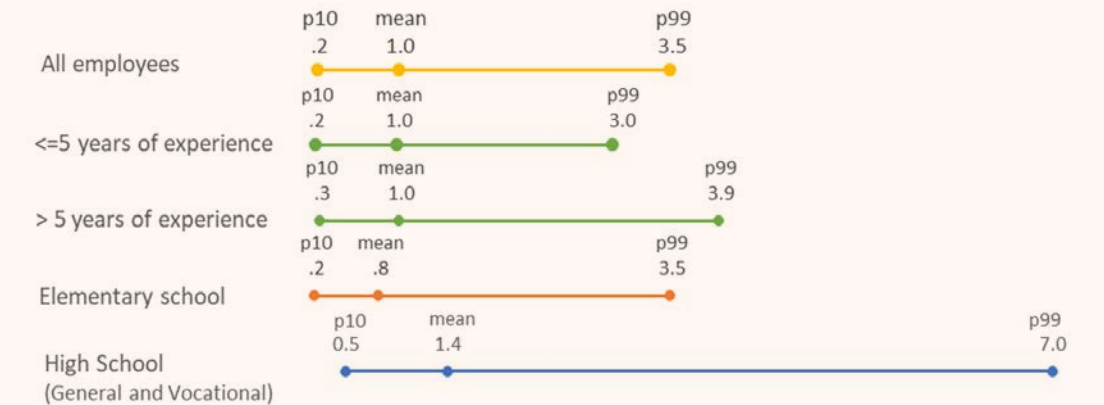
Pull the grooves into the weaving thread using hand tools.

Produce wall decorations, rugs, lace, or other woven fabrics using hand looms.

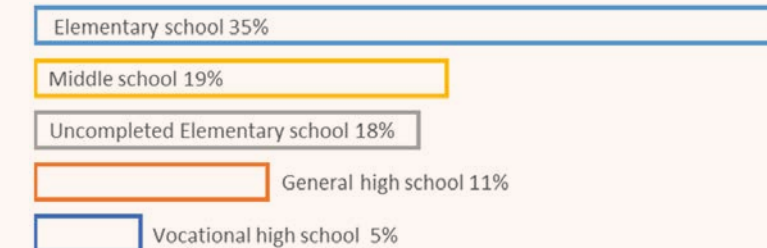
Make tapestries using knitting techniques; knit clothes and other items by machine or by hand; hook or make webbing by hand; make nets by hand.

What do national statistics say about this job family?

Monthly wage distribution, IDR (million)



Most common education achieved:



Occupation outlook:

	Mean	Percentile 10th to 99th	
Experience (yrs)	11	1	47
Hours worked (wk)	35	14	70
Age	40	22	75

Most common sectors of employment:

Manufacturing (96%)
Wholesale and retail trade, restaurants, and hotels (2%)

Provinces where most workers in this job family live:

Central Java (29%)
East Nusa Tenggara (20%)
West Java (12%)

* Small sample for this level of disaggregation. As such these numbers should be interpreted with caution.

** Data source: SAKERNAS (2015-17)

Power Plant Operators

The specific job titles in shortage within the **Power-Production Plant Operators** job family are shown below. Discussions with employers suggest that the workers in demand are highly skilled, and require specific technical skills and relevant work experience. However, SA-KERNAS data show that most workers in this job family tend to have lower education levels and, hence, lower wages than those reported by employers through the bottom-up analysis and online job portals. An important caveat to consider is that firms that participated in the consultations are likely to be large and formal companies that tend to demand more qualified workers than smaller firms.

Specific Job Titles in Shortage

Power Plant Operator

What did employers tell us about these job titles?

About vacancies:

Qualifications for these positions varied. One manufacturing company reported that they require less than 2 years of work experiences and a three-year diploma. Meanwhile, a steam power plant company reported that they require more than 4 years of work experiences and a bachelor's degree.

Most firms needed 2 to 6 months to fill these positions.

Reason for shortage:

Low number of applicants.

Lack of credentials/certifications.

Irrelevant work experience.

Lack of technical skills.

Candidates expect compensation above current market rates (that are unaffordable).

Strategies implemented to address the shortage:

No information on strategies to address occupation shortage was collected. Hired contract and temporary workers.

* Data source: Bottom-up Call for Evidence and Consultations. 2 employers indicated shortages for these job titles.

What does the market say about these job titles?

Monthly earnings according to online sources:

Job Titles	Monthly Wages (in IDR)	
	Gross	Estimated Net*
Weaver	7,947,748	7,550,361
Power Plant Operator	21,320,113	20,254,107

Notes: * Estimated net wages were calculated applying the personal income tax rate in steps without any deduction

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

Job family according to the Indonesian official classification of occupations

KBJI code and title

8161 – Power-Production Plant Operators

What workers in this occupation do

Workers in this group operate and supervise machinery and equipment related to power generation and distribution.

Role and tasks include

Operate and supervise coal, oil, or natural gas power plants and steam power.

Operate and oversee the engine of a nuclear-fueled steam power plant.

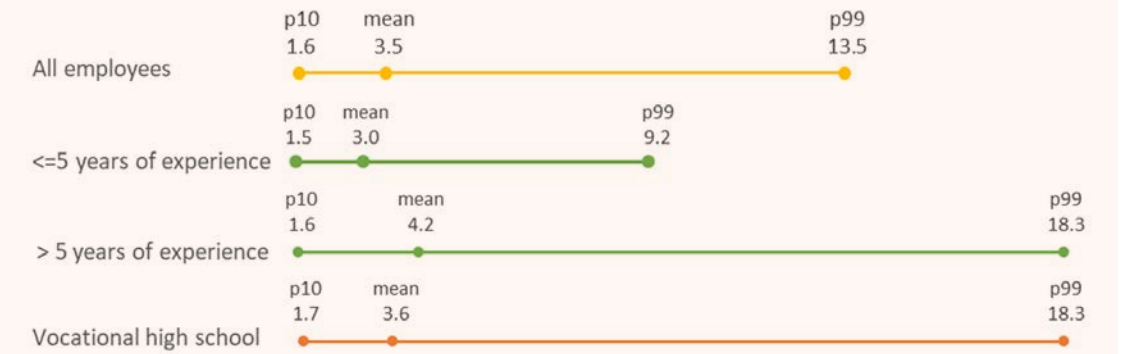
Operate and oversee the hydroelectric power plant.

Operate and supervise other power plants, such as solar, tidal, geothermal, or wind power.

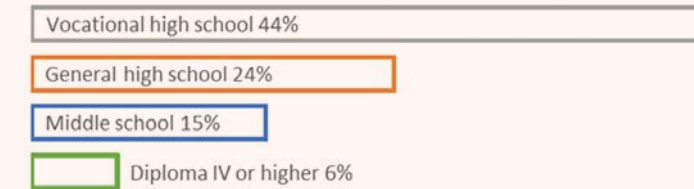
Control the power produced and the distribution of electricity from power plants.

What do national statistics say about this job family?

Monthly wage distribution, IDR (million)



Most common education achieved:



Most common fields of study for Vocational high school graduates:

Mechanical Engineering

Occupation outlook:

	Mean	Percentile 10th to 99th	
Experience (yrs)	7	1	31
Hours worked (wk)	46	39	77
Age	32	20	66

Most common sectors of employment:

Manufacturing (77%)
Electricity, gas, and water supply (14%)

Provinces where most workers in this job family live:

West Java (24%)
Banten (23%)
East Java (17%)

* Small sample for this level of disaggregation. As such these numbers should be interpreted with caution.

** Data source: SAKERNAS (2015-17)

Heavy-Truck Drivers

The specific job titles in shortage within the **Heavy-Truck Drivers** job family are shown below. Discussions with employers suggest that the workers in demand are highly skilled, and require specific licenses and technical skills. However, SAKERNAS data show that most workers in this job family tend to have lower education levels and, hence, lower wages than those reported by employers through the bottom-up analysis and online job portals. An important caveat to consider is that firms that participated in the consultations are likely to be large and formal companies that tend to demand more qualified workers than smaller firms.

Specific Job Titles in Shortage

Heavy-Truck Drivers

What did employers tell us about these job titles?

About vacancies:

Although positions do not require a high level of education it does require specific driver's license for heavy trucks and soft-skills (i.e., time management).

Firm needed more than 6 months to fill these positions.

Reason for shortage:

Lack of relevant technical skills and work experience.

Limited experienced heavy-truck drivers, especially drivers with driving certification.

Strategies implemented to address the shortage:

Provided training.

Hired temporary workers.

Other highlighted details:

Recently the Indonesian government encourage truck drivers to acquire driver's certification, beyond driver's license. Certification is required to improve knowledge in health and workplace safety (Keselamatan dan Kesehatan Kerja, K3) as truck drivers are expected to work safely and responsibly.

* Data source: Bottom-up Call for Evidence and Consultations. 1 employers indicated shortages for these job titles.

What does the market say about these job titles?

Monthly earnings according to online sources:

Job Titles	Monthly Wages (in IDR)	
	Gross	Estimated Net*
Heavy Truck Driver	13,132,685	12,476,051

Notes: * Estimated net wages were calculated applying the personal income tax rate in steps without any deduction

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

Job family according to the Indonesian official classification of occupations

KBJI code and title

8324 – Heavy-Truck Drivers

What workers in this occupation do

Workers in this group drive and maintain heavy motorized vehicles to transport goods, liquids, and heavy materials at close and long distances.

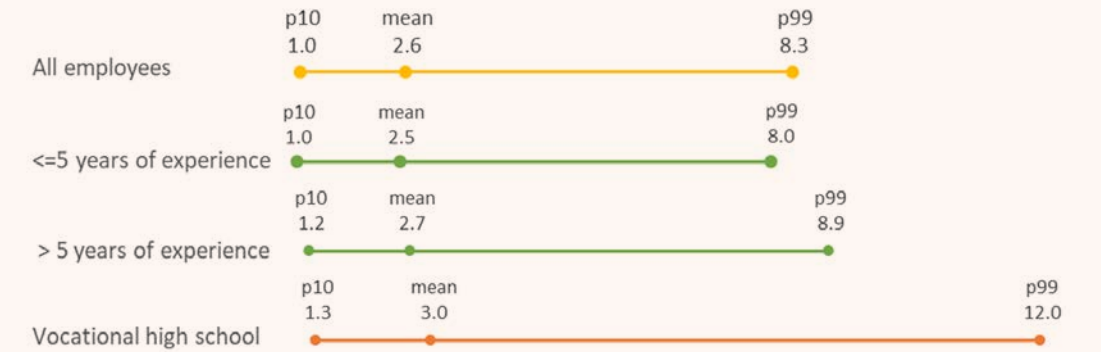
Role and tasks include

Drive and care for heavy motorized vehicles, such as trucks, with or without a trailer or truck cart.

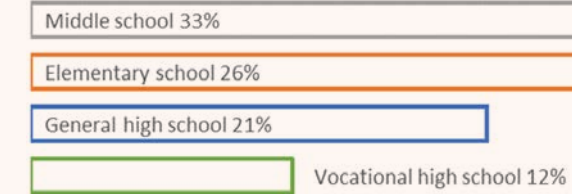
Transport goods, liquids, or heavy materials in close and long distances.

What do national statistics say about this job family?

Monthly wage distribution, IDR (million)



Most common education achieved:



Occupation outlook:

	Mean	Percentile 10th to 99th	
Experience (yrs)	8	1	35
Hours worked (wk)	48	26	96
Age	38	24	64

Most common sectors of employment:

Transportation, storage and communications (60%)
Wholesale and retail trade, restaurants, and hotels (10%)
Manufacturing (10%)

Provinces where most workers in this job family live:

East Java (16%)
Central Java (13%)
West Java (11%)

* Small sample for this level of disaggregation. As such these numbers should be interpreted with caution.

** Data source: SAKERNAS (2015-17)

