

ASEAN IN TRANSFORMATION

HOW TECHNOLOGY IS CHANGING JOBS AND ENTERPRISES

Indonesia Country Brief | April 2017



INTRODUCTION AND OVERVIEW OF INDONESIA

Indonesia is the largest economy among the Association of Southeast Asian Nations (ASEAN), and has a dynamic manufacturing sector.¹ In 2015, its gross domestic product (GDP) was US\$861.9 billion, of which manufacturing accounted for nearly 21 per cent.² Two sectors that are significant to manufacturing in Indonesia, include textiles, clothing and footwear (TCF) and automotive and auto parts.³

Among ASEAN, Indonesia is the second largest TCF exporter, totalling US\$16.3 billion in 2015, less than half the level of the regional leader, Viet Nam.⁴ Moreover, TCF products represented the largest manufacturing export, accounting for 25 per cent of Indonesia's total manufactured exports in 2015. Indonesia's main TCF export destination markets are the United States and the European Union (EU), representing 34 per cent and 20 per cent of total TCF export value in 2015, respectively.

¹ This country brief was prepared by Linda Vega Orozco, and benefited from technical contributions from Jae-Hee Chang, Gary Rynhart and Phu Huynh. It is based on ILO: *ASEAN in transformation: How technology is changing jobs and enterprises* (Geneva, 2016).

² World Bank Group: World Bank Open Data (2017).

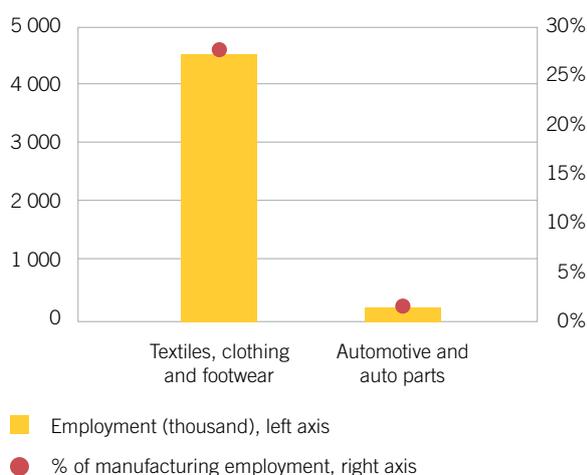
³ In 2014, the most important manufacturing sectors in terms of contribution to manufacturing GDP were food, beverages and tobacco (37 per cent), and transport equipment, machinery and apparatus (28 per cent) (BPS Statistics Indonesia: *Gross Domestic Product at Current Market Prices by Industrial Origin* (2000-2014)).

⁴ UNCTAD: UNCTAD Stat Database (2017).

Another increasingly important sector for Indonesia's economy is the automotive and auto parts sector. In 2015, Indonesia was the second largest exporter of motor vehicles and auto parts in ASEAN, totalling US\$5 billion, about one fifth of the level of the regional leader, Thailand.⁵ Indonesia's major automotive export market is ASEAN accounting for almost 50 per cent of Indonesia's automotive export value in 2015.

Indonesia has a total labour force of almost 128 million women and men.⁶ The service sector is the largest job provider accounting for 45 per cent of total employment. However, manufacturing jobs have expanded and now account for over 13 per cent of jobs. Notably, TCF production contributes 28 per cent of all manufacturing employment, or 4.5 million jobs (figure 1). By comparison, the automotive sector makes up 1 per cent of manufacturing jobs.

Figure 1. Total employment in TCF and automotive and auto parts (thousand) and share of total manufacturing employment (per cent), Indonesia, 2016



Source: Adapted from ILO: *ASEAN in transformation: How technology is changing jobs and enterprises*, op. cit.

Gender disparities in employment in Indonesia are prominent as men account for more than 60 per cent of employment. Of total Indonesian workforce,

69 per cent of total Indonesian workforce are primary school graduates, while only 16 per cent completed secondary education, and an equal proportion finished tertiary education.⁷ Regarding workforce skill levels, 79 per cent of workers in Indonesia are medium-skilled employed and occupy positions as clerks, service and sales workers, and plant and machine operators, among others. About 13 per cent of workers are low-skilled and do elementary education jobs. The remaining 9 per cent of the workforce is high-skilled and work as managers, professionals, technicians and associate professionals.⁸

This country brief highlights the key findings relevant to Indonesia from the series of ILO reports *ASEAN in transformation*, which analyses current technological trends and how they are transforming enterprises and skills requirements across five major manufacturing and services sectors in the region.⁹ The regional research was complemented by surveys conducted with 4,076 enterprises and 2,747 university and technical vocational education and training (TVET) students in the ten ASEAN Member States. This Indonesia brief focuses on technology dynamics in the TCF and automotive sectors as they represent two of the main sectors for the country's manufacturing industry that are likely to be impacted by new technology and innovations that are transforming the workplace.

ENTERPRISE AND STUDENT SURVEY RESULTS

The enterprise survey in Indonesia was conducted with 732 enterprises. The student survey was conducted with 492 students, including 367 university students and 125 TVET students. The main findings of these surveys applicable to Indonesia are highlighted below. Indonesia specific findings are also compared to ASEAN regional findings.

⁵ Ibid.

⁶ IBPS Statistics Indonesia: *Labour Force Survey February 2016* (Jakarta, 2015).

⁷ ILO: *ASEAN in transformation: The future of jobs at risk of automation* (Bangkok, 2016).

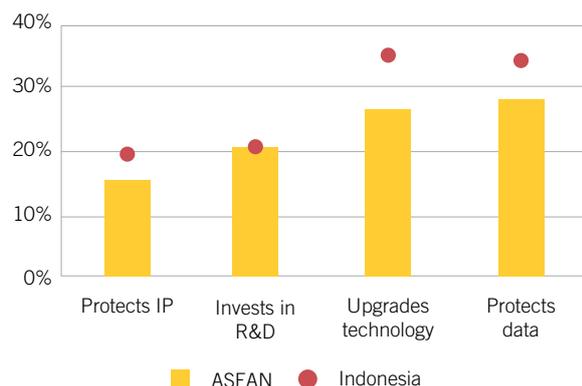
⁸ Ibid.

⁹ The five manufacturing and services sectors analysed were: automotive and auto parts; electrical and electronic parts; textile, clothing and footwear; business process outsourcing; and retail.

Technology uptake by Indonesian enterprises

The enterprise survey revealed that enterprises in Indonesia tend to outperform enterprises in ASEAN in terms of technology adoption and innovation (figure 2).

Figure 2. Which of the following does your enterprise currently do?



Source: Adapted from ILO: *ASEAN in transformation: Perspectives of enterprises and students on future work* (Bangkok, 2016).

For example, around 34 per cent of enterprises in Indonesia delegated responsibility for protecting data, higher than the regional average of 28 per cent. In addition, about 35 per cent of enterprises in Indonesia reported upgrading technology, also higher than the ASEAN trend of 27 per cent. Moreover, 20 per cent of Indonesian enterprises reported investing in research and development while 19 per cent reported protecting intellectual property.

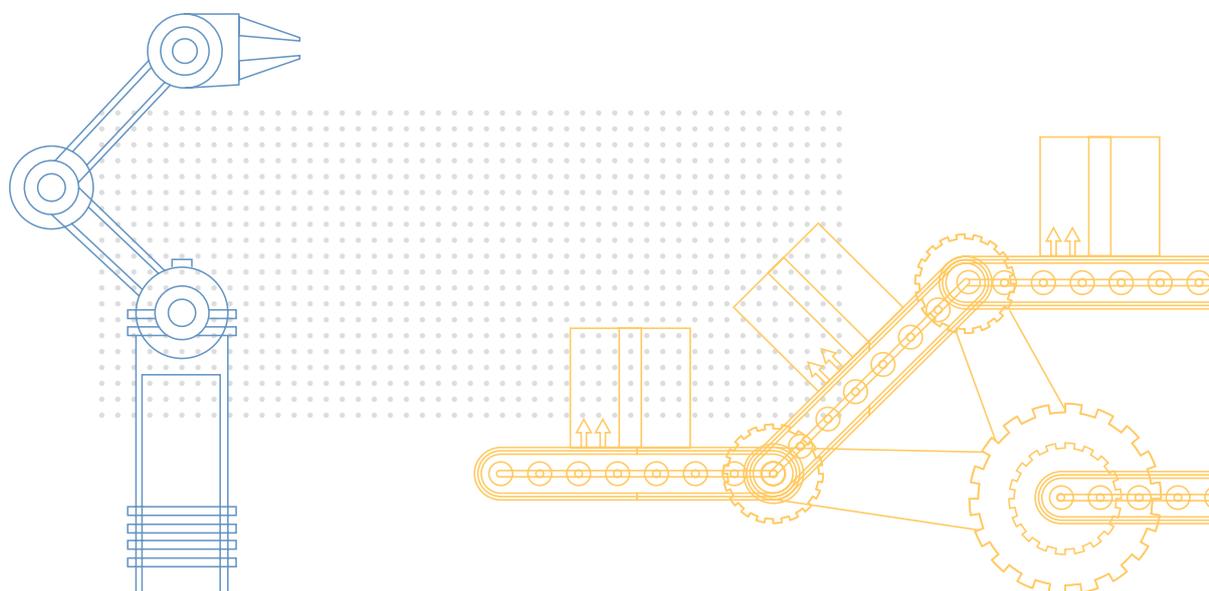
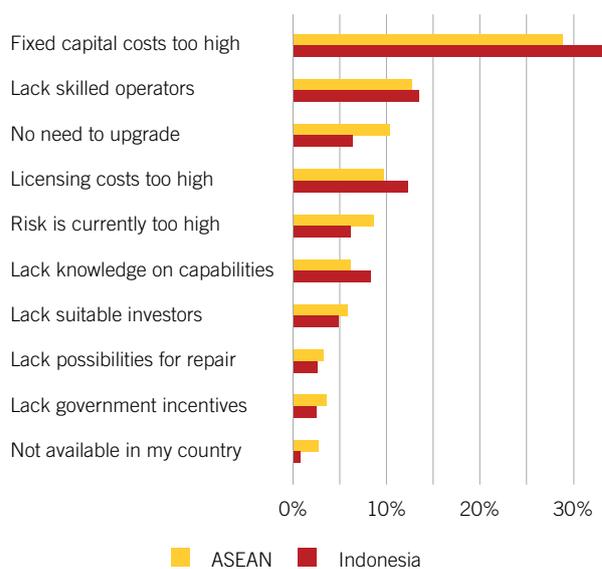


Figure 3. What is currently the single biggest barrier your enterprise faces to upgrade its technology?



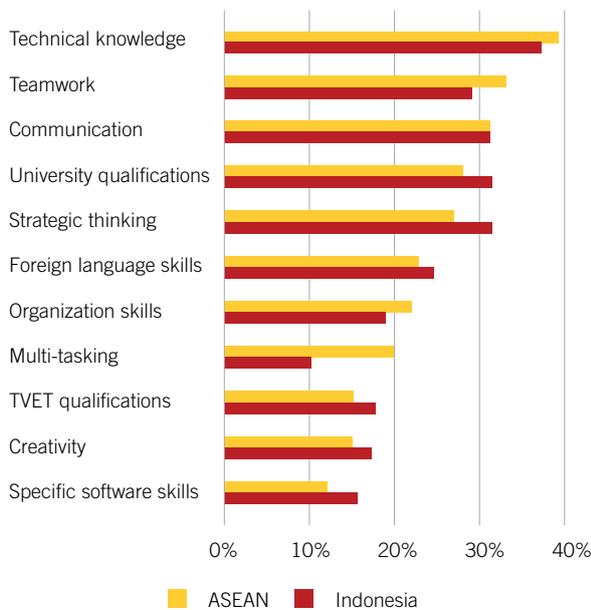
Source: Adapted from ILO: *ASEAN in transformation: Perspectives of enterprises and students on future work*, op. cit.

Enterprises in Indonesia face a number of barriers to upgrading technology (figure 3). Slightly higher than the ASEAN average, around one in three enterprises surveyed in Indonesia cited high fixed capital costs as the leading obstacle. The second largest barrier chosen by enterprises in both Indonesia and across ASEAN was the lack of a skilled workforce to operate the technology. While high costs and lack of expertise to manage new technologies are the two largest obstacles to uptake technology both in Indonesia and ASEAN, continued increase in labour costs and reduction of technology costs will trigger enterprises to adopt technology and look for workers with the necessary skills to use new technologies.

Critical skills and enterprise future outlook

The enterprise survey gathered insights into the most critical skill requirements for enterprises (figure 4).

Figure 4. Which type of skills are currently the most critical for your enterprise?



Source: Adapted from ILO: *ASEAN in transformation: Perspectives of enterprises and students on future work*, op. cit.

ASEAN enterprises overall cited a mix of technical skills combined with core skills such as teamwork and communication as the most important areas. Similarly, Indonesian enterprises listed the same mix of critical skills, but also identified strategic thinking and university qualifications as important. Future job-seekers would increasingly require to advance skills development in technical areas while fostering core skills that remain essential regardless of technological advances in the workplace.

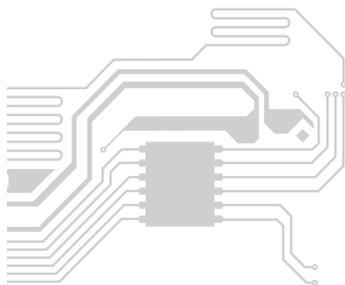
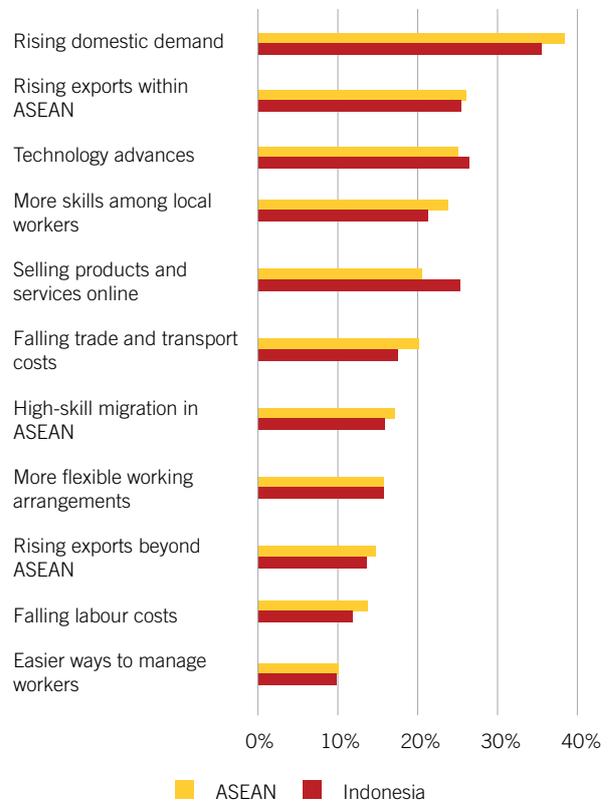


Figure 5. Which do you perceive are the biggest opportunities facing your enterprise up to 2025?



Source: Adapted from ILO: *ASEAN in transformation: Perspectives of enterprises and students on future work*, op. cit.

Looking ahead to 2025, enterprises across ASEAN foresee the biggest opportunities arising from expanding markets, both domestically and within the region, as well as technological innovations (figure 5). Likewise, enterprises in Indonesia highlighted the same areas of opportunities, but also cited the ability to sell their products and services online as an important opportunity for their enterprises up to 2025. The perceived potential of online commerce in Indonesia is associated with the prevalence of the service sector in the country's national economy. Widespread use of online commerce could impact Indonesia's retail sector which in 2015 provided 20.4 million jobs, accounting for almost 40 per cent of total employment in Indonesia's service sector.¹⁰ The potential of online commerce for retail enterprises is high as 30 to 40 per cent of Indonesia's population owns a smartphone.¹¹ Furthermore, smartphone ownership in Indonesia's urban areas is even more remarkable as almost 90 per cent of urban Indonesians own a smartphone.¹²

¹⁰ ILO: *ASEAN in transformation: How technology is changing jobs and enterprises*, op. cit.

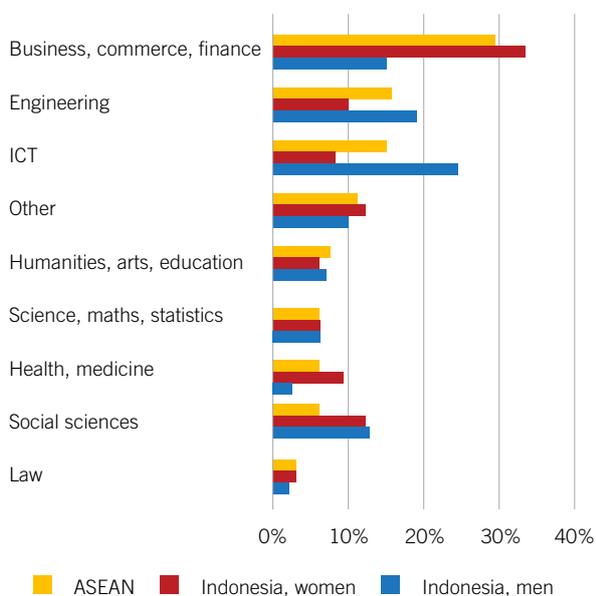
¹¹ Ibid.

¹² Ibid.

Students future outlook

The 367 university students and 125 TVET students surveyed students in Indonesia came from a diverse range of academic fields (figure 6).

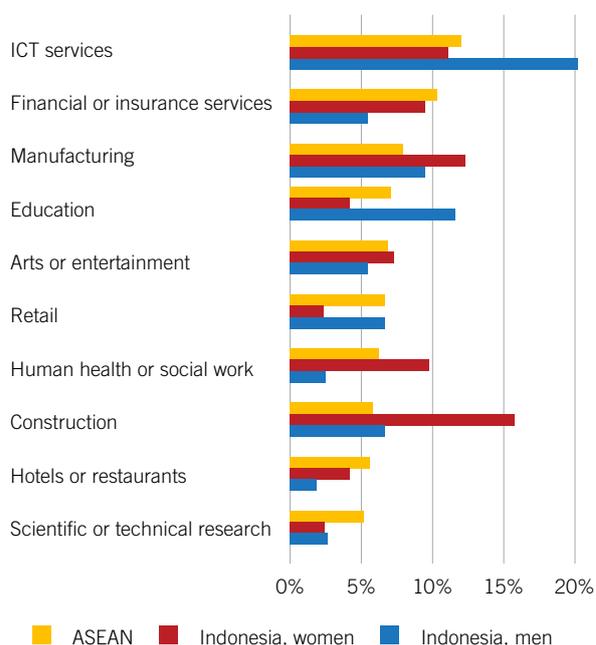
Figure 6. What is your main field of study?



Source: Adapted from ILO: *ASEAN in transformation: Perspectives of enterprises and students on future work*, op. cit.

The leading disciplines were business, commerce and finance for women (33.1 per cent) and information, communications and technology (ICT) for men (24.4 per cent). These results compare to 29.5 per cent and 15.1 per cent of ASEAN students that studied business, commerce and finance, and ICT, respectively. For Indonesian women, other prominent areas of study included social sciences (12.2 per cent) and engineering (10 per cent). Other popular fields of study among Indonesian men were engineering (19.2 per cent) and business, commerce and finance (15.1 per cent). It is worth highlighting that only 16.3 per cent of Indonesian women studied science, technology, engineering and mathematics (STEM) degrees, compared to 25.6 per cent of Indonesian men.¹³ These gender differentials in STEM uptake point to potential disadvantages that Indonesian women may face when entering the job market, especially in growing sectors such as automotive manufacturing in Indonesia.

Figure 7. In which economic sector would you ideally want to work when choosing your first employment after graduation?



Notes: nine economic sectors accounting for shares lower than 5 per cent across ASEAN were not included in figure 7. These sectors were agriculture, forestry or fishing; administrative or support services; mining and quarrying; public administration or defence; real estate activities; supply of electricity or gas; transport or storage services; water or waste management; and other service activities.

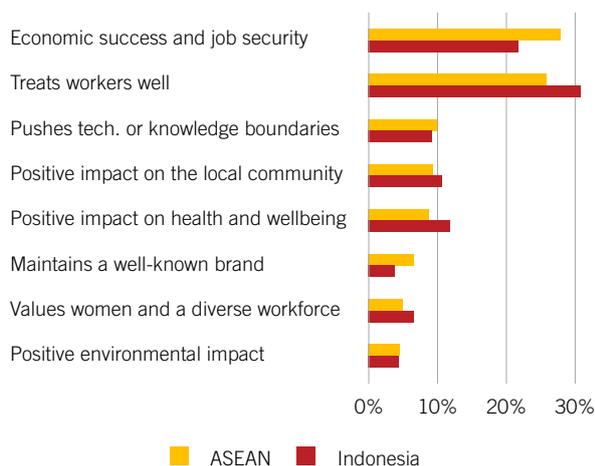
Source: Adapted from ILO: *ASEAN in transformation: Perspectives of enterprises and students on future work*, op. cit.

Students were also asked to identify the sector in which they most wanted to work after graduation (figure 7). The three most desired sectors among Indonesian women were construction (15.6 per cent), manufacturing (12.2 per cent) and ICT services (10.9 per cent). Among Indonesian men, the three most desired sectors were ICT (20.3 per cent), education (11.6 per cent) and manufacturing (9.3 per cent). Women disproportionately wanted to work in the construction and manufacturing sectors compared to men (27.8 per cent compared to 15.7 per cent, respectively). However, less than 25 per cent of women was enrolled in STEM degrees compared to 50 per cent of men, which reflects the misalignment between students' ideal employment sectors and areas of study, particularly for women. The three most preferred sectors of employment in ASEAN were ICT services (11.9 per cent), financial or insurance services (10.2 per cent) and manufacturing (7.8 per

¹³ Ibid.

cent). Even though scientific and technical research was not among the most preferred sectors, it is worth noting that about 2.2 per cent of Indonesian students wanted to work in this sector compared 5.1 per cent of students across ASEAN.

Figure 8. What is the most important factor for a company's reputation?



Source: Adapted from ILO: *ASEAN in transformation: Perspectives of enterprises and students on future work*, op. cit.

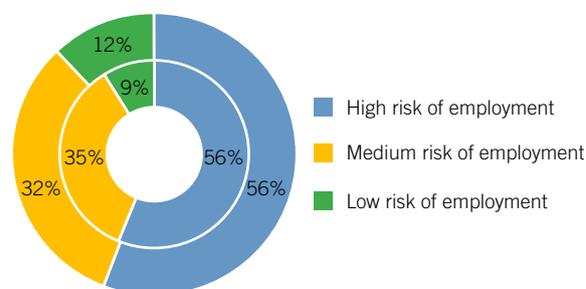
The student survey also asked respondents the most important factor for a company's reputation (figure 8). Unsurprisingly, around one in three students across ASEAN and one in four students in Indonesia cited economic success and job security as the most significant aspect. On average, around one in four students across ASEAN also prioritized the company's treatment of staff, while one in three students in Indonesia indicated this factor as the second most critical. It is worth noting, moreover, that students in Indonesia ranked innovative technology and knowledge, and positive impact on the local community as the third and fourth most important features, respectively.

JOBS AT RISK OF AUTOMATION

The ILO assessed the automation risk of occupations in five ASEAN countries including Cambodia, Indonesia, the Philippines, Thailand and Viet Nam.¹⁴ These five countries, jointly referred to as ASEAN-5, comprise 80 per cent of the total workforce in the ten ASEAN member states.

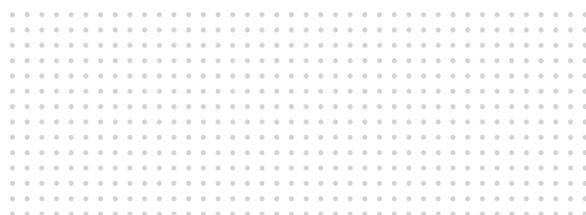
Advances in technology including automation and robotics, could bring significant changes to employment in Indonesia in the next two decades. The ILO estimated that 56 per cent of employment (about 60 million jobs) face a high risk of automation in Indonesia (figure 9). This share is equal to the ASEAN-5 average, but lower than countries where more workers are low-skilled such as Viet Nam (70 per cent). In Indonesia, key occupations at high risk include gardeners (9.1 million), shop salespersons (1.8 million), office clerks (1.7 million) and tailors (1.1 million).

Figure 9. Distribution of employment at risk of automation



Notes: The outer ring represents average risk of automation across ASEAN-5, the inner ring represents risk of automation in Indonesia.

Source: Adapted from ILO: *ASEAN in transformation: The future of jobs at risk of automation*, op. cit.



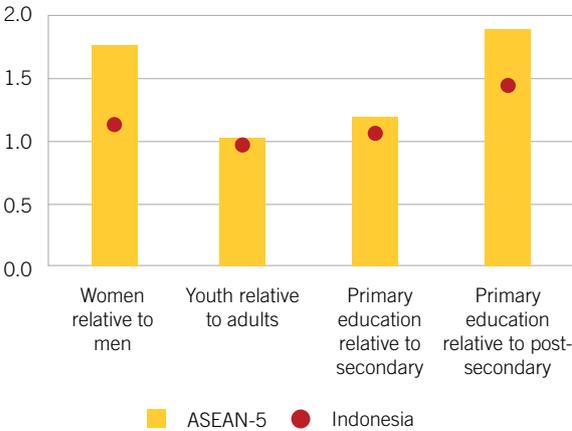
¹⁴ ILO: *ASEAN in transformation: The future of jobs at risk of automation* (Bangkok, 2016). This ILO study was conducted by applying a research methodology developed by Carl Frey and Michael Osborne of the University of Oxford. The ILO did not attempt to predict the precise number of jobs that would be automated or displaced, rather it identified the occupations and types of workers facing a high probability of automation over the next couple decades based on the nature of tasks involved.

Across all economic sectors in Indonesia, workers in the construction and retail sectors face the highest risk of automation accounting for 81 per cent and 91 per cent, respectively. The TCF and automotive sectors could also be greatly impacted by advances in technological engineering. TCF production in Indonesia ranges from high-value added to low-value added production, and characterized with a workforce that is low- to medium-skilled. Of all wage workers in Indonesia’s TCF sector, 64 per cent could face a high risk of automation.¹⁵ Women could be significantly more impacted than men, as they represent 60 per cent of total TCF wage workers.¹⁶ Sewing machine operators who perform repetitive and manual tasks are among the TCF workers at highest risk of automation. Additionally, in the automotive sector, about 58 per cent of jobs are at high-risk of being automated.

Moreover, 35 per cent of total Indonesian workforce faces a medium-risk of automation.¹⁷ This compares to an average medium-risk of 32 per cent across ASEAN-5 workforce. Economic sectors at medium-risk of automation in Indonesia include agriculture, forestry and fishery, and transport and storage. Finally, 9 per cent of Indonesia’s workforce faces low-risk of automation, compared to an average 12 per cent across ASEAN-5. Economic sectors in Indonesia at low-risk of automation include education and training, human health and social work activities, and real estate work. Occupations at low automation risk include primary education teaching professionals (1.9 million), personal services workers (1.1 million) and managers in wholesale and retail trade (249,400).¹⁸

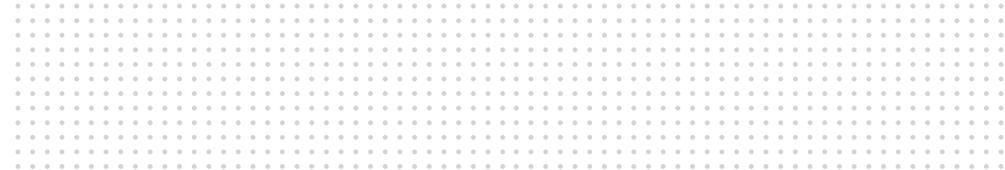
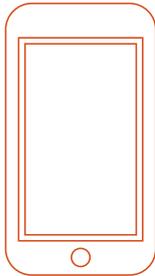
To extend insights beyond the main occupations and sectors at risk of automation, socio-demographic indicators including sex, age and level of education were analysed to further understand how workplace automation affects different segments of the workforce (figure 10).

Figure 10. Probability of occupying a high-risk, automatable job by gender, age and education levels



Source: Adapted from ILO: *ASEAN in transformation: The future of jobs at risk of automation*, op. cit.

Automation risk in Indonesia could disproportionately impact women, who across all industries are 1.2 times more likely than men to be employed in an occupation at high risk of automation. Additionally, young Indonesian workers aged 15 to 24 are slightly more susceptible to having an occupation at high risk relative to adult Indonesian workers. Likewise, primary school graduates are about 50 per cent more likely to be at high risk compared with those with post-secondary education. Probabilities of automation in Indonesia by gender, age and education levels are lower than in ASEAN-5. These trends tend to support the notion that higher education and training helps develop the competencies needed for complicated tasks requiring advanced levels of perception and manipulation, creative intelligence, and social intelligence. These tasks are considered difficult to automate.



¹⁵ ILO: *ASEAN in transformation: The future of jobs at risk of automation*, op. cit.
¹⁶ ILO: *ASEAN in transformation: Textiles, clothing and footwear: Refashioning the future*, op. cit.
¹⁷ ILO: *ASEAN in transformation: The future of jobs at risk of automation*, op. cit.
¹⁸ *ibid.*

IMPACT OF TECHNOLOGY ON TCF AND AUTOMOTIVE SECTORS

Highlights of main technological innovations and impacts on the TCF and automotive sectors are examined below.

TCF sector

Key technologies driving the TCF sector worldwide are related to product customization technology such as additive manufacturing, body scanners and computer-aided design. Other advances impacting the sector include smart apparel, nanotechnology, robotic automation and automated sewing machines.¹⁹ In Indonesia, robotic automation and automated sewing machines are likely to have the greatest impact on TCF enterprises and workers. Recent examples have shown that TCF enterprises in Indonesia are already redefining production methods through technology innovation aimed to improve product quality and labour productivity, increase workplace safety, and reduce environmental impact. For instance, in 2016, Adidas (Indonesia) reported using automated cutting as a key innovation strategy to reduce manual cutting down to 30 per cent.

Technology uptake in the sector creates potential for increasing labour productivity and overcoming challenges in Indonesia's TCF sector. While not being among the lowest in the region, labour productivity in Indonesia's TCF sector is only half of the level in Thailand's TCF sector.²⁰ This sector struggles with outdated technology, which in 2012 the Ministry of Labour estimated to represent 70 per cent of all machinery in use.²¹ Other issues specific to the sector include a low-skilled workforce, high reliance on raw imported

inputs, and underdeveloped power infrastructure which increases energy costs.²²

Over the medium-term, TCF production in Indonesia could be impacted by technology uptake both inside and outside Indonesia. Inside Indonesia, TCF enterprises could uptake technology so as to raise labour productivity in the sector. This could support the government's target of exporting US\$75 billion of TCF products by 2030 so as to become one of the five largest TCF exporters worldwide.²³ To achieve this, Indonesia would need to address its infrastructural constraints to reduce relatively high electricity costs in the country.²⁴ Increased technology uptake in the sector would result in a higher demand for technicians with backgrounds in STEM and lower demand for manual workers in the sector.²⁵ This is because fundamental tasks in TCF manufacturing including sewing could be automated. Indeed, as mentioned earlier, sewing machine operators are among the occupations at highest risk of automation in Indonesia.

Outside Indonesia, technology adoption by TCF enterprises could impact export growth of the Indonesian TCF sector. Main destination countries (such as the United States) and major regional competitors (including China) could increasingly incorporate automation into their most labour intensive production processes. Besides labour costs, offshoring also entails costs in terms of shipping, duty and reputational risks. If the total cost of using automated sewing machines proves to be more efficient than offshoring, retailers may increasingly reshore TCF production to destination countries from Indonesia. Additionally, technology adoption in TCF factories in countries in Asia could result in less relocation of TCF production to Indonesia, which ultimately would reduce Indonesia's TCF competitiveness and decrease its global market share.



¹⁹ Automated sewing machines have been developed and are becoming widely available in the market. These machines are able to run on a continuous basis without human operators.

²⁰ ILO: *ASEAN in transformation: Textiles, clothing and footwear: Refashioning the future*, op. cit.

²¹ Ibid.

²² Indonesia Business Guide: *Indonesia's Textile Industry – Testing Times Upstream* (2015). It is worth highlighting, however, that in 2016 the Indonesian government reduced taxes on raw materials and provided export incentives to TCF enterprises in order to promote local sourcing of inputs

²³ The Comprehensive Economic Partnership Agreement (CEPA), a bilateral free-trade agreement which is currently being negotiated with the EU, could support export-growth as it would provide Indonesia with duty-free access for TCF products to the EU, if ratified.

²⁴ In 2015, electricity costs in the Indonesian TCF sector reportedly accounted for 30 per cent of total production costs (Indonesia Business Guide, 2015).

²⁵ Estimates based on 2013 national labour force survey. See: P. Huynh: *Employment, wages and working conditions in Asia's garment sector: Finding new drivers of competitiveness*, ILO Asia-Pacific Working Paper Series (Bangkok, ILO, 2015).

Automotive sector

Worldwide, four major technologies are transforming the automotive sector, namely, electrification of vehicles and vehicular components, advancements in lightweight materials, autonomous driving, and robotic automation.²⁶ Consumer demand for better quality and higher performing cars, government regulations to lower carbon emissions and more environmental consciousness are likely to influence the adoption of these technologies in Indonesia.

A key factor driving the development of the automotive sector in Indonesia has been its competitive labour costs (compared to those of developed countries). This sector has consistently attracted foreign investment, particularly from Japanese car makers due to the country's growing middle class workforce which increased from 4.1 to 32.7 million people between 1993 and 2013.²⁷ To date, middle class workforce growth has been coupled with relatively low levels of car ownership, as only 10 per cent of the population reported owning a car in 2014; however car ownership is projected to grow in Indonesia.²⁸ As a result, both production and consumption have expanded in the country.²⁹

In Indonesia's automotive sector, robotic automation is likely to be the most disruptive technology impacting both enterprises and workers. In fact, Indonesia's robot acquisition increased in 2013 and 2014, and its current robot density of 39 robots per 100,000 workers is expected to continue growing.³⁰ Robots are getting smaller, better at assembly, cheaper, easier to install and more adaptable. Cost-reduction agreements where the same parts must be made more cheaply or the quantity produced must increase with the same resource intensity are driving automation. Additionally, rapid increases in minimum wage levels, which more than doubled between 2011 and 2015, are incentivising automation in the sector.

Over the medium-term, automation is likely to be widespread in the sector. Examples of automation of production have already been seen in Indonesia through ILO interviews. For instance, an auto parts company specializing in interior components and insulation automated certain production processes and successfully doubled its water-jet efficiency and increased capacity in cutting automobile parts by more than threefold.³¹ Additionally, collaborative robots, or 'cobots' that are able to work alongside workers, are increasingly taking on manual and hazardous tasks performed by low-skilled workers, making the workplace safer in the sector.

Technological uptake will change skill requirements in Indonesia's automotive sector. Automation will shift the industry's labour needs from low-skilled, assembly line workers to technically equipped workers with a variety and depth of skills. This will result in fewer workers on factory floors.

SUMMARY

In the next two decades, 56 per cent of jobs in Indonesia are at high risk of being automated. Technology advances are likely to disproportionately impact specific segments of the workforce including low-skilled workers, women, youth and less educated workers. While workers in the construction and retail sectors are at the highest risk of being automated, a large proportion of workers in the TCF and manufacturing sectors are also prone to automation. The transformation of TCF and automotive workplaces is already underway. In the TCF sector, robots are progressively taking on dangerous and manual tasks traditionally performed by less skilled workers. Enterprises in the automotive sector are deploying cobots, which are able to collaborate with skilled human workers.

²⁶ ILO: *ASEAN in transformation: Automotive and auto parts: Shifting gears* (Bangkok, 2016).

²⁷ ILO: Key indicators of the labour market (KILM) 9th Edition (2015). The growing middle class workforce can be defined as the working population with purchasing power parity between US\$5 and US\$13. ²¹ Ibid.

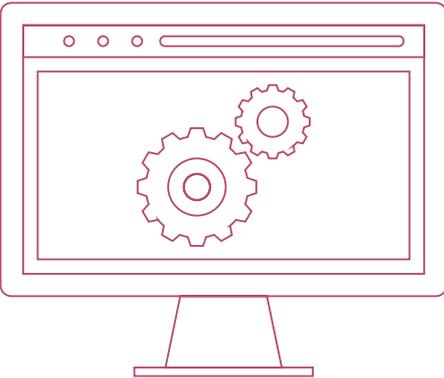
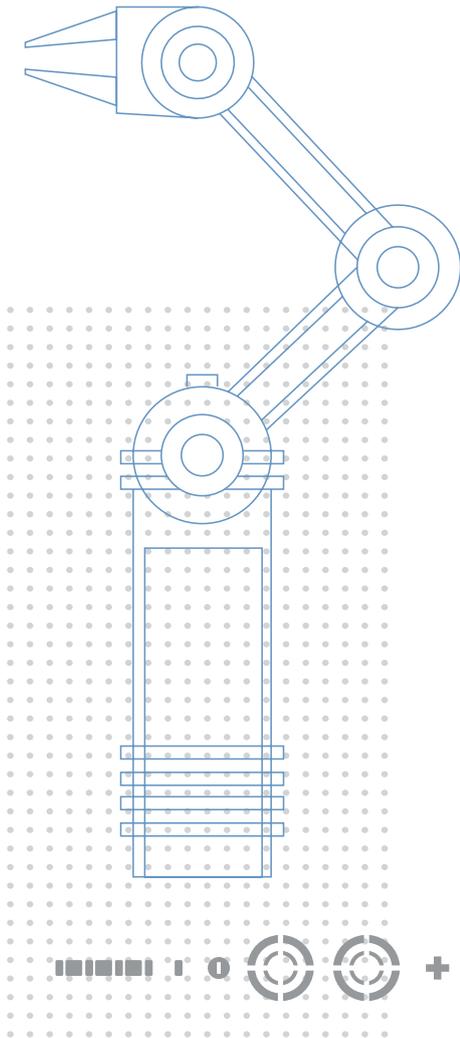
²⁸ PwC: *Riding Southeast Asia's automotive highway: Strategies to steer through Southeast Asia's promising automotive market* (November 2015). The level of car ownership in Indonesia is equivalent to 75 cars per one thousand people, which compares to 184 cars per the same number of people in Thailand (PwC, 2015).

²⁹ Between 2011 and 2015, as reported by the International Organization of Motor Vehicle Manufacturers, annual production of motor vehicles in Indonesia increased from 838,388 to almost 1.1 million units (an increase of 31 per cent). In the same period, annual sales of motor vehicles in Indonesia grew from 894,164 to about 1 million units (an expansion of 15 per cent). See OICA: Sales and production statistics (2017).

³⁰ International Federation of Robotics: IFR Press Release: Global robotics industry: Record beats Record! (2013); International Federation of Robotics: IFR Press Release Survey: 1.3 million industrial robots to enter service by 2018 (2016).

³¹ ILO: *ASEAN in transformation: Automotive and auto parts: Shifting gears*, op. cit.

Technology adoption is transforming skill requirements. Enterprises are requiring technicians and high-skilled workers with strong STEM backgrounds. In this context, a priority focus on skills and workforce readiness in Indonesia is critical. Policymakers, employers and training institutions should work together in order to foster technical skills, strategic thinking as well as communication and teamwork among the workforce. Promoting academic pursuits in STEM is important, particularly among young women, which will be increasingly instrumental in technology-centred enterprises.



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