



# ASEAN IN TRANSFORMATION

## HOW TECHNOLOGY IS CHANGING JOBS AND ENTERPRISES

Thailand Country Brief | September 2017



### INTRODUCTION AND OVERVIEW OF THAILAND

Thailand is an emerging economy with robust manufacturing and service sectors.<sup>1</sup> In 2016, Thailand's GDP totalled US\$407 billion, the second largest in ASEAN after Indonesia (US\$932 billion).<sup>2</sup> Services and manufacturing sectors contributed 56 per cent and 27 per cent to total GDP, respectively. Three key manufacturing sectors in Thailand's economy are electrical and electronics (E&E); automotive and auto parts; and textiles, clothing and footwear (TCF).

In 2016, Thailand's total exports totalled US\$211.8 billion.<sup>3</sup> Of this total, E&E exports accounted for 25 per cent, or US\$53 billion, making it the third largest exporter among ASEAN countries. Thailand is the world's second largest producer of hard disk drives, after China, supplying about 30 per cent of the world's market. Additionally, Thailand is the second largest manufacturer of air conditioning units in the world and a significant producer of refrigerators. Thailand's major E&E export markets are the United States (US), ASEAN and Hong Kong (China), which together represented almost half of Thailand's E&E exports in 2016.

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

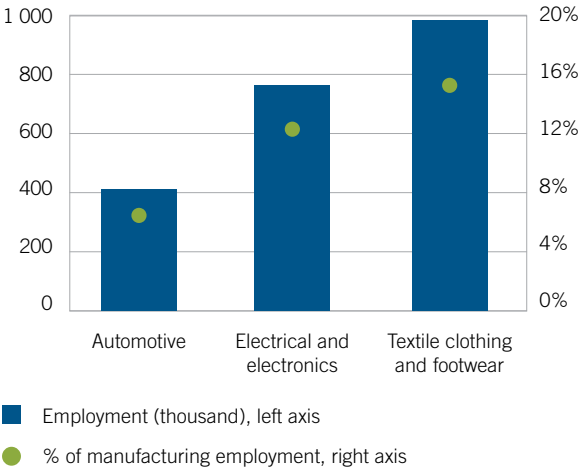
<sup>2</sup> World Bank Group: World Bank Data (2017).

<sup>3</sup> UNCTAD: UNCTAD Stat Database (2017).

Among ASEAN, Thailand is the largest exporter of automobiles and auto parts, totalling US\$25.8 billion in 2016, more than four times the level of Indonesia, the second largest automotive exporter in the region. Thailand's most important automotive export market is ASEAN which accounted for almost 30 per cent of exports in 2016. As regards the TCF sector, Thailand's TCF exports accounted for US\$9.2 billion, 4 per cent of total exports in 2016. Thailand is the third largest exporter of TCF in the ASEAN region. Key TCF export markets include the US (20 per cent), ASEAN (19 per cent) and the European Union (EU) (16 per cent).

The service sector is the largest job provider accounting for 44 per cent of employment, and manufacturing represents 16 per cent of total jobs. Of total employment in manufacturing, the TCF sector represents 16 per cent (almost 1 million jobs), the E&E sector accounts for 12 per cent (780,000 jobs) and the automotive sector makes up almost 7 per cent (415,200 jobs) (figure 1).

**Figure 1. Total employment in automotive, E&E, and TCF sectors (thousand) and share of total manufacturing employment (per cent), Thailand, 2015**



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

Thailand has a total labour force of almost 39 million, of which 45 per cent are women and 55 per cent are men. Of this total, 67 per cent are primary school graduates, 15 per cent finished secondary education and 17 per cent completed tertiary education.<sup>4</sup> In terms of workforce skills levels, the majority of the workforce (77 per cent) is medium skilled, 14 per cent is high skilled and 9 per cent is low skilled.<sup>5</sup> Medium-skilled workers in Thailand primarily work as clerks, service and sales workers, skilled agricultural and fishery workers, and machine operators, among others. Low-skilled workers perform elementary occupations, and high-skilled workers are employed as managers, professionals, technicians and associate professionals.

This country brief highlights the key findings relevant to Thailand from the series of ILO reports ASEAN in transformation, which analyses how current technological trends are transforming enterprises and skills requirements across five major manufacturing and services sectors in the region.<sup>6</sup> 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 brief focuses on technology dynamics in Thailand's automotive, E&E and TCF sectors as they represent key sectors that are being impacted by technology changes that are transforming the workplace.

## ENTERPRISE AND STUDENT SURVEY RESULTS

The enterprise and student surveys in Thailand were conducted with 664 enterprises and 461 students, respectively. Of the total surveyed students, 336 were university students and 125 were TVET students. The main findings of the enterprise and student surveys applicable to Thailand are analysed and compared to the regional findings below.



<sup>4</sup> ILO: *ASEAN in transformation: The future of jobs at risk of automation* (Geneva, 2016).

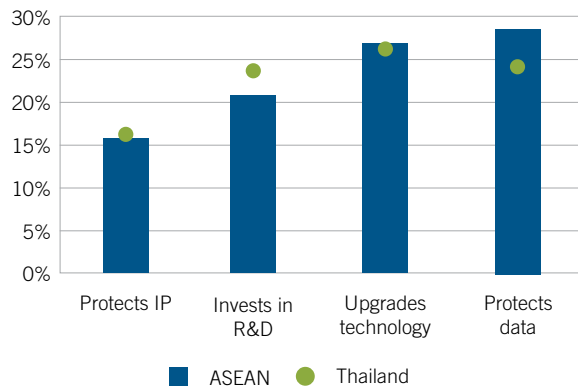
<sup>5</sup> Ibid.

<sup>6</sup> 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 enterprises in Thailand

ASEAN enterprises are not at the forefront of technological innovation compared to other regions in the world. Besides Singapore and Malaysia, the region is a “taker” of technology, rather than its “maker”. The enterprise survey revealed that enterprises in Thailand tend to follow the ASEAN general trend, and in some cases underperform the regional average (figure 2).

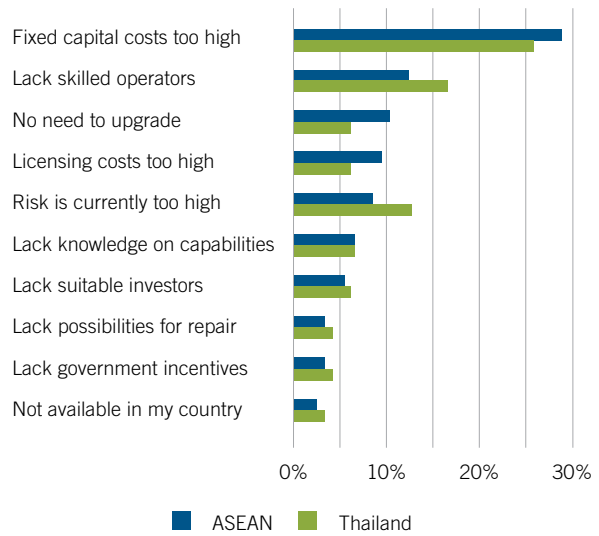
**Figure 2. Which of the following does your enterprise currently do?**



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

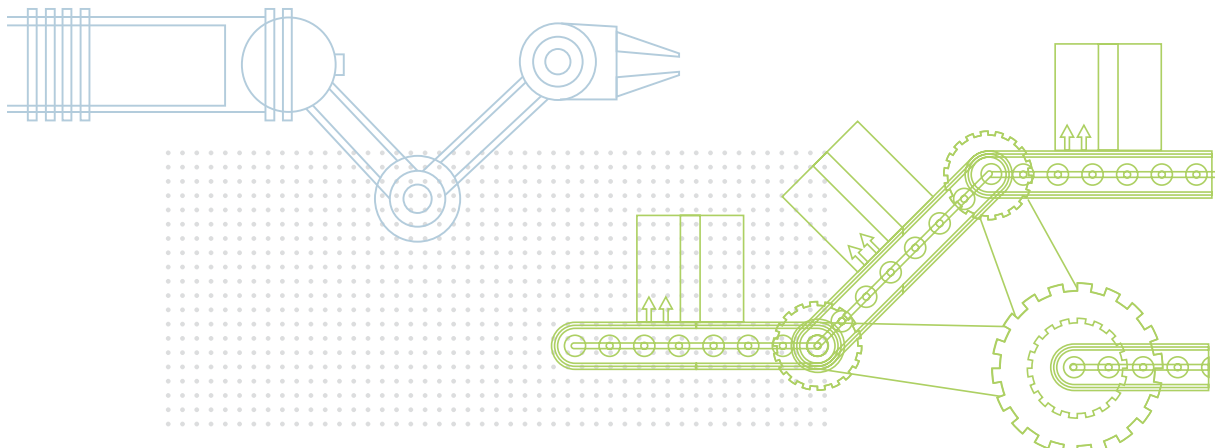
About 24 per cent of enterprises in Thailand reported protecting data, lower than the ASEAN average of 28 per cent. Additionally, 26 per cent of enterprises in Thailand upgraded technology, compared to 27 per cent of ASEAN enterprises. Approximately 23 per cent of enterprises in Thailand invested in research and development (R&D), relative to 21 per cent of enterprises in ASEAN. Finally, 16 per cent of enterprises both in Thailand and across ASEAN 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.

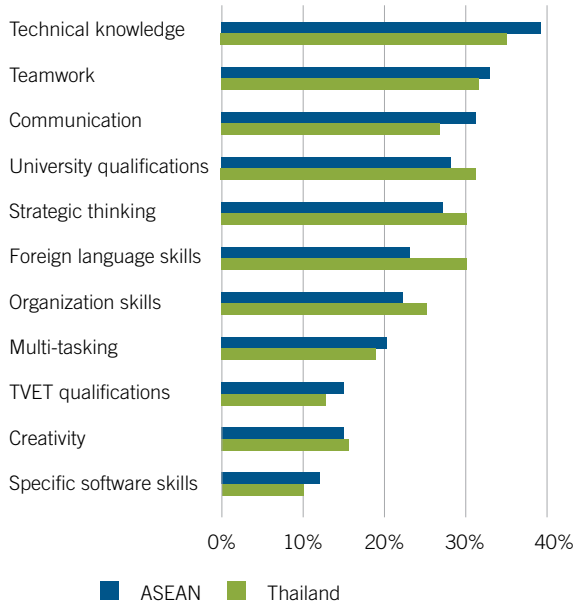
Enterprises were asked about the perceived barriers to upgrade technology (figure 3). The first largest barrier chosen by 26 per cent of enterprises in Thailand and 29 per cent of ASEAN enterprises was the high cost of fixed capital. The second largest barrier selected by 17 per cent of enterprises in Thailand and 13 per cent of ASEAN enterprises was the lack of skilled operators to use new technologies. Enterprises in Thailand also highlighted the high risk involved in such investments as a significant barrier to uptake technology. These findings are relevant, but could change as technology costs decrease while labour costs increase. The survey results also highlight the need to recruit skilled workers to operate new technologies.



## Critical skills and enterprise future outlook

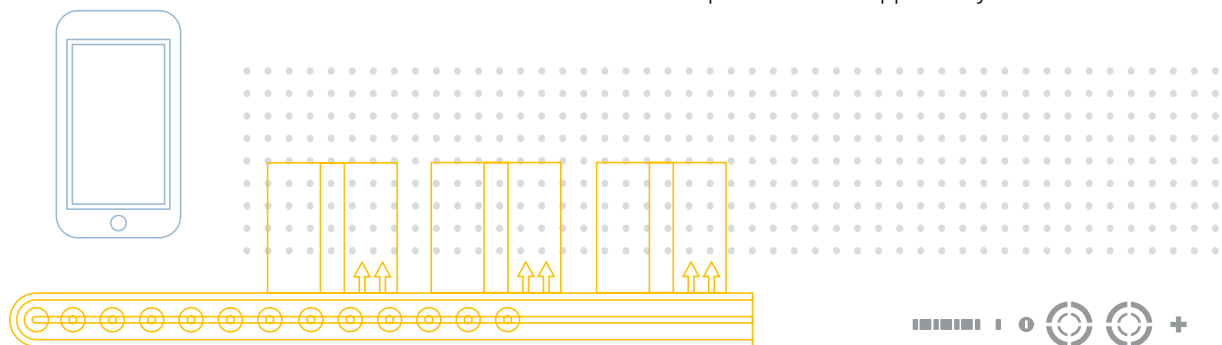
Enterprises were also asked to identify the most critical skills in their enterprises (figure 4).

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



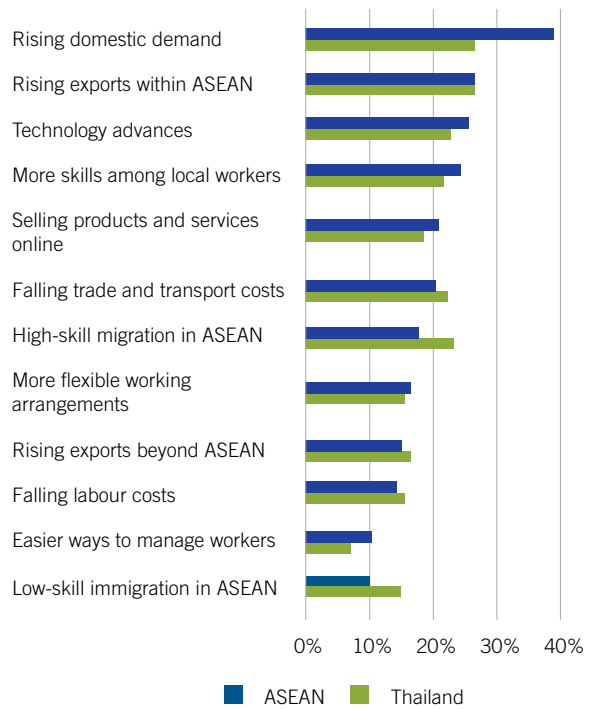
Source: Adapted from ILO: *ASEAN in transformation: Perspectives of enterprises and students on future work*, op. cit.

Enterprises in ASEAN valued technical knowledge, teamwork and communication skills, and university qualifications the most. Likewise, enterprises in Thailand cited the same skills, and also identified foreign language skills and strategic thinking. These results reveal the importance of fostering both soft and hard skills regardless of technological innovations impacting the workplace. The preference for foreign language skills could be associated with business opportunities arising from integration with ASEAN.



Companies in Thailand are reportedly encouraging their workers to learn English.<sup>7</sup> Some companies pay for their staff's English lessons, while others have established reward systems that offer salary increases after reaching certain level of English proficiency.

**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.

Enterprises were also asked about their biggest opportunities up to 2025 (figure 5). ASEAN enterprises perceived the biggest opportunities arising from rising domestic demand and exports within ASEAN as well as technological advances. Likewise, enterprises in Thailand foresaw the same areas of opportunities, and highlighted high-skilled migration in ASEAN as an important future opportunity for their businesses.

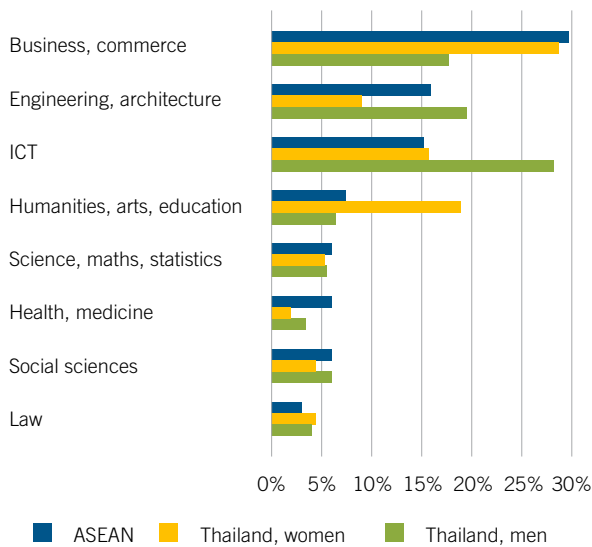
<sup>7</sup> Bangkok Post: "Is English language proficiency the passport to business success?" 4 Sep. 2017.

A preference for high skilled migrants is directly linked to the importance placed on foreign language skills. Generally, high-skilled migrants have a good level of English, which is useful to conduct business at regional and global levels.

## Students future outlook

The 336 university students and 125 TVET students surveyed in Thailand studied a diverse range of academic fields (figure 6).

**Figure 6. What is your main field of study?**



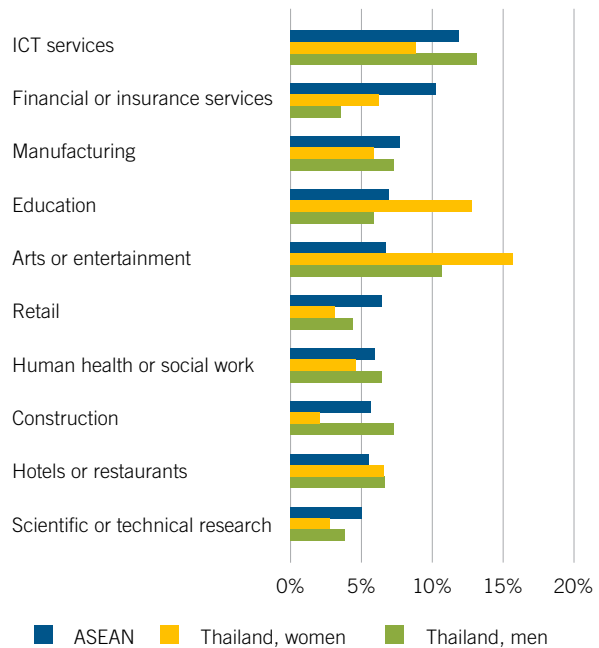
Source: Adapted from ILO: *ASEAN in transformation: Perspectives of enterprises and students on future work*, op. cit.

The most prominent disciplines among students in Thailand were business, commerce and finance for women (28.6 per cent) and information, communications and technology (ICT) for men (28.2 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. Other prominent areas of study among women in Thailand included humanities, arts and education (18.8 per cent) and ICT (15.7 per cent). Among men in Thailand, the second and third most prominent areas of study were engineering (19.4 per cent) and business, commerce and finance (17.5 per cent). Gender differences in STEM uptake in Thailand are significant, as 24.8 per cent of men



studied STEM degrees compared to 14.1 per cent of women.<sup>8</sup> With this trend, female students in Thailand could face disadvantages entering particular growth sectors where these skills are increasingly demanded including automotive and E&E manufacturing.

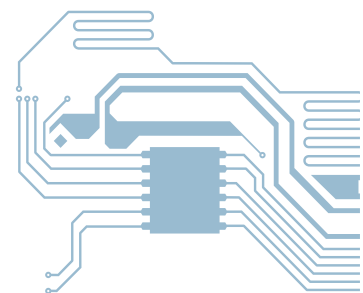
**Figure 7. In which economic sector would you ideally want to work when choosing your first employment after graduation?**



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.

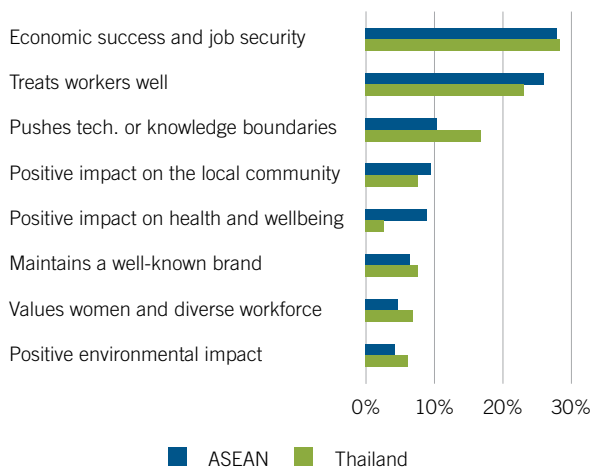
Students also identified the sector in which they most wanted to work after graduation (figure 7). The three most desired sectors among women in Thailand were arts or entertainment (15.7 per cent), education (12.9 per cent) and ICT services (9.0 per cent). Among men in Thailand, the three top sectors were ICT services (13.1 per cent), arts or entertainment (10.7



<sup>8</sup> ILO: *ASEAN in transformation: Perspectives of enterprises and students on future work*, op. cit.

per cent) and construction (7.3 per cent). Among students in ASEAN, the three most preferred sectors of employment were ICT services (11.9 per cent), financial or insurance services (10.2 per cent) and manufacturing (7.8 per cent).

**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.

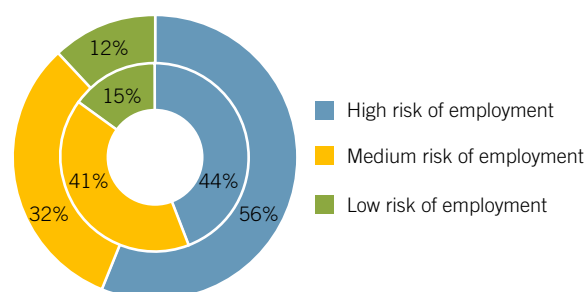
The survey also asked students about the most important factor for a company's reputation (figure 8). About a third of the students across ASEAN and Thailand reported that economic success and job security was the most important factor. The second and third most important factors across ASEAN and Thailand were the company's treatment of staff, and the ability to uptake technology, respectively. Having positive impact on the local community was ranked as the fourth most important factor by students in Thailand and ASEAN.

## JOBS AT RISK OF AUTOMATION

The ILO assessed automation risk of occupations in five ASEAN countries, namely Cambodia, Indonesia, the Philippines, Thailand and Viet Nam.<sup>9</sup> These five countries combined comprise 80 per cent of the total workforce in the ten ASEAN Member States.

Over the next two decades, technological advances including automation and robotics, could significantly change jobs and enterprises in Thailand. The ILO estimated that 44 per cent of employment (over 17 million jobs) face a high risk of automation in Thailand (figure 9). This share is lower than the ASEAN-5 average of 56 per cent, and the lowest among individual ASEAN-5 countries. This is associated with the relatively large shares of medium- and high-skilled workers in Thailand. Key occupations facing high automation risk in this country include subsistence crop farmers (3.3 million), shop sales assistants (991,500) and food service counter attendants (623,800).

**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 Thailand.

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

Workers in the TCF, E&E and automotive sectors could in particular be greatly impacted by technological advances. Of total wage workers in Thailand's TCF sector, nearly 80 per cent face a high risk of automation. Women in TCF could be significantly more impacted than men, as they represent 76 per cent of total TCF wage workers in Thailand, primarily working as sewing machine operators, performing repetitive and manual tasks. Moreover, in Thailand's E&E and automotive sectors, 75 per cent and 73 per cent of jobs are at high risk of automation, respectively.

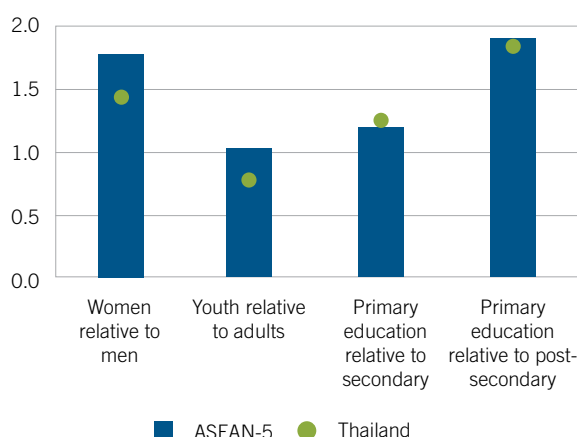
Additionally, about 15 per cent of Thailand's workforce faces low-risk of automation, compared to an average 12 per cent in ASEAN-5. Economic sectors in Thailand at low-risk of automation include education and training, human health, and ICT. Likewise, occupations at low automation risk in Thailand include primary secondary education teachers (207,000), primary

9. 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.

school teachers (385,400) and finance managers (145,600).<sup>10</sup> These low risk sectors tend to require workers with strong socio-emotional and creative skills which currently cannot be substituted by technology.

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

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



Note: A value of 1 represents equal likelihood of being employed in a job at high-risk of automation.

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

Automation risk in Thailand could disproportionately impact women, who across all industries are 50 per cent more likely than men to be employed in an occupation at high risk of automation. Conversely, workers in Thailand aged 15 to 24 are slightly less susceptible to having an occupation at high risk relative to adult workers. Primary school graduates in Thailand are 30 to 90 per cent more likely to be at high risk compared to secondary and post-secondary graduates. These findings reveal that tasks performed by workers with higher education and training are more difficult to automate, due to more advanced levels of perception and manipulation, creative intelligence, and social intelligence.

## IMPACT OF TECHNOLOGY ON THE AUTOMOTIVE, E&E AND TCF SECTORS

Highlights of main technological innovations and impacts on Thailand's automotive, E&E and TCF sectors are examined below.

### Automotive sector

Worldwide, four major technologies are transforming the automotive sector, namely, robotic automation, electrification of vehicles and vehicular components, advancements in lightweight materials and autonomous driving.<sup>11</sup>

Robotic automation is likely to be the most disruptive technology impacting Thailand's automotive sector. In fact, Thailand is already showing strong reliance on industrial robots. In 2014, Thailand's annual acquisition of industrial robots totalled 3,657 units, ranking eight globally, and it is forecast to reach 4,500 annual units in 2019.<sup>12</sup> The two key factors driving robotic automation in Thailand's automotive sector are both cheaper, adaptable and easier-to-install robots, and increasing labour costs. Indeed, between 2006 and 2016, the daily minimum wage increased from THB 184 to THB 310, an increase of almost 70 per cent.<sup>13</sup>

Other factors pushing technology adoption include consumer demand for better quality and higher performing cars, and government regulations to lower carbon emissions. Between 1991 and 2015, Thailand's developing middle class workforce grew from 9.3 million to 16.2 million people, an increase of 74 per cent.<sup>14</sup> With more disposable income, Thailand's developing middle class is increasingly demanding better, more effective and technologically advanced cars. Additionally, Thailand's Eco-Car programme offers tax incentives and duty exemptions to large automotive manufacturers to meet specific size and efficiency requirements. Thailand is in fact expected

<sup>10</sup> *ibid.*

<sup>11</sup> ILO: *ASEAN in transformation: Automotive and auto parts: Shifting gears* (Geneva, 2016).

<sup>12</sup> International Federation of Robotics: IFR Press Release: Global robotics industry: Record beats Record! (2013); International Federation of Robotics: IFR Executive Summary World Robotics 2016 Industrial Robotics.

<sup>13</sup> ILO: *ASEAN in transformation: Automotive and auto parts: Shifting gears* (Bangkok, 2016); ASEAN Briefing: "Daily Minimum Wage Rates in Thailand to Increase from January 1, 2017" (2 Dec. 2016).

<sup>14</sup> ILO: ILOstat (2017). The developing middle class is defined as people with purchasing power parity between US\$5 and US\$13.

to play a key role when it comes to manufacturing hybrid electric vehicles among ASEAN countries.

Over the medium-term, robotic automation is likely to be widespread in the sector. Collaborative robots, or 'cobots', that able to work alongside human workers, are increasingly taking on manual, high-precision and hazardous tasks previously performed by low-skilled workers. For example, a Bangkok-based automotive manufacturer interviewed by the ILO, reported using a robotic arm to automate the process of injection moulding whereby melted thermoplastic is injected into a mould cavity.<sup>15</sup> Injection moulding in this company was previously done manually by line workers, making the process highly unreliable. In this company, robotic automation has helped increasing both reliability of the overall process and workers' safety.

Technological uptake is transforming skill requirements in Thailand's automotive sector. Enterprises are increasingly demanding technicians with a variety of skills, and reducing the number of low-skilled assembly line workers. Foreign original equipment manufacturers in the sector have already started building a stronger skills pipeline. For example, in 2014, Mercedes-Benz in Thailand offered technical apprenticeships in partnership with vocational schools accredited by the Thailand Ministry of Education.<sup>16</sup> This initiative aimed to raise the quality of production and expand the use of new technologies so as to meet standard requirements established by the company's regional headquarters.

## E&E sector

Worldwide, the three main technologies impacting the E&E sector are robotic automation, the internet of things (IoT) and additive manufacturing (or 3D printing). In Thailand, robotic automation and the IoT are likely to be the most disruptive technologies.<sup>17</sup>

Two main factors are driving technology adoption in the E&E sector. On the one hand, robots have become more affordable and easier to use to replace low-skilled tasks. On the other hand, the E&E sector is becoming increasingly connected to every economic sector

whether directly or indirectly, including automotive and TCF. For example, electronics have become an indispensable element of the modern automobile being present in various systems including: power or engine controlling systems, security, safety systems, driver assistance, diagnostic systems, passenger comfort, information systems, and in-car entertainment.

Over the medium term, automation in the E&E sector could be widespread as enterprises in Thailand are already producing higher-value added E&E products, including hard-disk drives, integrated circuits, microchips, air conditioning units and refrigerators. Similarly to the automotive sector, Thailand's E&E sector will increasingly adopt human centric automation through the use of cobots.

Automation in Thailand's E&E sector is becoming widespread. As it was mentioned earlier, 75 per cent of workers in the E&E sector are at high automation risk. Indeed, technology adoption is expected to ultimately decrease the number low-skilled workers in the sector. While this occurs, the sector would increasingly demand high-skilled workers and technicians with strong technical backgrounds in STEM to manage new technologies and perform supervisory roles. As cobots become more sophisticated and able to perform more difficult tasks, human workers would increasingly need to add value to E&E manufacturing through technical and high skilled roles.

## TCF sector

Key technologies impacting the TCF sector worldwide are product customization technology such as additive manufacturing, body scanners and computer-aided design. Other important technologies in the sector include smart apparel, nanotechnology, robotic automation and automated sewing machines.<sup>18</sup> Recent examples have revealed that TCF enterprises in Thailand have started redefining production methods to improve product quality, and ultimately manufacture higher end textiles, clothing and footwear. For example, ECCO, a Danish shoe-maker that has operated in Thailand for over 20 years, introduced a new quick drying technology to increase shoe comfort.

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

16 Ibid.

17 The IoT is a network of objects that connect humans and things across the economic value chain in order to improve decision making and optimize production processes.

18 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.



In Thailand, robotic automation and automated sewing machines are likely to be the greatest disruptors impacting the TCF sector. Automated sewing machines are able to automatically sew garments on a continuous basis without human operators. To better understand the disruptive nature of automated sewing machines, the ILO estimated when these will become a profitable investment for TCF manufacturers in Thailand. Based on these estimates, a pair of automated sewing machines, that would replace a human worker and work 24/7, could be more economical and efficient for TCF manufacturers if investments are made after 2020, reaching a break-even point by 2025. Therefore, in some years, adopting automated sewing machines could be cost-effective and financially sustainable, which could lead to increasing their adoption in the TCF sector.

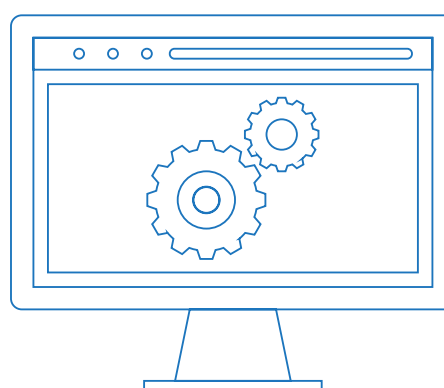
Among ASEAN countries, Thailand has the highest labour productivity in TCF accounting for US\$8,178, almost double the level of the second most productive TCF sector in ASEAN, the Philippines (US\$4,646). By embracing technology, Thailand could further increase its TCF labour productivity, improve its competitiveness and maintain its position as a high-end apparel producer. Technology adoption in Thailand's TCF sector would reduce the number of manual sewers as these fundamental tasks could become automated. This would particularly impact women who represent 76 per cent of total TCF workers. Technology adoption in the TCF sector would also create higher demand for technicians with backgrounds in STEM to supervise and operate new machinery.

## SUMMARY

In the next two decades, 44 per cent of jobs in Thailand could be at high risk of automation. Technology adoption in Thailand is likely to disproportionately impact specific segments of the workforce, including low-skilled workers, women and less educated workers. Moreover, between 73 and 80 per cent of workers in the automotive, E&E and TCF sectors are at high risk of automation. In both the automotive and

E&E sectors, cobots are increasingly collaborating with skilled human workers and improving workplace safety. In the TCF sector, automated sewing machines and robots are becoming a more cost-effective option, and are progressively taking on repetitive and dangerous tasks. Automation risk in TCF could disproportionately impact women who represent 76 per cent of total TCF workers.

Technology adoption in Thailand is already transforming skill requirements. Enterprises in the automotive and E&E sectors are requiring technicians and high-skilled workers with strong STEM backgrounds. In the TCF sector, robotic automation and automated sewing machines are likely to become widespread, also changing skills demands in the sector. In this context, it is key to focus on skills and workforce readiness in Thailand across several sectors. Policymakers, employers and training institutions should work together in order to foster technical skills, strategic thinking, communication and foreign language skills among workers. Promoting academic pursuits in STEM is important, particularly among young women. These skills would increasingly be required in technology-centred enterprises.



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