ASEAN IN TRANSFORMATION

HOW TECHNOLOGY IS CHANGING JOBS AND ENTERPRISES

EXECUTIVE SUMMARY

International Labour Organization

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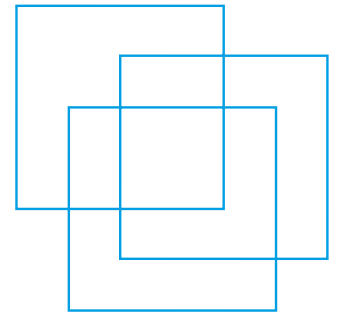## HOW TECHNOLOGY IS CHANGING JOBS AND ENTERPRISES

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ACT/EMP
The Bureau for Employers' Activities

EXECUTIVE SUMMARY

New developments in technology are transpiring at an increasingly rapid rate. The speed with which innovations move from "the lab" to the market is accelerating. Consequently, with each advancement, the effects on consumers and the labour market worldwide are being felt more quickly than during previous technology revolutions. While many anticipate the promise of added convenience and efficiency from these new technologies, others worry about its impact on jobs.
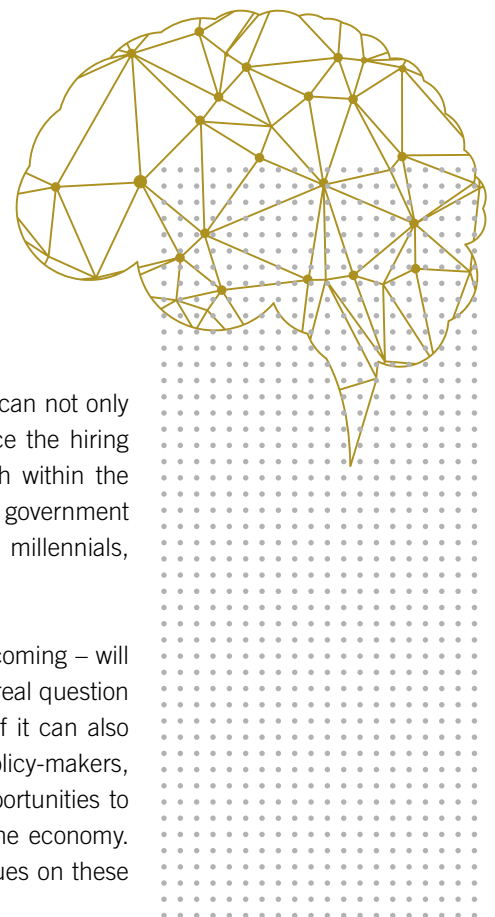
To date, discussions on the impact of technology on enterprises and workers have centred mostly on developed and advanced economies. Yet, enterprises and workers in the Association of Southeast Asian Nations (ASEAN) are also facing a technology transformation. ASEAN is a politically and economically diverse region, boasting a population of over 632 million people, a swelling middle class, growing amounts of disposable income and an increasingly educated workforce. Technology presents tremendous potential for ASEAN, but sound information and analyses of how these technologies will concretely impact the workplace remain limited.

To address this knowledge gap, the International Labour Organization (ILO) conducted more than 330 interviews (in ASEAN and beyond), 4,000 enterprise surveys and 2,700 student surveys across ASEAN, as well as extensive secondary research to better understand how disruptive technologies may reshape the landscape of labour in the region. This paper presents a detailed analysis of technology impacts in five key sectors within the region:

1. **Automotive and auto parts**
2. **Electrical and electronics (E&E)**
3. **Textiles, clothing and footwear (TCF)**
4. **Business process outsourcing (BPO)**
5. **Retail**

We identify the disruptive technologies relevant to each sector and detail how they can not only displace workers in the future, but also generate demand for other skills, influence the hiring practices and operations of enterprises, and present new opportunities for growth within the ASEAN region. Our analysis considers both sector- and region-specific factors, such as government incentives, ASEAN enterprise culture, shifting consumer habits, and the rise of millennials, as well as external forces (such as dynamics in China).

Overall, across all five sectors, it is clear that technologies – both current and forthcoming – will increase productivity, render some occupations obsolete and create new ones. The real question lies in whether ASEAN can take advantage of the benefits technology offers and if it can also adequately prepare its workforce. A lack of action by ASEAN actors at all levels – policy-makers, social partners, educationalists and other stakeholders – could lead to missed opportunities to expand markets and boost competitiveness, bringing negative consequences for the economy. It is our hope that this paper will serve as important contribution to national dialogues on these issues and help facilitate important policy choices.
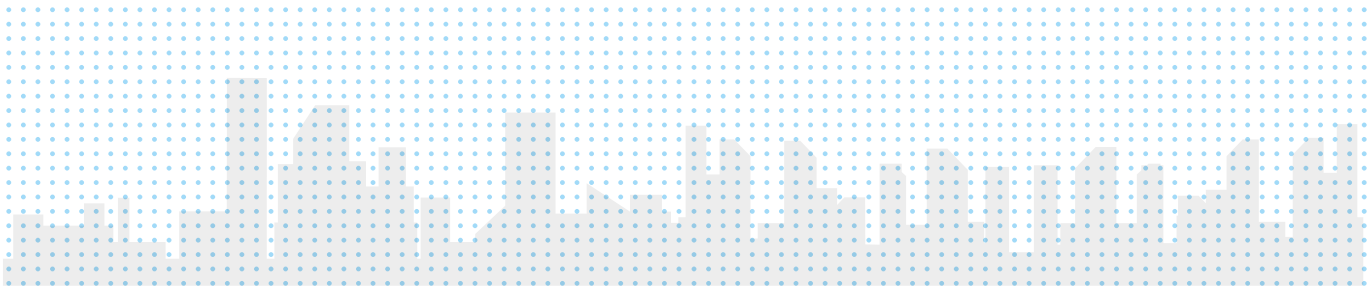
Illustration 1. Scope of research efforts

Lao PDR
351
surveys

Viet Nam
908
surveys

Philippines
943
surveys

Myanmar
404
surveys

Thailand
1 125
surveys

Cambodia
406
surveys

Brunei
Darussalam
104
surveys

Malaysia
851
surveys

Indonesia
1 224
surveys

Singapore
507
surveys

Brunei Darussalam
Cambodia
Indonesia
Lao PDR
Malaysia
Myanmar
Philippines
Singapore
Thailand
Viet Nam
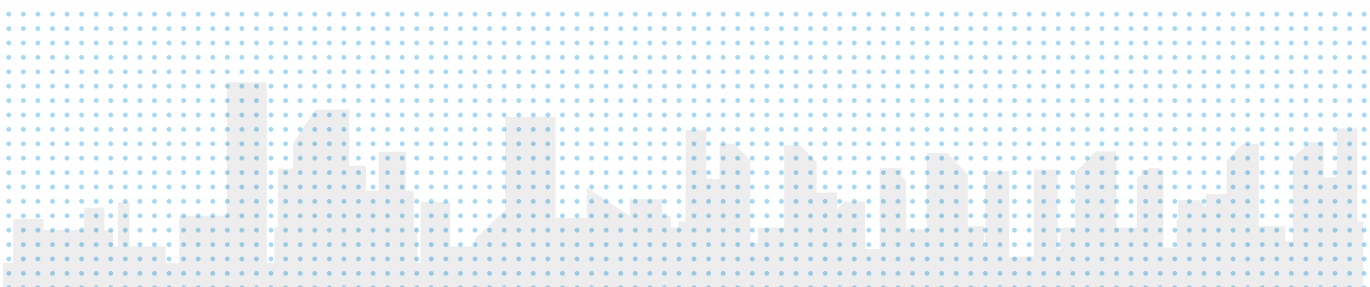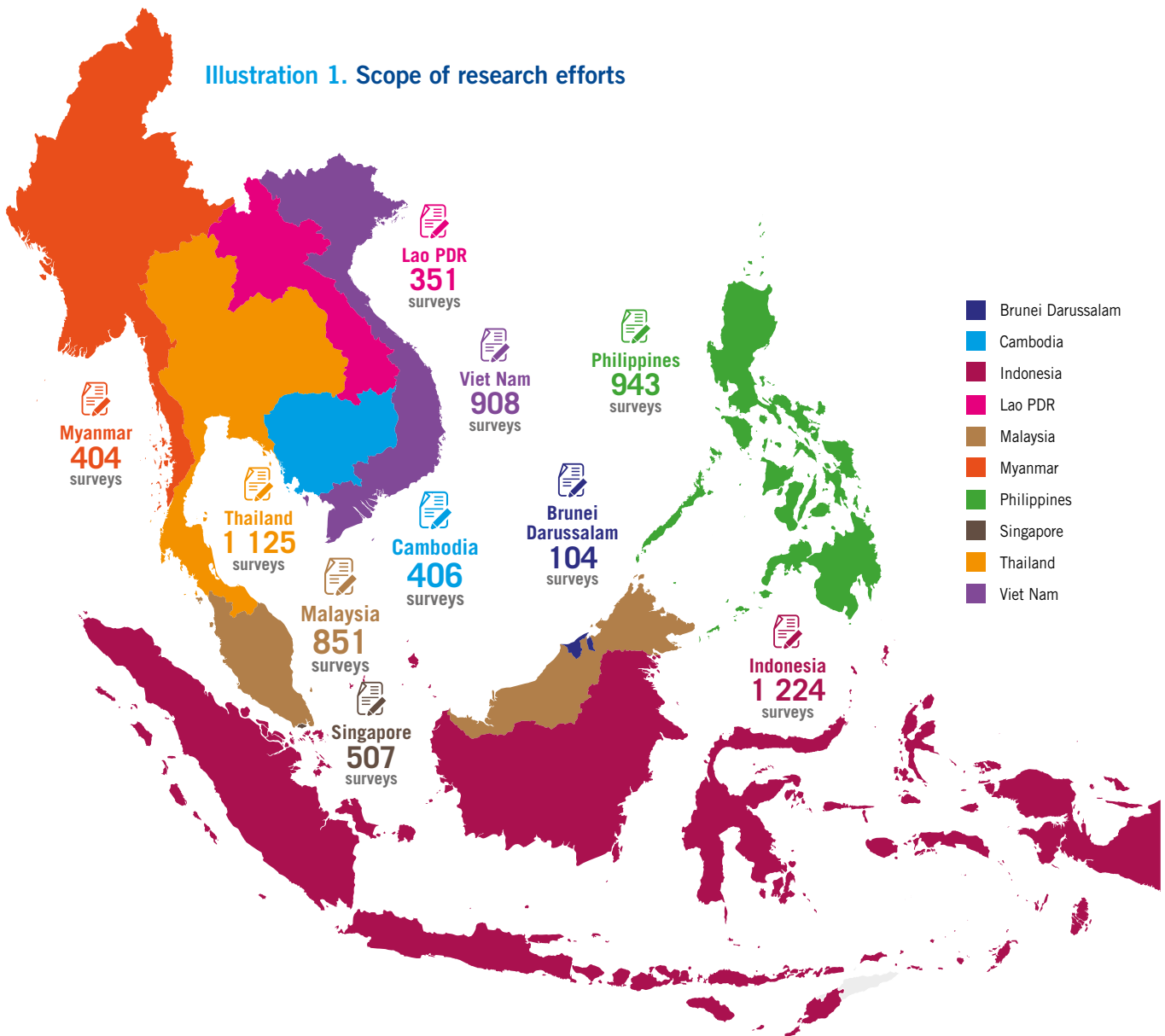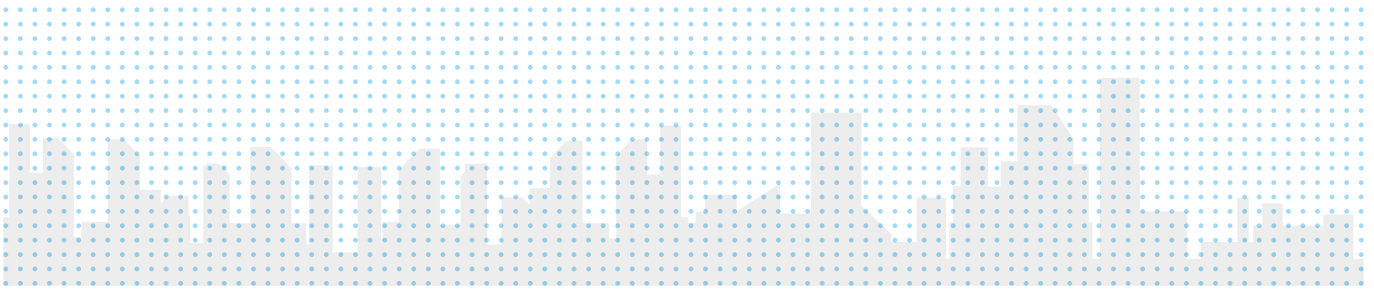
Over 50 stakeholder interviews

6 expert and national consultations

Automotive and auto parts

91 interviews   **5** site visits

Electrical and electronics

73 interviews

Textiles, clothing and footwear
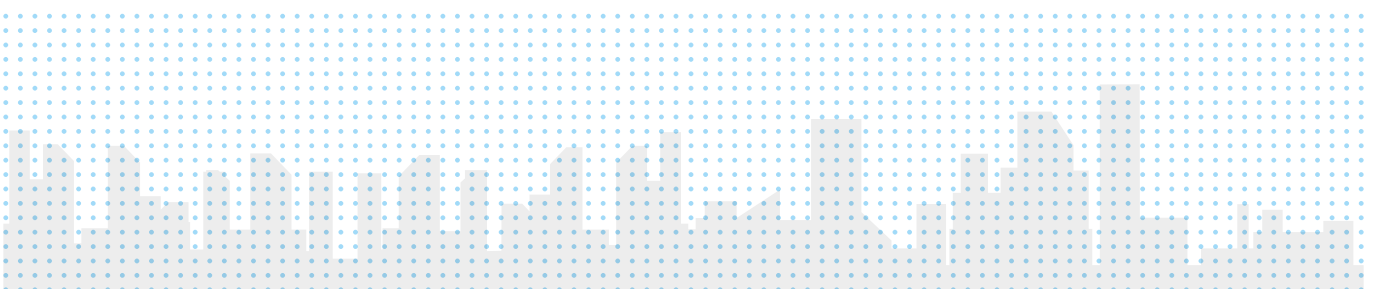
55 interviews   **8** site visits

Business process outsourcing

14 interviews

Retail

43 interviews

Automotive and auto parts

ASEAN has become a dominant player in the automotive industry. Collectively, the region was the seventh largest producer of vehicles in 2015 globally, boasting a compound annual growth rate of 10 per cent since 2009. Over the past decade, automotive exports from ASEAN have consistently increased, partly due to an expanding middle class within the region. The industry employs more than 800,000 workers in ASEAN. The automotive sector is one of the sectors most receptive to adopting available technologies.

Four major technologies are shaping the automotive sector: the electrification of vehicles and vehicular components, advancements in lightweight materials, autonomous driving, and robotic automation.

We expect enterprises to accelerate research and development (R&D), with a focus on electric vehicles (EVs), hybrid electric vehicles (HEVs), lightweight materials and autonomous vehicles. As consumer demand for technologically capable cars with less environmentally harmful effects rises, governments across ASEAN will be compelled to implement policies incentivizing R&D activities and the purchasing of EV/HEVs. The pressure to innovate and bring to market technologically advanced vehicles will be substantive. However, in the near term, we expect these technologies to be integrated into the higher end car market segment first, followed by an encroachment into the mass consumer market.

Our research indicates that automation and robotics will have the largest impact on jobs in the industry throughout the region. Robots are becoming better at assembly, cheaper and increasingly able to collaborate with people. They are also critical in making firms more productive and workplaces safer. One key driver for robotic and automation deployment is the common practice of including "cost down" agreements, in which suppliers enter a contractual agreement to either reduce the overall price of an auto part or increase productivity without increasing the resources expended. To meet these agreements, automation has become an attractive and likely alternative, especially within countries with rising labour costs.

These trends have a twofold effect on the labour force. Firstly, Low-skill workers will find themselves displaced in favour of automation, and indeed, over 60 per cent of salaried workers in Indonesia and over 70 per cent of workers in Thailand face high automation risk. Secondly, manufacturers will increasingly seek higher skilled talent with R&D competencies, ranging from analytical experts to autonomous driving engineers and sustainability integration experts.

Recruiting higher skills remains a challenge for employers, necessitating efforts on several fronts to address this skills gap. Education and vocational training institutions must revamp their curricula and build stronger alliances with the sector to provide a pipeline of highly skilled workers. The automotive sector and educational institutions need to adapt and increase the sector's image as a gender-neutral employer of sophisticated talent. Equally important would be investing in the production capacity and technological capabilities of local automakers and strengthening their market position to ensure sustained domestic growth.
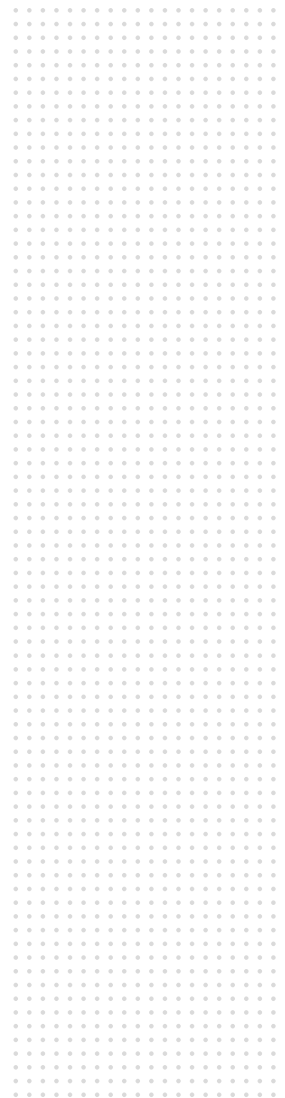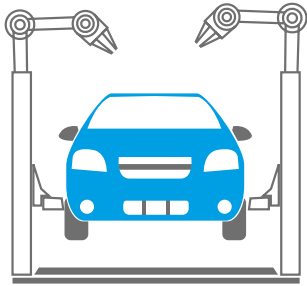
Illustration 2. ASEAN automotive and auto parts overview

In 2015, ASEAN **was the seventh largest producer of vehicles globally,** with a compound annual growth rate of **10% since 2009**

Electric vehicles, lightweight materials, self-driving cars, and robotic automation are disruptive technologies globally

In ASEAN, **ROBOTIC AUTOMATION** is having the greatest impact AND replacing lower-skilled jobs
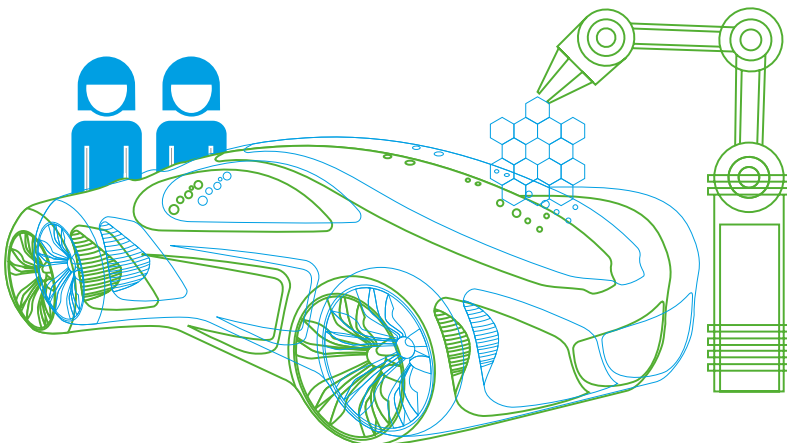
ASEAN employs over **800,000 workers** in the sector
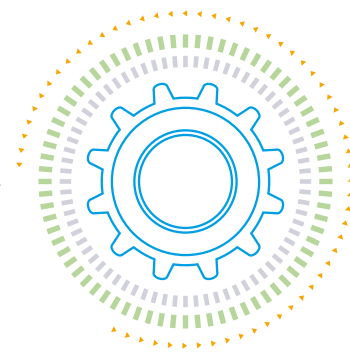
Over 60% of salaried workers in **Indonesia** and **73% in Thailand** face high risk of automation

60% of tier one suppliers have seen **significant increases** in automation

Electrical and electronics (E&E)

E&E manufacturing is one of ASEAN's most prominent sectors and a mainstay of economic growth, especially as the region moves up the value ladder and shifts away from low-cost production. Through rapid economic development and a rising middle class, the ASEAN region has also developed a broad industrial and consumer market for E&E machinery and goods. The sector directly employs an aggregate of more than 2.5 million workers in ASEAN.

Looking ahead, three disruptive technologies are likely to shape the E&E sector: robotic automation, 3D printing (also known as additive manufacturing) and the Internet of Things (IoT).

Robotic automation in this sector is "human centric," occurring in the form of collaborative robots, or "cobots", able to perform repetitive, high precision and difficult tasks. This technology – also seen in the automotive sector – aids workers rather than replaces them. Currently, people exceed the capabilities of robots in overall assembly, perception, flexibility, dexterity and adaptation to new duties, which means human workers are (for now) more cost-effective. However, this is changing. Compounded with predicted uptakes in 3D printing, displacement – particularly of lower skilled packaging and assembling jobs – is possible.

Opinions vary as to how quickly 3D printing can become cost-effective and useful for mass deployment. While its potential is undeniable, with some believing it could be deployed within the next ten years, 3D printing will primarily be used for highly customized, low-volume production. The key variance in our research participants' assessment of this technology was not "if", but "when" it will be prevalently adopted.

Unlike robotic automation and 3D printing, which threaten to displace workers, the IoT offers an important growth opportunity for ASEAN's E&E players. The IoT's ability to connect disparate operations, synchronize machines and generate insightful data presents exciting possibilities for enterprises to improve their efficiency in almost every sector. Because ASEAN's E&E sector and subsectors possess a formidable and established nexus of producers and suppliers, the world's high demand for IoT devices and components presents a significant growth opportunity.

China's actions are also critical in how the E&E sector will develop in ASEAN. As China advances up the E&E value chain and enters higher-skilled tiers of production, ASEAN countries are well positioned to absorb much of the lower-skilled E&E jobs from which China is moving away, but mostly in the short term. Even though wages are rising in ASEAN, the region's lower labour costs are still more attractive.

Currently, over 60 per cent of salaried workers in Indonesia, the Philippines, Thailand and Viet Nam occupy E&E positions at high risk of automation. To capitalize fully on the sector's growth opportunity and foreign direct investments, policy-makers across the region urgently need to raise skills levels and innovatively connect skills providers to enterprise needs. In particular, more efforts are specifically needed to encourage women to pursue studies in science, technology, engineering and mathematics (STEM) disciplines to spur the availability of higher skilled labour.
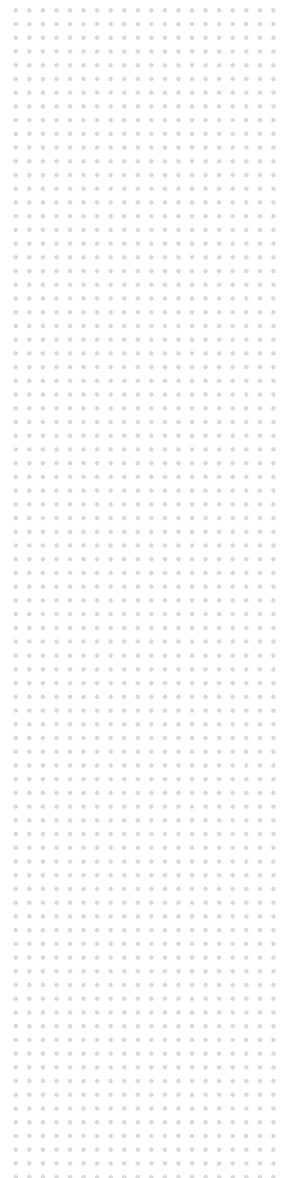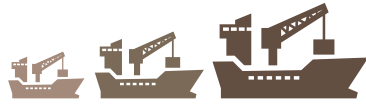
Illustration 3. ASEAN E&E overview

ASEAN's E&E exports almost tripled over the past decade, reaching **US$382.1 billion** in 2014

ASEAN directly employs an aggregate of over **2.5 million workers** in the sector

Robotic automation, 3D printing and the Internet of Things are disruptive technologies globally

In ASEAN ROBOTIC AUTOMATION is currently replacing simple assembly, lower-skilled tasks
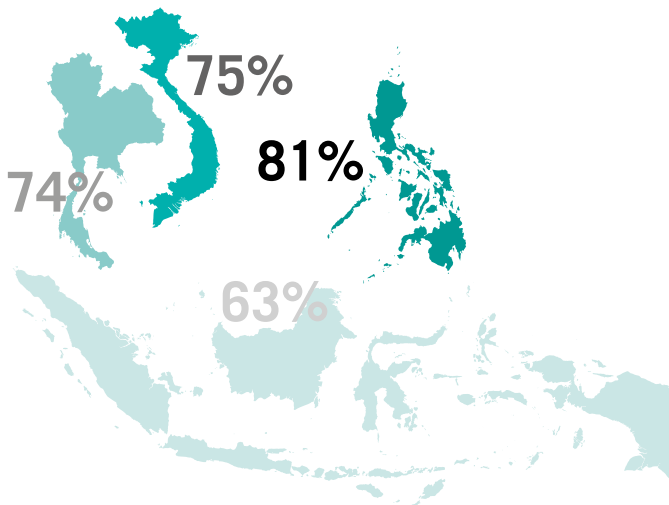
75%

74%

81%

63%

Over 60% of salaried workers in Indonesia, the Philippines, Thailand and Viet Nam occupy E&E positions at **high risk of automation**

China **is both an opportunity for ASEAN to scoop up lower-skilled jobs** and a reason to **invest more in technology** to become more competitive

Textiles, clothing and footwear (TCF)

TCF is a highly competitive sector. In ASEAN, TCF is predominately shaped by large multinational brands and retailers, acting as a conduit for transitioning economies to shift from informal agricultural jobs to formal wage employment. It is also one of the most labour-intensive industries, assisting countries with moving into their secondary economic cycle. Collectively, TCF provides over 9 million jobs in ASEAN, mostly for young women.
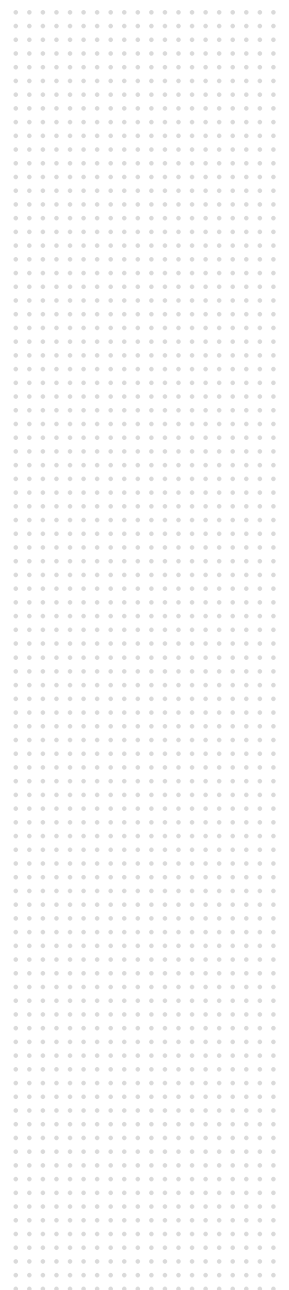
Of all the sectors analysed in this paper, the TCF sector seems to be the most vulnerable to the extensive technological displacement of workers. A number of technologies stand to disrupt this sector: 3D printing, body scanning technology, computer-aided design (CAD), wearable technology, nanotechnology, environmentally friendly manufacturing techniques, and lastly, robotic automation.

Combined, body scanning sensors and CAD can not only provide the perfect fit to the consumer, but also permit extremely fast delivery, which is further accelerated through 3D printing. Because 3D printing does not require as much human input, it enables production to move closer to the markets in which products are sold. Indeed, there are early indications that the need for mass production footwear factories in ASEAN is being dissipated: The footwear industry has begun using 3D printing techniques to open automated shoe factories in key destination markets. If these operations prove profitable, such automated shoe factories will no doubt reduce the need for ASEAN workers.

Recently, researchers successfully prototyped smart clothes, or apparel enhanced with electronic and digital capabilities (e.g., smart shoes that provide health metrics and measure distances travelled). Moreover, advancements in nanoparticle research have introduced nanoparticle-infused clothes that are waterproof, stain-proof, UV protecting and/or odourless. In addition, larger TCF brands are implementing more environmentally friendly manufacturing techniques to reduce the amount of water consumed, chemicals used and material waste produced. When the price point becomes favourable, an increasing number of consumers will demand these improved and sustainably manufactured goods *en masse.* Overall, these technologies present a different kind of challenge: a lack of skilled talent.

Automated cutting machines are now becoming a widely available technology, and robots capable of sewing – called "sewbots" – will soon change the calculus of TCF production. Sewbots are unlikely to displace current workers in ASEAN garment factories, but more likely to be deployed in destination markets such as China, Europe and the United States. The disruptive impact on the sector in ASEAN could be very substantial, as robotic automation poses a significant threat of job displacement. The implications of technologically induced upheaval for the TCF sector in ASEAN are profound and likely to disproportionally affect female workers, who currently serve as the backbone of the TCF sector. The female share of TCF employment exceeds 70 per cent in Cambodia, Lao People's Democratic Republic, the Philippines, Thailand and Viet Nam. An additional concern for ASEAN's TCF sector is the continued and improved production growth of China's TCF activities: China currently produces more with less workers, and this production gap will increase as it deploys more automotive processes.

ASEAN's TCF workforce needs will drastically change. The region will encounter both a displacement of lower-skilled workers and an increase in the demand for higher skilled technicians and engineers to serve niche apparel producers. Significant shares of TCF workers in ASEAN are at high risk of automation, from 64 per cent in Indonesia, 86 per cent in Viet Nam and 88 per cent in Cambodia. To remain competitive, industry players must accelerate partnerships with educational and training institutions to groom the next generation of TCF workers who have stronger technical qualifications, expertise and the ability to work seamlessly with multiple strands of emerging technologies.

Illustration 4. ASEAN TCF overview

TCF is at the highest risk of automation
of the five sectors analysed

>>>>>>>>>>>>>>>>>>>>>>>>>>>

TCF provides over
9 million jobs
in ASEAN,
**most of whom are
filled by young women**

The female share of
TCF employment exceeds 70%
in Cambodia, Lao PDR,
the Philippines,
Thailand and Viet Nam

3D printing, body scanning technology,
computer-aided design, wearable technology,
nanotechnology, sustainable/environmentally friendly
manufacturing and robotic automation are disruptive
technologies globally

In ASEAN ROBOTIC AUTOMATION
forms the biggest threat to workers

Sewbots
enable production
reshoring

**The United States
sees immediate
savings from sewbots**
if purchased in 2016

Significant shares of
TCF salaried workers in ASEAN are at
high risk of automation, from
64% in Indonesia,
86% in Viet Nam and
88% in Cambodia

Savings of
US$180,000
can be seen over 5 years

Business process outsourcing (BPO)

ASEAN's BPO activities predominantly take place in the Philippines. This sector has seen extraordinary growth over the past decade and now employs approximately 1 million people in the Philippines. It was an industry born out of technological advancement that is now on the cusp of major changes due to technology.

Cloud computing, software automation and knowledge process outsourcing are three technologies that are impacting this sector.

Strong cloud computing products offer an opportunity to expand enterprises' client pool and continue the sector's growth. Cloud computing, specifically Business Process as a Service (BPaaS), allows BPO enterprises to store software and data over the Internet. Cloud computing also enables enterprises to select services personalized to their needs, as opposed to purchasing an entire outsourcing package. Moreover, it decreases overhead costs by reducing the need for hardware and software installation, maintenance and upgrade. These advantages make BPO services accessible to small- and medium-sized enterprises (SMEs) – a previously untapped market segment – and allow BPO enterprises in the Philippines to target a massive new market segment.

While cloud computing promises growth for the Philippines, software robots pose a threat. Also referred to as robotic process automation (RPA), they are not only able to perform tasks quickly, but can also learn from experience and improve their execution after each operation. In addition, they can work around the clock, are less error prone, and also present a solution to high worker turnover problems, which are characteristic of the sector. Some BPO clients have already begun purchasing RPA licenses to reduce their outsourcing dependence, relocating their operations closer to home. RPA's accelerated adoption will have considerable impacts on the Philippines's BPO workers, especially those working in call centres.

Some BPO players in the Philippines are indeed responding to these challenges and shifting their services towards knowledge process outsourcing (KPO). KPO services are of higher value than BPO services, and they include: fraud analytics, data integration, project management, R&D, mergers and acquisitions valuation, and medical image analysis. In addition, BPO enterprises in the Philippines are also improving customer experiences by offering omni-channel services, which provide clients with access to services through non-voice platforms such as short messaging services, online chat and social media. Diversification is critical to BPO enterprises, as they must maintain their attractiveness to clients and expand their market in the face of increased software automation.

These technologies have significant implications for workers. While RPA software still needs to become more "intelligent" before it can fully takeover back-office tasks and replace the human speaking components of BPO services on a large scale, RPA software will become increasingly attractive as their price decreases in tandem with labour cost increases. The 600,000 workers in call centres face high risk of automation at 89 per cent. In addition, increases in the provision of KPO services will further raise the skills requirements of the sector. Credentials in medicine, business, law, finance, accounting, and data analysis, among others, will be sought to provide higher value and sector-specific solutions.
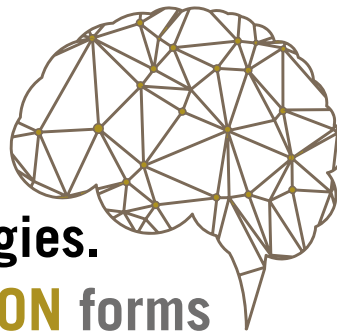
Illustration 5. ASEAN BPO overview

In 2014, BPO employed **over 1 million workers** in the Philippines

Women make up **59%** of the Philippines' BPO workforce

Cloud computing and software automation are disruptive technologies. **SOFTWARE AUTOMATION** forms the greatest risk to workers in the Philippines working in call centres
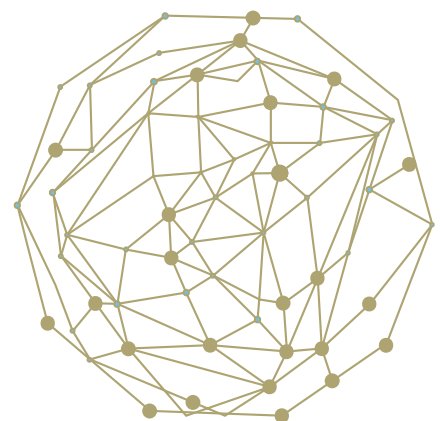
Call centres (voice work) comprise **60%** of BPO employment

89% of salaried workers in the Philippines' BPO sector are at high risk of automation

Software automation can reduce costs by **40-75%** for BPO clients

Retail

ASEAN's retail sector is primed for growth: The sector's sales growth in the region has outperformed the rest of the world, with the region's consumer market numbering at 632 million and a growing middle class with increased disposable income. In 2013, retail sales in major ASEAN countries reached US$767 billion, with projected increases to US$1.3 trillion in 2018. In terms of employment, retail stands as one of the largest sources of jobs. It employs an aggregate of 44.6 million workers in the region, representing 16 per cent of total employment and 44 per cent of jobs in the services sector.

Of all the sectors analysed, ASEAN's retail industry appears to be the least threatened by up-and-coming technologies. Disruptive technologies in retail – such as mobile and e-Commerce platforms, the IoT, cloud technology, and big data analytics – are still yet to achieve mainstream usage in the region.

Theoretically, mobile and e-Commerce platforms could massively displace ASEAN's more conventional "brick-and-mortar" retail establishments. Products can increasingly be sold online more cheaply, especially because rent and overhead expenses are rising, consumers are becoming more tech-savvy, and Internet infrastructure is improving. However, e-Commerce currently makes up a very low share of the ASEAN retail market – less than 1 per cent of all sales regionally. Even in Singapore, e-Commerce accounts for only 3.4 per cent of total retail sales. One explanation for this is that ASEAN consumers generally do not trust online and mobile shopping. Moreover, the region's retail outlets – wet markets, street vendors, traditional stores, department stores and hypermarkets – continue to be popular.

Cloud technologies, big data analytics and the IoT promise to improve enterprise operations by optimizing inventory management, product tracking and shopping intelligence. Classic retail challenges, such as producing too much or too little of a product, can be solved through an effective, Internet-connected system.

In the short term, we expect ASEAN retailers to focus their efforts on improving business logistics. However, our primary research indicates that enterprise culture and senior management commitment play a strong role in determining if the promise they hold will be realized. Unlike the export-oriented sectors analysed, ASEAN's retail activities largely remain local, and so external pressures to innovate are not as high as the four other sectors examined. Rather, the pressure to innovate is being exerted by customers.

Technology in ASEAN's retail sector is not yet set to displace workers widely. However, as more modern and large retail outfits with greater capital and drive for technology implementation become pervasive in the region, the sector's need for human workers will be reduced. Moreover, significant shares of retail salaried workers in ASEAN are at high risk of automation: 68 per cent in Thailand, 71 per cent in Cambodia, 85 per cent in Indonesia and 88 per cent in the Philippines.

For enterprises seeking to intensify their e-Commerce and mobile shopping presence, we expect them to increasingly recruit individuals with strong digital marketing and social media skills. Additionally, an increase in the use of cloud technologies, big data analytics and the IoT will intensify hiring demands for technically capable workers in areas such as data analysis, programming and supply chain management. ASEAN's workforce requirements in the retail space will therefore change, asking for those who have the ability to keep up with the digital age to enhance customer's overall retail experience.
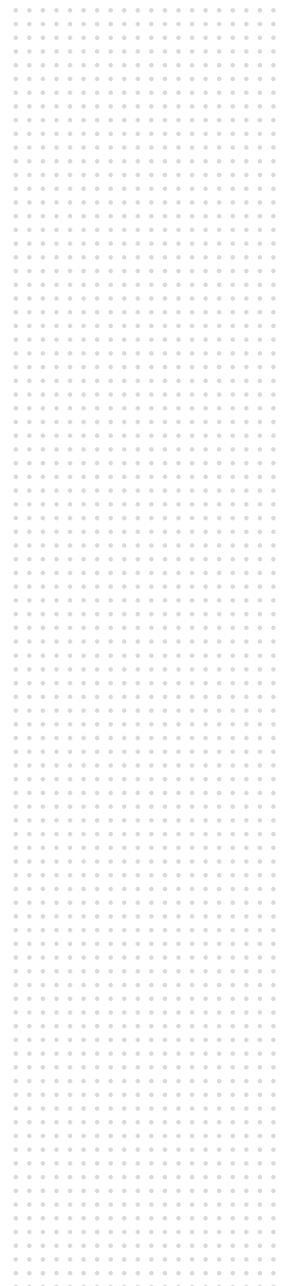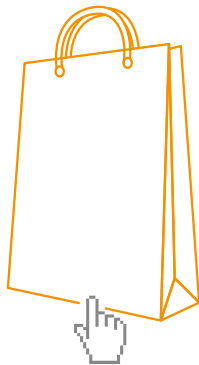
Illustration 5. ASEAN retail overview

Retail is at the lowest risk of automation out of the five sectors analysed

Mobile and e-Commerce platforms, the Internet of Things, cloud technology and big data analytics could have **transformative impacts on jobs in ASEAN** This is yet to come.

Retail in major ASEAN countries reached US$767 billion in 2013

44.6 million workers are employed in ASEAN's retail sector,

Local and traditional retail are the biggest barriers for technology's advancement in ASEAN

50% of the retail workforce are women

Significant shares of retail salaried workers in ASEAN are at high risk of automation:
68% in Thailand, **71%** in Cambodia
85% in Indonesia and **88%** in the Philippines

Closing remarks

Across all the sectors examined in this paper, technological advancements and innovations are challenging the existing order. Jobs – particularly in low-skilled, labour-intensive sectors – will be displaced by technology and global supply chains may start experiencing a period of flux as production relocates closer to purchasing markets. We are also witnessing the emergence of new markets, new jobs and even new sectors that mostly require higher levels of skills.
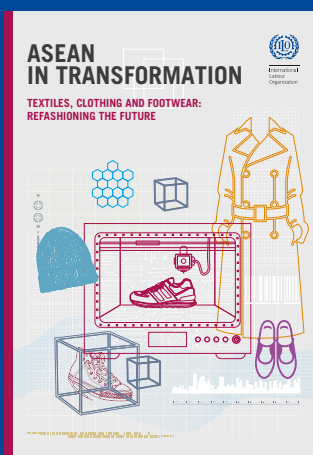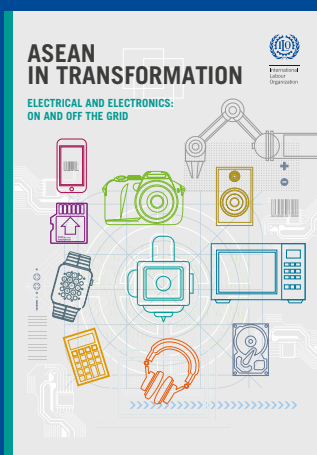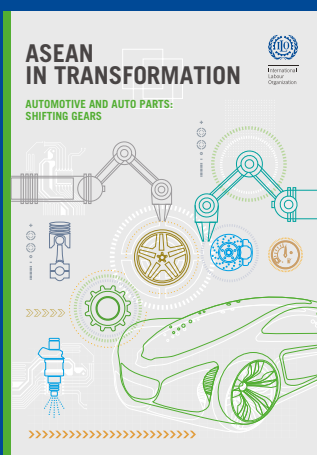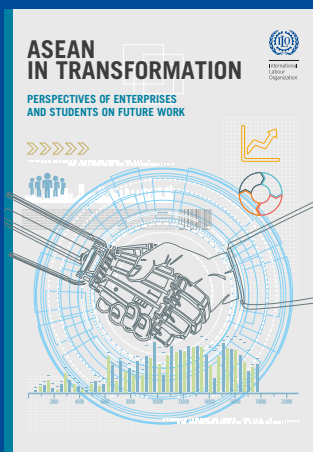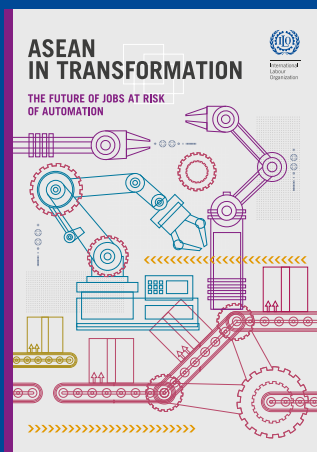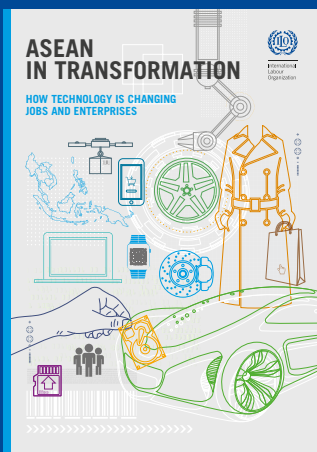
The challenge before policy-makers, enterprises, workers and those that represent them is how to navigate these inevitable changes in labour markets in a way that is socially and economically sustainable. This is a formidable challenge, requiring highly concerted efforts.
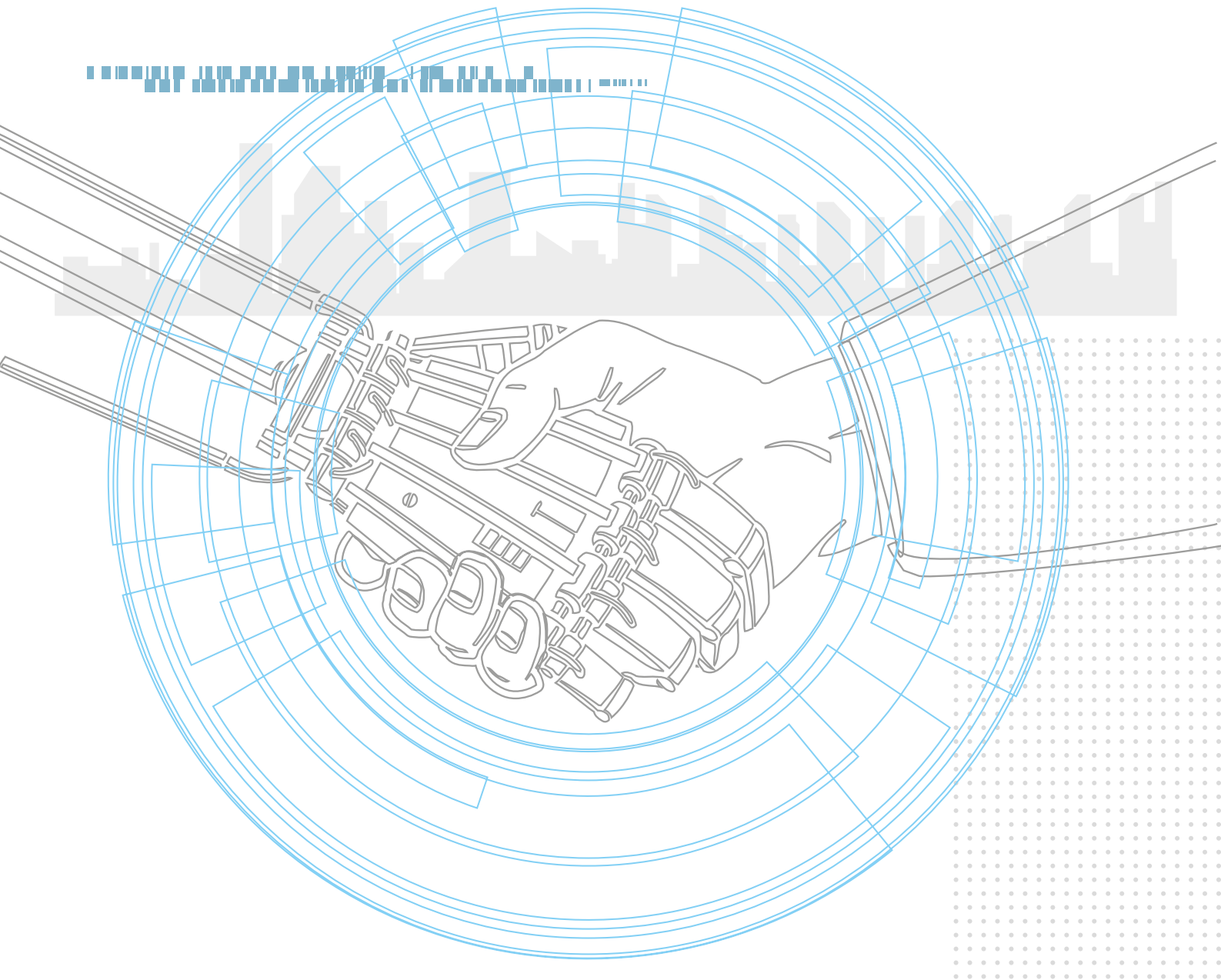
ASEAN in transformation: How technology is changing jobs and enterprises

New and advanced developments in technology are transpiring at an increasingly rapid rate. This study explores the technological impacts felt by employers and workers of the ten countries that form the Association of Southeast Asian Nations (ASEAN). ASEAN is a politically and economically diverse region, boasting a population of over 632 million people, a swelling middle class, growing amounts of disposable income and an increasingly educated workforce. Technology presents tremendous potential and challenge for the ASEAN region.

The paper presents a detailed analysis of how technology is transforming five key labour-intensive and economically prominent sectors in ASEAN: the automotive and auto parts; electrical and electronics; textiles, clothing and footwear; business process outsourcing; and retail sectors. It also highlights findings from extensive enterprise and student surveys as well as stakeholder interviews conducted in ASEAN and beyond. It is clear that technologies – both current and forthcoming – will increase productivity, render some occupations obsolete and create new ones. The real question lies in whether ASEAN can take advantage of the benefits technology offers and if it can also adequately prepare its workforce.