Navigating transformational changes and transitions

The skills development and employment landscape in Thailand’s automotive manufacturing sector
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Executive summary

The automotive manufacturing sector in Thailand is undergoing significant transformations, largely driven by technological advancements and the shifts towards electric and other low-carbon vehicles as part of the green revolution. This report, commissioned by the International Labour Organization (ILO) and prepared by Rapid Asia Co., Ltd., with technical guidance from ILO specialists, explores the evolving landscape of skills development and employment within this industry. Recognizing that effective skills development is foundational for the supply of labour, the report highlights the intricate link between equipping the workforce with necessary skills and upholding responsible business practices that contribute to sustainable mobility. This alignment is critical as the industry strives for higher technological integration and more robust yet sustainable practices. Based on an in-depth examination of the employment and skills landscape in Thailand's automotive manufacturing sector, the report highlights gaps and needs for building a skilled workforce and proposes strategic initiatives and measures to address the needs. The study posed several critical questions to guide this examination and to explore the emerging skill needs as the sector strides towards higher technological integration and more robust yet sustainable practices. Another pivotal aspect of the inquiry focused on the role of skills development measures, especially training and education programmes. The report assesses whether existing initiatives are adequate in equipping the workforce for the industry's future demands and the improvements needed to enhance their relevance and impact.

Employing a mixed-methods approach comprising qualitative and quantitative methods, the study combined industry data analysis, interviews with stakeholders and surveys with employers and workers to capture the complexity of the manufacturing subsector of Thailand's automotive sector. Insights from government agencies, manufacturers and supply chain entities provided a holistic view of the industry's dynamics, particularly as it pivots towards a greener future. All data collection was conducted during September–December 2023. In addition, the ILO organized a consultation and workshop on 6 February 2024 to present the initial findings to a range of stakeholders for validation and to facilitate a collaborative discussion on the preliminary conclusions and recommendations. The following research components involved examination of skill gaps and the crafting of strategic initiatives for skills development, which is crucial for fostering an environment that adheres to responsible business conduct practices.

Research design and objective: The research included several stages, including a literature review, methodology development and participant identification for interviews.

Data collection: Data were collected through in-depth interviews and informant interviews involving stakeholders across various levels of the automotive industry, from government bodies to private companies. These interviews helped gather nuanced insights into the skills ecosystem within the sector.

Analysis: The data from different sources were thoroughly analysed to triangulate findings and draw conclusions about the skills supply and demand within the industry. This involved comparing qualitative insights with quantitative data from the surveys and literature.

Validation: Preliminary findings were presented to stakeholders in a validation workshop, which not only confirmed the results but also engaged industry representatives in a dialogue about potential solutions and strategies.

The report provides a detailed overview of the current and emerging trends affecting Thailand's automotive manufacturing sector. In general, the findings highlight the need for a strategic evaluation of the skills development framework within the manufacturing subsector to address current and future skill shortages. This will require a collaborative approach among industry stakeholders, educational bodies and the Government to ensure that the workforce transitions effectively into the emerging technological paradigm, thereby securing the sector's growth and sustainability.
Transformation trends

Thailand’s automotive manufacturing sector, integral to its economic strategy, is transitioning towards electric vehicles in response to global environmental concerns and consumer preferences. The country aims to become a central hub in the ASEAN region for electric vehicle manufacturing. This shift is underpinned by significant growth in electric vehicle purchases and growth in domestic manufacturing and supportive government policies aimed at increasing the number of electric vehicle-charging stations and promoting the adoption of green vehicles. These trends are reshaping the industry’s growth, which presents both opportunities and challenges. There is strong focus on upskilling the workforce to bridge the gap between current skill sets and the emerging needs due to the shift towards more sustainable and technologically advanced manufacturing processes.

Employment trends and occupational shifts

The study’s findings point to the changing employment landscape in the manufacturing subsector of the automotive industry, influenced by customer preferences for environment-friendly vehicles and Industry 4.0 technologies. The emergence of new job roles and the need for diverse skills, mostly in relation to digital skills and skills for green jobs, is evident. There is also a particular shortage in high-tech skills related to electric vehicle components, such as battery production and software for vehicle automation. The necessity for ongoing skills development to manage the transition towards a more digital and automated manufacturing environment is noted.

Integrating responsible business conduct into business practices

The report emphasizes the critical role of responsible business conduct in modernizing the practices of Thailand’s automotive industry. It underscores the necessity of incorporating human rights due diligence and decent work principles as core elements of a business strategy, which are increasingly important in a globally connected market. The commitment to responsible business conduct is intricately linked to workforce development and emphasizes the need to equip all employees, including the 10 per cent of the workforce comprising migrant workers, with the skills required to effectively engage with new technologies while upholding ethical standards. The systematic exclusion of migrant workers from skills initiatives poses a significant challenge because it leads to disparities in rights protection and access to decent work, undermining the goals of responsible business conduct. To address this issue, comprehensive training programmes are required that embed principles of responsible business conduct into the fabric of everyday business operations, ensuring that all levels of the workforce, regardless of their origin, understand and can implement these practices. The report also discusses the benefits of responsible business conduct to a business’ sustainability and competitive edge, suggesting that companies that proactively adopt a responsible business conduct framework, including the equitable inclusion of migrant workers, are better positioned to attract investment and partnership opportunities. Responsible business conduct practices help mitigate risks by ensuring that companies are proactive in identifying and addressing potential ethical violations before they escalate.

Workforce demographics and the impact on skills development

The report elaborates on the demographic shifts occurring within Thailand’s automotive industry and examines how these changes influence the skills development needs. It highlights that older workers who may not have had the same exposure to digital tools and technologies as their younger counterparts require additional support while they offer invaluable expertise accumulated over the years. The generational disparity poses a unique set of challenges, particularly in upskilling and integrating these employees into a technologically advancing work environment. The findings also highlight the importance of creating tailored training programmes that are sensitive to the varying learning paces and styles of different age groups. There is emphasis on the necessity for businesses to deploy innovative and inclusive training approaches that facilitate lifelong learning. Such initiatives are crucial to ensuring that all employees, regardless of age, can contribute effectively and remain productive as the industry evolves.
The potential of mentorship programmes, whereby more experienced workers pair with younger employees, is presented as an easy-to-adopt solution. This not only facilitates knowledge transfer and fosters intergenerational collaboration but also enhances the social and professional integration of older employees, keeping them more engaged and valued in the workplace. In addition to addressing the challenges, this section also explores the opportunities presented by a diverse workforce, such as the rich experience and industry knowledge that older workers bring. Harnessing these assets through appropriate skills development strategies can lead to a more innovative, resilient and competitive automotive industry. In terms of ensuring a just transition for older unskilled workers, it is crucial to integrate strategies that specifically address their potential vulnerability in the face of rapid technological changes. This includes developing transition pathways that offer reskilling opportunities aligned with evolving industry needs while also providing robust support systems, such as career counselling and job placement services tailored for older workers. Additionally, enhancing access to flexible learning options that accommodate different life stages can help ease the transition, ensuring that these workers are not left behind as the sector evolves. Policies must also consider the socio-economic aspects of this transition and offer support, such as wage subsidies or temporary income support during training periods.

Emerging needs for soft skills and digital literacy

The discussion highlights the critical demand for soft skills and digital literacy as the automotive industry in Thailand moves towards increasingly sophisticated and integrated technological operations. The necessity for teamwork, analytical thinking and problem-solving is emphasized, illustrating how these capabilities are essential for employees to successfully navigate and contribute to the modern, digitally driven work environment. Employers recognize that as machines and automation take on more routine tasks, the human workforce needs to excel in areas that require judgement, creativity and interpersonal communication. The report further analyses the integral role of digital literacy in this transformation. As the industry adopts more advanced technologies, including artificial intelligence and robotics, workers must become proficient in digital tools and platforms. This includes not just the ability to use these technologies but understanding their implications on work processes and outcomes to enhance both individual and organizational performance.

In response to these needs, the findings suggest mainstreaming training elements on critical soft skills and digital literacy across all training activities for all levels of a business. Such programmes should be designed not only to improve technical competence but also to foster a culture of continuous learning and adaptation, which is crucial in a rapidly evolving industry. Additionally, the section discusses the strategic importance of these skills in facilitating effective teamwork in technologically complex environments. By enhancing soft skills and digital literacy, employees can better collaborate in diverse teams, lead projects, manage cross-functional initiatives and contribute to innovation.

Addressing skill shortages: Recruitment, in-house training and cooperation with training institutions

This section elaborates on the skill shortages within Thailand's automotive manufacturing sector that may pose a challenge for the industry's growth and adaptability in a competitive global market. It overviews how companies are addressing these gaps through innovative recruitment strategies, robust in-house training programmes and strategic partnerships with educational and training institutions. The findings emphasize the need for recruitment processes that attract the right talent and match individuals to roles that align with their skills and the strategic goals of the organization. This alignment is crucial for maximizing employee contributions and satisfaction. The report highlights that effective recruitment is only the first step in tackling skill shortages; sustaining and enhancing these skills through continuous development is equally vital. In-house training is portrayed as a cornerstone of skills development that allows companies to tailor learning experiences to specific operational needs and technological advancements. The importance of these programmes lies in their ability to provide targeted, practical training that directly impacts employees' job performance and productivity. The section advocates for these training initiatives to be dynamic and responsive to the rapid changes in technology that characterize the modern automotive industry.
Collaboration with educational and training institutions is discussed as essential for extending learning opportunities beyond the confines of a company. These partnerships can provide access to a broader range of resources, expertise and new perspectives, which are crucial for developing a well-rounded, skilled workforce. Such collaborations can also help ensure that the training programmes are comprehensive and aligned with industry standards and future needs and preparing workers for current roles as well as future advancements in their career. A good practice exemplifying this is the ILO’s partnership with the Automotive Human Resources Development Academy (AHRDA). Managed by the Thai Department of Skill Development, AHRDA has restructured its training programmes to considerably enhance the skills of the sector’s workforce. It aims to remain responsive to industry demands, assessing the immediate interests regarding each training course it offers and identifying demands for new courses. This proactive approach ensures that the training provided directly aligns with the evolving requirements of the automotive manufacturing industry, making it a vital component in preparing a highly skilled workforce for Thailand’s growing focus on electric vehicle production and other advanced automotive technologies. The partnership with the ILO contributes to AHRDA’s capacity in assessing the rapidly changing skill needs. In addition to contributing to inclusive growth, the partnership aims to invest in tools and training programmes that identify the most vulnerable workers and increase their employment resilience. These efforts are instrumental in informing larger strategies that include policy support from the Government and industry bodies to foster an ecosystem conducive to continuous learning and skills development.
Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>ASEAN</td>
<td>Association of Southeast Asian Nations</td>
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<tr>
<td>AHRDA</td>
<td>Automotive Human Resource Development Academy</td>
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<tr>
<td>AHRDI</td>
<td>Automotive Human Resource Development Institute</td>
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<tr>
<td>AI</td>
<td>artificial intelligence</td>
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<tr>
<td>ILO</td>
<td>International Labour Organization</td>
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<tr>
<td>MOVE</td>
<td>Mobility &amp; Vehicle Technology Research Center</td>
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<tr>
<td>OEM</td>
<td>original equipment manufacturer</td>
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<tr>
<td>SMEs</td>
<td>small and medium-sized enterprises</td>
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<tr>
<td>TAI</td>
<td>Thailand Automotive Institute</td>
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<tr>
<td>TVET</td>
<td>technical and vocational education and training</td>
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All $ references are United States dollars.
Introduction

Thailand’s automotive manufacturing sector is the country’s second-largest export sector, accounting for 14 per cent of total exports during the first nine months of 2023 and valued at 1.02 trillion Thai baht. Thailand is also the largest automotive producer and exporter in the ASEAN region and the eleventh-largest globally, producing more than 2 million units annually. In 2022, domestic market sales amounted to 840,000, or a 12 per cent increase from the previous year, and are projected to reach 900,000 in 2023. Within these figures, pickups constituted 54 per cent of domestic sales, passenger cars made up 41 per cent, and other commercial vehicles (including trucks, vans and buses) comprised 5 per cent of the market. The automotive industry is one of the ten key industries in the country’s national strategy, Thailand 4.0.

The hierarchy of the Thai automotive industry is organized like a pyramid, with car manufacturers at the top and suppliers of auto parts occupying lower tiers, based on their delivery contributions. As of 2022, 27 companies manufacture motor vehicles and 18 companies produce motorcycles in Thailand, with more than 90 per cent owned by multinational corporations. The first tier of suppliers consists of 525 companies; approximately 65 per cent of them have majority foreign ownership. In the second and subsequent tiers, there is a total of 1,760 suppliers, with roughly 70 per cent of them Thai-owned enterprises. The sector is dominated by 19 major automotive assemblers, with eight of them Japanese (Toyota, Isuzu, Honda, Mitsubishi, Nissan, Mazda, Suzuki and Hino).

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1 BOI 2023.
2 ONESDC 2022.
3 TAI 2022.
4 ibid.
1.1 Technological advancements and employment trends

The landscape of automotive manufacturing is transforming towards increased technological intelligence, enhanced efficiency and heightened sustainability. Factors contributing to this evolution include adopting digital driving systems, changing consumer preferences, growing emphasis on sustainability driven by environmental concerns like climate change and the impact of regulatory pressures and measures. The global demand for environment-friendly vehicles is on the rise, with electric vehicles projected to comprise 35 per cent of all vehicles internationally by 2040 and thus catalyse a significant transformation in the Thai automotive industry, with a 7 per cent market share in 2036.5

In response to the escalating global focus on emission standards, Thailand is eager to expand its automotive manufacturing sector to specialize in producing green vehicles. The nation aspires to position itself as the primary electric vehicle hub within the ASEAN region while securing a pivotal role in the global electric vehicle supply network. In pursuit of this goal, the Government of Thailand initiated a policy in 2015 to promote the adoption of electric vehicles in the country. Complementing this initiative is the Eastern Economic Corridor (economic zone), which places substantial importance on positioning Thailand as a leader in the next-generation automotive industry, particularly in the electronic vehicle sector. Notably, the registration of battery electric vehicles experienced a remarkable 413 per cent growth in 2022.6

At the beginning of 2022, there were around 1,000 electric vehicle charging stations, with approximately half of them situated in the Bangkok area. Thailand's goal is to increase the number of charging points to 12,000 across various regions by 2030 through a collaboration involving the Electricity Generating Authority of Thailand, the Metropolitan Electricity Authority, the Provincial Electricity Authority and the PTT Group.7

To ensure a just transition in this rapidly evolving sector, it is critical to discuss and implement social security and protection mechanisms that safeguard the most vulnerable workers. This conversation is becoming increasingly urgent as the industry shifts towards high-tech manufacturing processes that may sideline workers with outdated skills. The Government of Thailand, in collaboration with industry stakeholders, is beginning to address these challenges by formulating policies that focus on technological advancement as well as creating inclusive workforce policies that support retooling and reskilling efforts.

Thailand aims to produce 380,250 electric vehicles by 20278 and achieve a net-zero carbon economy by 2065. Thailand's electric vehicle market is expected to register a 22 per cent compounded annual growth rate from 2022 to 2025.9 Moreover, Thailand is pivotal in the electric vehicle industry by manufacturing essential components, such as batteries, motors, chargers, converters and high-performance resins. Over the past few years, Thailand emerged as an investment destination for electric vehicle parts and materials, attracting manufacturers from Japan, China, Republic of Korea and Germany.

To ensure a just transition in this rapidly evolving sector, it is critical to discuss and implement social security and protection mechanisms that safeguard the most vulnerable workers. This conversation is becoming increasingly urgent as the industry shifts towards high-tech manufacturing processes that may sideline workers with outdated skills. The Government of Thailand, in collaboration with industry stakeholders, is beginning to address these challenges by formulating policies that focus on technological advancement as well as creating inclusive workforce policies that support retooling and reskilling efforts.

Favourable government policies, a strategic geographical location and a skilled workforce bolster Thailand's allure as an investment destination in the electric vehicle industry. This has led to the attraction of various global and regional players investing in the electric vehicle supply chain, manufacturing and battery technology, thus solidifying Thailand's position also as an important player in the evolving landscape of electric vehicles.

Toyota and Panasonic, for instance, each plan to establish an electric vehicle battery production plant in Thailand. And Mercedes-Benz, the German luxury carmaker, recently started production of its fully electric EQS model in Thailand. In 2023, Mercedes-Benz recorded 400 per cent growth in registered electric vehicles

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5 BOI 2017.
6 TAI 2022.
7 Meethong and Imson 2022.
8 NESDC 2022.
9 Meethong and Imson 2022.
1. Introduction

from the previous year, largely due to the launch of its EQS model. The company chose Thailand as one of only seven locations globally to manufacture the high-performance lithium-ion batteries that power the EQS model. This investment reflects the company's commitment to manufacturing electric vehicles in Thailand, as evidenced by a memorandum of understanding signed with the Government of Thailand.

Mercedes-Benz's commitment to manufacturing electric vehicles and high-performance batteries in Thailand is as much a business decision as a strategic move in light of the human rights due diligence requirements under German law. The German Supply Chain Due Diligence Act, which became effective in 2023, mandates German companies to ensure that their supply chains adhere to human rights and environmental standards. This legislation has considerable implications for Mercedes-Benz's operations in Thailand.

The expansion of the Mercedes-Benz manufacturing footprint in Thailand requires necessary training and ensuring that social protections are robust enough to support workers during the periods of transition, thereby fostering a workforce that is resilient, adaptable and capable of thriving in a new economic landscape. This also involves conducting thorough assessments of local suppliers, ensuring fair labour practices and mitigating environmental impacts. The company must establish mechanisms for grievance redressal and remediation for cases of human rights violations. The move to produce electric vehicles in Thailand also places Mercedes-Benz in a unique position to influence local supply chain standards positively, potentially raising the bar for labour and environmental practices in the region.

Additionally, Mercedes-Benz's alignment with Germany's human rights due diligence standards and the European Union standards in Thailand could set a precedent for other multinational enterprises in the automotive manufacturing sector, particularly those from Japan, where similar initiatives are gaining traction. The involvement of Japanese multinational enterprises in Thailand's electric vehicle sector, guided by Japan's Ministry of Economy, Trade and Industry priorities, reflects growing international focus on sustainable and responsible automotive manufacturing.

Thus, the expansion of companies like Mercedes-Benz and BMW in Thailand's electric vehicle market is not only a testament to the country's growing importance in this industry but also a reflection of a broader global shift towards responsible and sustainable business practices that are in line with international human rights standards. This shift towards ethical and sustainable practices is crucial, especially as other major players in the industry ramp up their efforts in the electric vehicle market in Thailand.

Toyota, which is the world's and Thailand's largest vehicle manufacturer, is embracing this trend with its plan to launch ten electric vehicle models in Thailand by 2025. These models include a range of technologies, such as hybrid electric vehicles, plug-in hybrid electric vehicles, battery electric vehicles and fuel cell electric vehicles. Toyota's move signifies a broader industry shift towards diverse and sustainable mobility solutions.

Likewise, the Chinese automakers Great Wall Motor and SAIC Motor, which have been instrumental in making China the world's leading electric vehicle market by volume, chose Thailand for their regional manufacturing base by setting up the second full-production manufacturing facility outside of China, in Rayong Province in 2021. Great Wall Motor aims to produce 80,000 electric vehicles annually in Thailand, while SAIC Motor targets production at 50,000 cars as of 2024.

Build Your Dreams (BYD), another Chinese electric vehicle maker, has also made great strides by setting up a facility in Rayong Province to produce 150,000 passenger cars annually, starting in 2024. The company plans to sell 10,000 units in Thailand and export to South-East Asian and European countries, indicating a strategic focus on expanding its global electric vehicle footprint.

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10 Marketeer 2023.
12 Envizi 2022.
13 Languepin 2023
14 ibid.
Also in 2024, Chinese battery giant Contemporary Amperex Technology Co., Ltd. (CATL) will open a factory in Thailand in collaboration with Arun Plus, a subsidiary of the PTT Group. This $106 million investment in assembling batteries for electric vehicles is part of Thailand's strategy to secure its automotive supply chain for electric vehicles.\(^\text{15}\)

These developments highlight Thailand's growing importance as a central hub for electric vehicle manufacturing in the region. And they accentuate the country's commitment to becoming a player in the global electric vehicle market.

The Government of Thailand, through the Board of Investment, actively supports these developments. It provides incentives to stimulate the production of hybrid electric vehicle parts and plug-in hybrid electric vehicles, offering import duty exemptions for machinery and an attractive three-year corporate income tax exemption package. These incentives aim to maintain Thailand's industry leadership, with more than 2,300 manufacturers, including car assemblers and parts makers, transitioning to electric vehicles. Plans to increase charging stations by 5,000 locations nationwide by 2027 further demonstrate the Government's commitment to supporting this industry shift.\(^\text{16}\) The approval of 24 Board of Investment projects involving major corporations, such as Mitsubishi Motors and Sammitr Group, is a clear indication of the concerted efforts to enhance domestic electric vehicle production and the subsequent goal of introducing commercial electric vehicles into the market by 2025.\(^\text{17}\) This strategic move aims to capture the local market while facilitating exports to other ASEAN countries.\(^\text{18}\)

As the automotive industry gravitates towards electric vehicles, Thailand's automotive supply chain is poised for significant transformation. This shift necessitates different automotive components compared with those used in internal combustion engines. Components like exhaust systems and gearboxes, which are integral to the internal combustion engines, will become outdated while the demand for electric parts, such as electronic systems and batteries, will rise. The Thai automotive parts industry, therefore, faces a fundamental moment of change in its transition towards new vehicle types and their specific components.

\(^{15}\) Francesca Regalado, “CATL to Develop Electric Vehicle Batteries with Thailand’s Arun Plus”, in Nikkei Asia, 9 June 2023.

\(^{16}\) NESDC 2022.

\(^{17}\) ibid.

\(^{18}\) BOI 2023.
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Approximately 816 of the 2,500 Thai-based auto parts companies manufacturing traditional components, such as exhaust pipes, fuel tanks, radiators, engines and engine parts, face the risk of redundancy with the expansion of electric vehicle production. Technological advancements, including the rise of electric vehicle technologies, increased automation and robotics, innovations in 3D printing, artificial intelligence (AI), machine learning and the integration of augmented reality and virtual reality technologies into training, are driving this transformation. These changes present opportunities and challenges, especially for areas where traditional skills may become obsolete and thus require considerable reskilling, upskilling and adaptation. The next 10–15 years will be a crucial period for the Thai automotive manufacturing supply chain, which has traditionally concentrated on developing the supply chain for internal combustion engines. This shift will exert profound impact on the structure and governance of the supply chain.

These shifts pose considerable challenges to workers in roles that are becoming redundant due to the technological advancements and changing manufacturing processes. The transformation could lead to job reductions that particularly affect the lower-skill jobs.

The labour market is thus facing the urgent need to adapt and acquire new skills pertinent to the electric vehicle sector. This includes expertise in manufacturing electronic systems and batteries. However, the challenge extends beyond technical skills required for a work environment increasingly dominated by the advanced technologies. The heightened utilization of automation and robotics in manufacturing processes, innovations in additive manufacturing (3D printing) and the growing significance of AI and machine learning are reshaping job profiles. Additionally, the integration of augmented reality and virtual reality for training purposes, advances in material technology, the evolution of connected and autonomous vehicles and the adoption of sustainable manufacturing practices are all contributing to a rapidly changing industry landscape.

The transition also brings to the forefront the need for comprehensive reskilling and upskilling programmes. These programmes should be designed to impart technical knowledge and to develop digital literacy and adaptability, which are essential in an industry increasingly influenced by AI, machine learning and connected technologies. The Government of Thailand and industry stakeholders must collaborate to ensure that these workforce transformations are accompanied by adequate support systems, including education, training and social security measures, to mitigate the impact on affected workers.

The shift also highlights the importance of proactive labour market policies that anticipate and thus address the displacement of workers. These policies could include job-matching services, career counselling and financial support during the transition period. The ultimate goal is to ensure that as the Thai automotive industry evolves, it does so inclusively, offering pathways for all workers to participate in and benefit from the new opportunities presented by the burgeoning electric vehicle market. In line with the ASEAN Declaration on Human Resources Development for the Changing World of Work and Its Roadmap, there is a mandate to foster a workforce that is agile, resilient and skilled in new technologies. This regional commitment to human resource development further emphasizes the need for a multifaceted approach to workforce training and development that encompasses technical skills, digital competencies and soft skills essential for the modern workplace.

19 Kulkolkarn 2019.
20 Upskilling is defined as “short-term targeted training typically provided following initial education or training and aimed at supplementing, improving or updating knowledge, skills and competencies”. See UNESCO glossary.
21 See the ASEAN Declaration on Human Resources Development for the Changing World of Work and Its Roadmap, adopted at the 36th ASEAN Summit, 2020. The Declaration addresses the challenges and opportunities presented by the changing world of work by emphasizing the need for a collective response to enhance human resource development strategies within the ASEAN region. It outlines a road map focusing on inclusive and sustainable human resource development, lifelong learning and skills training in response to the demands of the digital age and the evolving global labour market. The Declaration and its accompanying road map aim to foster a resilient and competent workforce in ASEAN countries, equipped to adapt to the rapid pace of technological and economic changes and thus contribute to regional growth and development.
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1. Introduction

The number of workers in the manufacturing subsector of the automotive industry varies according to different sources and data collection methodology. According to the National Economic and Social Development Council (NESDC), the automotive industry has a manufacturing capacity of 2 million units per year, employs 850,000 workers in total, with 520,000 of them in the manufacturing supply chain. According to World Bank development indicators, Thailand's labour force total was 40,813,511 in 2023. The Thai automobile and auto parts industry accounts for nearly 12 per cent of Thailand's economic growth and employed more than 700,000 people in 2017, which accounted for approximately 1.7 per cent of the labour force. The variance in employment figures presented here can be attributed to differences in data collection methodologies and the scope of industry coverage. For example, although the NESDC's figure may encompass a wider range of roles within the automotive manufacturing industry, other estimates are likely to focus on direct manufacturing positions.

The International Labour Organization’s (ILO) analysis of the workforce composition in automotive manufacturing factories indicated the almost equal representation of both genders, with men comprising 49.8 per cent and women constituting 50.2 per cent of employees in 2018. However, closer examination of the data revealed gender imbalances in specific roles. According to a study that the ILO conducted in 2022 with tier 1 and tier 2 auto parts producers, women accounted for only 15–20 per cent of the workforce, mainly occupying white collar or professional positions, such as in accounting, sales and human resources. Notably, a gender pay gap existed within the industry. A survey conducted among semi-skilled workers from 50 automotive plants in the eastern province of Chachoengsao found that women's wages were 92.8 per cent of what their male counterparts were paid.

Thailand's automotive manufacturing supply chain has undergone significant changes and encountered challenges influenced by various trends. A crucial factor in this transformation is the growing reliance on automation and digital workforce management. Since the 2010s, Thailand has been experiencing a shortage of skilled technicians and engineers, calling attention to the demand for a proficient workforce. To address this, there was a recognized need for updating labour regulations to focus on both improving the skills of the workforce through upskilling and reskilling and providing training opportunities, education and academic courses tailored to the specific occupations required by the industry. A detailed breakdown of which specific occupations, particularly among skilled technicians and engineers, are in demand to facilitate more precise policy development, however, is not available.

Another constraint is the pressing requirement to enhance the skills of those employed in the industry to align with continuous technological advancement, which suggests the need for skills anticipation systems that provide updated insights into more specific skills requirements and occupations.

Although there are efforts to track labour market trends and skill demands, a fully integrated skills-needs anticipation system requires investment and expertise. Such a system also requires robust data collection mechanisms, including labour market information systems, employer surveys and educational and training provider inputs, among others. The critical aspect at this point is to ensure the system's adaptability, real-time data analysis capabilities and alignment with the country's economic and educational policies.
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The Thai automotive manufacturing sector faces a persistent challenge of skill shortages, which represents a considerable barrier to the adoption of the new technologies and future job creation within the industry. It also represents a major kink to the development plan of investors looking to make Thailand a central hub. According to the Thailand Automotive Institute (TAI), the shortage of workers with sufficient science, technology and engineering skills is a formidable challenge facing the country. In addition to a shortage of highly skilled ICT specialists, Thailand has a shortage of semi-skilled ICT workers who support and maintain ICT services, including networks, servers, software packages and computer equipment. This issue is echoed in a 2020 ILO report citing skill shortages and gaps in the local labour market as “the most significant barrier to the adoption of new technologies and to job creation in the automotive industry in the future”.

The manufacturing subsector, particularly the burgeoning electric vehicle industry in Thailand, experienced a critical shortage of skilled workers as recently as September 2023. According to the Electric Vehicle Association of Thailand, the industry faces considerable challenges in filling more than 53,000 positions. This figure underlines the acute demand for electric vehicle specialists and skilled workers essential for the industry’s growth.

A detailed breakdown of these positions revealed that a large majority, approximately 44,492 roles, require candidates with a vocational school education. The remaining positions necessitate higher education qualifications, including bachelor’s, master’s and doctorate degrees. The electric vehicle industry’s demand extends to various specialized fields, including software, material science, simulation and user experience. When interviewed for this study, the Vice-President of the Electric Vehicle Association, stressed the urgent need for experts in these areas.

Thailand’s position in terms of technology and digital skills is superior to that of Indonesia and the Philippines but considerably lags behind Malaysia and Singapore. This disparity highlights a potential critical shortfall in the labour force in Thailand, especially concerning skilled workers in areas important for technological innovation and intellectual property development within the automotive industry.

To combat the shortages, a partnership was established in 2013 between Thailand and Japan to create the Automotive Human Resource Development Institute (AHRDI) Programme. This programme closely aligns with the Thailand Automotive Institute, an organization founded in 1998 with the vision of elevating Thailand’s automotive industry to global competitiveness. Having outlined four core strategies, such as fostering a conducive business environment and enhancing efficiency and productivity in Thailand’s auto part industry, TAI serves as an institutional backbone for the AHRDI Programme.

The AHRDI Programme has demonstrated remarkable success in its skills development initiatives. In fiscal year 2023, spanning from October 2022 to September 2023, the AHRDI Programme exceeded its targets: It upskilled 1,320 workers, surpassing its intended goal of 1,000 workers by 132 per cent. This achievement is a testament to the programme’s effective approach to addressing the skills gap in the industry.

The AHRDI Programme has been particularly successful in its high skills development programmes within the Eastern Economic Corridor (see Annex 3 for a training model overview). The programme initially aimed to train 20 workers but reached 68 workers, which was 340 per cent of the target, due to the popularity of the course and the demand from the labour market. This exceptional performance in upskilling workers in specialized

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31 ILO 2020.
35 Industry Team 2022.
36 ibid.
37 ILO 2022c.
38 Suwanwityaya 2013.
39 AHRDI 2023.
areas crucial to the electric vehicle industry, such as software, material science and user experience, illustrates the significant impact of the AHRDI Programme in cultivating a highly skilled workforce, thereby contributing to the overall growth and competitiveness of Thailand's automotive manufacturing sector.

These developments underline the urgency of revising labour regulations to enhance workforce capabilities through reskilling and upskilling initiatives. Additionally, it is imperative to offer training programmes, educational opportunities and academic courses tailored to the specific roles required by the industry, thereby efficiently mitigating workforce shortages.

The AHRDI initiative is specifically supported under TAI’s focus area of Human Resource Development, one of three excellence pillars along with Technology R&D and Strengthening of Supply Chain. The programme involves Japanese experts training Thai “master trainers”, who subsequently train trainers in tier 1 and tier 2 parts makers. This collaborative framework not only aligns with TAI’s objectives of human resource development and industrial standard enhancement but also benefits from TAI’s infrastructure, including its robust team of 107 personnel, 50 of whom are engineers and technical staff. Even with the institutional backing of TAI and its focus on human resource development, the AHRDI Programme has not been without its challenges. Reluctance among Japanese experts to transfer proprietary technologies and a general lack of motivation among trainers have been stumbling blocks. There is pronounced need to constantly revise and upgrade the skill sets imparted to meet the continually evolving technological landscape of the automotive industry.

Efforts to improve workers’ skills extend beyond the AHRDI Programme. They include collaborations between automotive companies and the Government as well as renowned Thai universities to equip students with critical technical expertise (see Annex 1 and Annex 2):

- Mitsubishi Motors Thailand opened the Automotive Center of Excellence with Chonburi Technical College in 2021.
- The Ministry of Labour and Toyota Motor Thailand Co. Ltd. opened the Toyota Motor Thailand Center in 2018.
- The Automotive Human Resources Development Academy (AHRDA) was established under the Department of Skill Development with a focus on delivering technical courses to the automotive industry in 2015.
- Chulalongkorn University began offering Bachelor of Engineering in Automotive Design and Manufacturing Engineering courses in 2005.
- King Mongkut’s Institute of Technology Ladkrabang established an Automotive and Advanced Transportation Engineering master’s degree programme in 2007.
- King Mongkut’s University of Technology Thonburi set up the Mobility & Vehicle Technology Research Center (MOVE) in 2020.

Managed by the Department of Skill Development, AHRDA recently refocused its training programmes to substantially elevate the skill set of trainees in Thailand’s automotive industry. AHRDA aims to increase the percentage of advanced skilled workers to 80 per cent, a huge escalation from its previous 20 per cent target.

To stay up to date with the changing requirements of the industry, AHRDA conducts a training needs survey every three months, which reveals the immediate interest of the sector towards each course that is being offered by the academy and the demands for new courses.

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40 Intarakumnerd 2021.
41 See Annexes 1–3 for more details.
42 See Department of Social Development, Automotive Human Resource Development Academy.
43 ILO 2024.
Navigating transformational changes and transitions
1. Introduction

King Mongkut's University of Technology Thonburi established MOVE to foster multidisciplinary research and collaboration among the academia, industry and government sectors.44 The MOVE Center, which was inaugurated in January 2020, emphasizes next-generation automotive technologies that are commercially viable. And Toyota has strengthened its ties with Chulalongkorn University, assisting in formulating an automotive engineering curriculum and providing up-to-date equipment and instructors.

These efforts epitomize the industry's concerted attempt to bridge the gap between academia and industry, aiming to secure a well-trained, skilled workforce for the future. And while they are promising, they are not a panacea. Challenges remain in building up the industry's capacity to meet the evolving demands of automation, digitalization and the shift towards electric vehicles. Thus, despite robust frameworks and programmes, gaps persist that necessitate attention to sustain Thailand's automotive industry's competitiveness on the global stage.

The industry has embarked on extensive technological upgrading over the past two decades. In the 2000s, multinational enterprises began investing in more technologically sophisticated development activities in Thailand, such as advanced engineering, process and product design and advanced testing and validation.45 For example, General Motors has invested more than $2 billion in production facilities in Rayong Province since 2000.46 Toyota established its regional headquarters for Asia in Thailand, overseeing operations in around 20 countries, including engineering and manufacturing operations.47 Similarly, Huawei focused on Thailand for its digital ambitions, establishing its ASEAN regional headquarters there, launching the region's first 5G test bed and aiming to train 30,000 digital workers within three years.48 In response to these advancements, there is an increasing need for a workforce skilled in working with and managing robotic systems to ensure that the industry can fully leverage the technological capabilities being developed and implemented.

Regarding the lower-tier suppliers, the overall technological capability of domestic Thai parts suppliers remains relatively weak. Despite the provision of technology from joint-venture partners or licensors, there is a prevalent struggle to absorb the technology transferred due to a lack of skilled labour. Most tier 2 and tier 3 suppliers are still striving to enhance their production process efficiency.49

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44 See MOVE, Mobility and Vehicle Technology Research Center.
46 Konrad Legal 2021.
47 Board of Investment, "Thailand Eyed as Top Pick for Regional and International HQs", in South China Morning Post, 2 June 2021.
48 Board of Investment, "Thailand Eyed as Top Pick for Regional and International HQs", WSJ Business, 10 May 2021.
49 ibid.
The integration of Industry 4.0 technologies and digitalization into the Thai automotive industry has encountered challenges. A survey conducted in 2020 found that more than half of the automotive industry respondents, mostly parts suppliers, were still operating at the level of Industry 2.0, with less than 10 per cent at Industry 3.0. Despite the prevalent use of industrial robots, with more than half employed in the automotive industry, this eagerness for automation primarily responds to the labour shortages rather than an outright adoption of advanced technologies.

The Thai automotive industry faces additional challenges with the growing trend of manufacturing electric vehicles, which requires complex electronic parts. On a positive note, Thailand has made notable progress in robotizing its automotive industry, with more than half of the country’s robots being utilized in this industry. For example, Isuzu automotive assembly uses high-precision robots, such as in its frame factory, body factory and paint factory, to achieve maximum quality and efficiency of body welding and painting. Robots are used to reduce worker fatigue and to make it more convenient for employees to work in difficult spots or places of extreme heat as well as to allow them to work in a better and safer environment.

Nevertheless, even tier 1 manufacturers struggle to match the demand for manufactured complex electronic parts amid the industry’s shift towards electric vehicles. This is due to a shortage of skilled technicians and engineers, for example, electrification skills of battery production and software development, which in turn affects the ability of tier 2 and tier 3 suppliers to adapt to and master the transferred technology while maintaining their efficiency. Thailand’s automotive industry may face the risk of production lines being relocated to other countries if it is unable to address these technological challenges adequately.

Overall, the increasing automation, digital workforce management, the rise of electric vehicle use and the lack of skilled labour are driving much of the change in the Thai automotive manufacturing supply chain. These trends necessitate an ongoing focus on technological upgrading, skills development and strategic collaborations to ensure the industry’s competitiveness and resilience in a rapidly evolving global automotive landscape. Ultimately, there is still much room for improvement in the Thai automotive industry to ensure its readiness for the transition to sustainability and greener practices. While the production of vehicles, especially electric vehicles, continues to grow, further development of the supply chain and its workforce is necessary to enhance the industry’s overall efficiency.

Additionally, the transition to a more automated and digitally managed workforce has broader implications. For workers to adapt to these changes, they will need additional support, including occupational guidance and access to childcare. The improvement of online learning platforms is also essential to facilitate skills-building for those who must continue to work full time while training. The concept of “lifelong learning accounts”, which could be subsidized by policymakers, may become necessary to fund ongoing training and education.

As the nature of work changes due to automation, many individuals may need to transition to different occupations and acquire new skills. While automation is expected to displace many jobs over the next 10 to 15 years, it will also create new job opportunities and transform existing ones. This period of transition in the Thai automotive industry underscores the importance of proactive workforce development strategies to ensure that workers are equipped to handle the changes and take advantage of new opportunities in an evolving industry landscape.

50 ibid.
51 The 2017 World Robotics Report by the International Federation of Robotics also viewed Thailand as a growing market for industrial robots in Asia, with sales projected to reach 5,000 in 2020 from 2,646 in 2016. Thailand now ranks tenth when it comes to applying augmented reality technology to the local manufacturing sector, having 45 robotic systems in the industrial sector per 10,000 workers.
52 Isuzu n.d.
53 Intarakumnerd 2021.
54 ILO 2022c.
55 Intarakumnerd 2021.
1.2 Adhering to responsible business conduct practices in the supply chains

As it navigates through its transformative phase with increasing automation and technological advancements, the Thai automotive industry is also confronted with the critical task of aligning its operations with international human rights standards and responsible supply chain management. This aspect is particularly significant in light of the second National Action Plan on Business and Human Rights that Thailand’s Cabinet adopted in 2023, which remains in effect until 2027. Based on the United Nations Guiding Principles on Business and Human Rights, the National Action Plan outlines a framework for preventing, mitigating and addressing human rights violations arising from business activities. This framework seeks to safeguard workers’ rights in the face of automation and technological advancements and is essential for responding to the evolving skills development needs of the workforce.

The principles outlined in the National Action Plan and similar international guidelines underscore the necessity for the automotive industry to foster a working environment that respects human rights and actively contributes to the professional growth and upskilling of its employees, which is also recognized as an entitlement by the ILO. This is particularly relevant as the sector pivots towards more sustainable practices, where the demand for new skills and competencies, especially in the burgeoning field of electric vehicles, is rising. Thus, integrating human rights due diligence within the industry’s operational strategies is inherently tied to the broader goal of enhancing workforce capabilities through targeted training initiatives, education and academic courses tailored to the specific roles necessitated by the industry’s transition.

The emphasis on human rights and responsible supply chain management aligns with the industry’s recognition of the critical role of the senior workforce. Investing in the reskilling and upskilling of this demographic is crucial for ensuring their continued employability amidst rapid technological changes. Such investments benefit the workforce but are also paramount for business sustainability and competitiveness in the global market. By fostering an inclusive approach that values the contributions of all employees, irrespective of age, and by facilitating their adaptation to new technological paradigms through lifelong learning opportunities, the Thai automotive industry can ensure a responsible and equitable transition into the future of work.

Preventing involuntary early retirement through targeted reskilling and upskilling initiatives also serves to alleviate pressure on the national social security systems, ensuring a more sustainable approach to workforce management and economic stability. By aligning social protection mechanisms with active labour market programmes, including reskilling and upskilling initiatives, countries can better manage the transitions for workers affected by job displacement or changes in the labour market. As also argued by the ILO, this approach both supports individuals in adapting to new job requirements and enhances overall economic resilience and social welfare, thereby reducing the burden on national social security systems through improved employability and reduced dependency.

These concerns and efforts are echoed in Japan’s Guidelines on Respecting Human Rights in Responsible Supply Chains, introduced in September 2022, which provide tailored guidance for Japanese businesses, including those in the automotive manufacturing sector, to implement robust human rights due diligence practices. These Guidelines, aligned with global standards like the ILO’s Tripartite Declaration of Principles

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57 ibid.
58 Dunbar 2020.
59 ILO 2023.
Navigating transformational changes and transitions concerning Multinational Enterprises and Social Policy and the OECD Guidelines for Multinational Enterprises emphasize the importance of ensuring fair and safe working conditions, preventing discrimination and exploitation and promoting workers' rights to freedom of association and collective bargaining. Investing in skills development is essential for ensuring that the workforce can meet the demands of a rapidly evolving labour market, particularly in the context of increasing globalization and technological advancements. This approach aligns with the principles of respecting human rights and promoting responsible business practices that these guidelines feature. By focusing on reskilling and upskilling, companies can contribute to sustainable economic development, enhance their competitiveness and support the achievement of broader social goals, such as reducing inequalities and promoting decent work for all.

The commitment of the global automotive players, such as Mercedes-Benz, to manufacturing electric vehicles in Thailand under stringent human rights due diligence requirements, as mandated by legislation (like Germany's Supply Chain Due Diligence Act), highlights the interconnectedness of ethical supply chain practices and workforce development. These efforts not only aim to mitigate environmental impacts and ensure fair labour practices but also set a precedent for embedding skills development and continuous learning within the industry's human rights and sustainability agenda.

In the context of the Thai automotive industry, these principles are particularly relevant given the sector's ongoing transition to automation and digital workforce management. The industry's shift, marked by the need for a skilled workforce proficient in new technologies, brings to the fore the necessity of investing in skills development and lifelong learning. The ILO Centenary Declaration for the Future of Work reinforces this need by calling for significant investments in human capital development to ensure that workers can adapt to the changing technological landscape.

The ILO's 2020 report on the future of work in the Thai automotive industry highlighted opportunities and challenges for creating decent and sustainable work in Thailand. It stressed the imperative of continuous skills development, aligning with the previously discussed shortages of skilled technicians and engineers and the need to enhance the skills of current employees. The report also stressed the importance of social dialogue, including involving workers and their representatives in decision-making processes, to ensure a just transition into the future of work.

Thus, as the Thai automotive industry evolves with technological advancements, it must also concurrently focus on responsible supply chain management, adherence to international labour standards and investment in workforce development. This fourfold focus on technological progression and human rights adherence will contribute to sustainable development while building up trust and resilience in the industry to ensure that it remains competitive and responsible on the global stage.

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61 ILO 2022b.
62 OECD n.d.
63 The International Labour Conference adopted the Centenary Declaration for the Future of Work at its 108th Session in Geneva on 21 June 2019 to commemorate the 100th anniversary of the ILO. The Declaration outlines a human-centred approach to the future of work. It focuses on increasing investment in people's capabilities, institutions of work and in decent and sustainable work. Key elements include the right to lifelong learning, gender equality, a safe and healthy work environment and policies that promote full, productive and freely chosen employment. The Declaration reflects the collective commitment of Member States to shaping a future that prioritizes the dignity and well-being of workers globally in the face of unprecedented changes in the world of work.
64 ILO 2020.
65 Just transition in the labour market refers to the process of ensuring that the transition to a green economy is inclusive and equitable. It involves the creation of decent, high-quality work while simultaneously addressing the challenges posed by environmental and technological changes. A just transition prioritizes the protection of workers' rights and the provision of new opportunities for employment and education, ensuring that no one is left behind as industries adapt to more sustainable practices. See G7 Employment Ministerial Meeting, Just Transition: Make It Work Towards Decent and High-Quality Work in a Green Economy, Wolfsburg, Germany, 24 May 2022, G7 Information Centre, University of Toronto.
20180311:\20\Research methodology

2.1 Research objective and design

The research set out to overview the employment and skills landscape in the manufacturing subsector of the automotive sector in Thailand, with the aim of identifying skills gaps in terms of policy and measures and developing strategic initiatives for skills development.

The study applied a mixed-methods approach consisting of six phases (figure 1).

Figure 1. Research design

Inception Phase
Data Collection: Qualitative & Quantitative
Data Analysis & Triangulation
Consultation & Validation
Implementing the Results
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Navigating transformational changes and transitions

2. Research methodology

The inception phase consisted of the following steps.

1. Desk and literature review to understand the sector's current and designing data collection tools.
3. Identifying participants for the in-depth interviews and the informant interviews, in collaboration with the ILO.

2.2 Data collection and analysis

Qualitative data collection

During the data collection stage, Rapid Asia conducted the in-depth interviews with a diverse group of automotive workers, from tier 1 to tier 3, who had received formal or informal training, to understand their first-hand experiences, training backgrounds and perspectives on industry changes. The in-depth interviews involved 11 automotive workers (three women, eight men) from five companies located in the tier 1 industrial areas of Rayong and Chonburi provinces, providing a rich, grounded understanding of employee experiences and insights.

As well, ten (two women, eight men) informant interviews were conducted with a range of stakeholders to capture a comprehensive view of the skills ecosystem in the Thai automotive industry. The stakeholders for the informant interviews included representatives from government bodies, such as the Automotive Human Resource Development Academy, the Department of Skill Development, the Ministry of Labour, the Office of Vocational Education and Training in the Ministry of Education, the Ministry of Higher Education, Science, Research and Innovation, the Career for the Future Academy, the National Science and Technology Development Agency and members of independent organizations – the Thailand Professional Qualification Institute, the Automotive Industry Club and the Federation of Thai Industry. Insights were gathered from educational institutions, such as Toyota College and Chonburi Technical College, as well as players in the private sector. These informant interviews offered critical perspectives on the current state of skills training, supply and demand as well as strategic approaches to workforce development and planning in the manufacturing subsector.

A total of 21 informant interviews were carried out in November 2023 with stakeholders, including workers (figure 2).

A focus group discussion also took place with 15 participants, including officials from the Department of Skill Development, the Employers’ Confederation of Thailand and representatives from the automotive manufacturing industry, primarily human resources directors.

Figure 2. Stakeholder interviews

<table>
<thead>
<tr>
<th>Government institutions</th>
<th>Training and education institutions</th>
<th>Private sector</th>
<th>Trade union</th>
<th>Workers</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>11</td>
</tr>
</tbody>
</table>

Formal training was defined as having received TVET training or a certified training course.
Quantitative data collection

Quantitative data (figure 3 and table 1) were collected through surveys with employers and workers that the ILO developed and Thammasat University researchers administered. Rapid Asia conducted a second survey with workers.

Because the worker surveys shared similar and complementary research objectives and were analysed in a way to complement each other, both are referred to as the “worker surveys” for simplification in the following discussions on the findings and data analysis.

<table>
<thead>
<tr>
<th>Profile variable</th>
<th>Proportion n=126 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main business establishment</td>
<td></td>
</tr>
<tr>
<td>Car assembly</td>
<td>9</td>
</tr>
<tr>
<td>Engine</td>
<td>6</td>
</tr>
<tr>
<td>Transmission</td>
<td>8</td>
</tr>
<tr>
<td>Driveline and axels</td>
<td>6</td>
</tr>
<tr>
<td>Steering, suspension, wheels, tires</td>
<td>13</td>
</tr>
<tr>
<td>Braking system</td>
<td>10</td>
</tr>
<tr>
<td>Electrical and electronic systems</td>
<td>26</td>
</tr>
<tr>
<td>Body, frame and bumpers</td>
<td>17</td>
</tr>
<tr>
<td>Heating, ventilation and AC</td>
<td>5</td>
</tr>
<tr>
<td>Company ownership</td>
<td></td>
</tr>
<tr>
<td>Thai Company</td>
<td>55</td>
</tr>
<tr>
<td>Thai-majority company</td>
<td>5</td>
</tr>
<tr>
<td>Joint venture</td>
<td>10</td>
</tr>
<tr>
<td>Foreign majority</td>
<td>9</td>
</tr>
<tr>
<td>Multinational</td>
<td>22</td>
</tr>
</tbody>
</table>

67 ILO 2022d.
Navigating transformational changes and transitions

2. Research methodology

The data sources included the desk review, qualitative interviews, a focus group discussion, the worker survey conducted by Rapid Asia and the worker survey and employer survey conducted by Thammasat University and were analysed separately to identify themes. These themes were then sorted according to the research questions during a workshop that was conducted at Rapid Asia on 12 December 2023 to triangulate findings across diverse datasets to identify patterns and insights.

The integrated analysis approach comprised the following:

- Gap analysis to juxtapose the skills supply against the demand, highlighting discrepancies and areas needing attention.
- A deep dive into lessons learned to improve existing reskilling and upskilling programmes to ensure they are aligned with industry needs.
- Mapping the skills supply for the sector to understand the current capacity and future requirements.

Throughout the research, particular attention was given to understanding the impact of automation and technology on employment patterns and skill requirements. This included an examination of how businesses can protect labour rights in the wake of technological advancements, in line with Thailand’s National Action Plan on Business and Human Rights and the international guidelines, such as those from Japan and the United Nations.

Ultimately, the study design ensured a robust and systematic exploration of the Thai automotive industry’s skills dynamics to foster an environment conducive to sustainable growth and competitive skills development.

The initial findings were presented to a range of stakeholders for validation and to facilitate a collaborative discussion on preliminary conclusions and recommendations. The workshop (6 February 2024) drew around 70 participants from employers’ organizations, trade unions and government departments. The workshop generated diverse feedback from the participants on how the survey results could be used for future programme initiatives. Insights from the workshop were incorporated into the recommendations in this report.

Figure 4. Validation workshop

Key stakeholders attended the validation workshop for the skills needs assessment research. © ILO
2.3 Limitations

When conducting research on the skill demands and supply within an industry as dynamic as the automotive manufacturing sector in Thailand, certain limitations are inherent in the methodology employed. These limitations must be recognized to contextualize the findings and guide future research directions.

Based on the scope of work, a total of 21 in-depth and informant interviews were conducted for this study. While 21 interviews provide valuable insights, this number may not represent the entire workforce within the industry, which limits the generalizability of the findings. To compensate for this, the research incorporated triangulation methods. A more comprehensive picture was formed by comparing and cross-validating the qualitative findings from the interviews with the existing literature and the quantitative data collected from the employer and worker surveys as well as industry reports.

Another limitation is the selection bias inherent in the participant selection process. The stakeholders interviewed, including workers, were likely selected based on availability and willingness to participate, which may not have provided a representative sample of the industry. Additionally, most participants were from tier 1 companies in Rayong and Chonburi provinces, which may not have accurately represented the conditions and perspectives of stakeholders, including workers, from smaller tier 2 and tier 3 companies or other regions. Efforts were made to diversify the participant pool by reaching out to a broader range of stakeholders, including representatives from tier 2 and tier 3 companies and various regions. Additionally, purposive sampling was employed to include individuals with diverse roles and experiences within the industry, thereby reducing the impact of selection bias.

Qualitative data collection methods such as interviews, while rich in detail are subject to participant subjectivity. Responses may be influenced by the interviewees’ current job satisfaction, their understanding of the industry and their personal aspirations or fears about the future, potentially leading to skewed data. To address this challenge effectively, the assessment integrated quantitative data obtained from the employer and worker skill needs assessment survey. This approach helped to reinforce the reliability and comprehensiveness of the assessment.

Finally, the rapid pace of technological advancement in the automotive industry means that the findings of this research could quickly become outdated. Skill needs are evolving continuously, and what is relevant today might change in a few months. This limitation is particularly salient in an industry that is on the cusp of major shifts towards automation and electrification. To address this, the research adopted a forward-looking perspective, focusing on the industry's emerging trends and future projections. Continuous engagement with industry experts and regular updates from recent industry reports were utilized to keep the research relevant and timely.

Recognizing these limitations is crucial for stakeholders when considering the implications of the research findings. It also underscores the importance of ongoing research and the need for adaptive and flexible strategies for workforce development to keep pace with the rapidly changing landscape of the automotive industry.
Main findings

3.1 Transformation trends

The automotive industry in Thailand is undergoing a tremendous transformation, influenced by digitalization and automation and global trends towards electric vehicles and renewable energy technologies. As the employer survey and informant interviews revealed, these shifts present both opportunities and challenges for the sector.

The industry’s growth potential is being reshaped by the push towards electric vehicles and automation. Thailand’s established manufacturing subsector of the automotive sector, which is a crucial part of Japan’s supply chain and which has primarily focused on internal combustion engine vehicles, is now pivoting towards the new technologies. The transition is not without its difficulties. Workers in the industry are not prepared for the shift to electric vehicles and automation, reflecting a gap between the current skill set and the emerging needs. This underscores the necessity for a strategic approach to workforce development, with emphasis on broader skill sets beyond specific tasks. To address this, Mitsubishi, for example, initiated specific training (box 1).

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68 Presented during the ILO consultation and validation workshop.
Navigating transformational changes and transitions

3. Main findings

Box 1. Mitsubishi Thailand’s training initiative

During the validation meeting for this study’s research findings, Mitsubishi in Thailand presented an initiative of in-house training for trainers focusing on robotics skills conducted by volunteer trainers who had received external training. The process of selecting staff for training is based on the immediate need for upskilling. It was noted that those chosen to be in-house master trainers, taking on dual roles as part-time workers and trainers, should be provided with additional incentives to acknowledge their extended responsibilities.

The Government of Thailand has also been active in establishing green policies through international cooperation, aiming to enhance its commitment to reducing greenhouse gas emissions and transitioning to a low-carbon economy. The World Bank, through its Partnership for Market Readiness, has supported Thailand in designing and deploying carbon-pricing instruments. These efforts are part of a broader strategy to align with the Paris Agreement goals of reducing emissions by 20–25 per cent by 2030.69

Thailand is also pursuing robust renewable energy under its Alternative Energy Development Plan 2018.70 The Government aims to increase the share of renewable energy to 30 per cent of total energy consumption by 2037. This includes the development of solar, wind, hydropower, biomass and biofuels, among other sources.

These measures, including the implementation of smart-energy policies and the enhancement of renewable energy sources, indicate a strong national policy priority to transition to a more sustainable and environment-friendly energy system. As these policies are being developed and implemented, they are expected to have widespread implications across various industries and for workers in Thailand.

In parallel with these trends, nearly all company executives who were interviewed said they are revising their business strategies to emphasize hybrid or electric vehicles, in line with the global automotive industry’s move towards carbon neutrality. Insights from these interviews revealed a keen awareness within the sector of the opportunities that Thailand’s burgeoning electric vehicle industry presents as well as the potential for expansion into new markets overseas. This strategic pivot reflects a changing mindset at the leadership level to one that recognizes that the automotive industry’s future success is deeply connected to sustainable practices and the ability to innovate. Serving as an example to such practices, Mitsubishi Thailand has established a work team focused on green policies, drawing inspiration from Mitsubishi Japan’s planning.71 This includes energy management within the organization and the creation of new roles to promote green policies and trends.72

Automation and digitalization are emerging as the other crucial trends within the manufacturing processes of Thailand’s automotive industry: Nearly all interviewees acknowledged the presence of automated and robotic machines in their facilities. This transition brings with it a host of benefits but also raises concerns regarding the impact on the workforce, operational costs and the environment. To navigate these challenges, companies are taking a proactive stance, engaging external partners for research and strategic planning. As one representative from the sector explained regarding their company’s forward-looking strategy, “We have a plan to upgrade and invest in 4.0 technology. We have discussed it in the past five years and are ready with the equipment and resources. From recruitment and training, we have included the perspective of 4.0 technology. We are 70–80 per cent ready, and for the basic level, we are good.”

69 World Bank 2021.
71 For further information, see Mitsubishi Electric, “Sustainability”.
72 Mitsubishi Motors 2022.
The data and insights collected through this study clearly indicate an increasing demand for workers skilled in automation, particularly those skilled in controlling or operating robots used in manufacturing. As a result, there is a considerable shortage of such skilled technicians across all tiers, with particular emphasis on tiers 2 and 3, highlighting the urgent need for upskilling technicians. To retain talent within the workforce through appropriate incentives, there is a need for the development of a clear career path for technicians whose skills are in high demand.

In relation to these demands and the increased focus on skills required to operate in a digital environment, the worker survey findings indicate a correlation between formal training and workers’ attitudes towards technological advancements in the automotive industry. In the workers survey findings, respondents with formal training tend to view the impact of robotics, AI and electric vehicles more positively than their non-formally trained counterparts. Specifically, 9 per cent of the formally trained workers perceived robotics and AI positively, almost double the 4 per cent among those without formal training. Similarly, 7 per cent of formally trained workers had a positive outlook for electric vehicles versus 3 per cent of the non-formally trained. Conversely, a higher percentage of non-formally trained workers perceive these technologies negatively (at 47 per cent for robotics and AI, 39 per cent for electric vehicles) than their formally trained counterparts (at 39 per cent for robotics and AI, 26 per cent for electric vehicles). These figures suggest that formal training not only equips workers with the necessary skills to adapt to new technologies but also fosters a mindset that is more open to embracing change, thereby enhancing workforce resilience in the face of industry evolution.

3.2 Employment trends and occupational shifts

The Thai automotive industry is reflective of broader global shifts in employment trends influenced by various factors (figure 5). In the employer survey findings, customer preferences and trade patterns emerged as the top impacting factors, at 64 per cent and 63 per cent, respectively. These preferences included a growing demand for electric vehicles and environment-friendly practices, which align with the third most significant factor, Industry 4.0 technologies (46 per cent) and environmental concerns (32 per cent). These factors are reshaping the industry's approach to manufacturing and product development.

Considerable impacts were reported in restructuring the supply chain and diversifying the customer base, suggesting that automotive plants are rethinking and broadening their market approach to accommodate the shifting consumer demands and competitive pressures. The adoption of new technologies was also high on the agenda, with 45 per cent of respondents indicating this as a key impact. Increasing efficiency (41 per cent) has been understandably a priority because it directly correlates with the ability to remain competitive. Additionally, according to the worker survey findings, employees with a bachelor’s degree or higher are mostly affected in terms of handling a wide range of tasks (60 per cent), while those with less education are primarily impacted in terms of using new production techniques or work processes (62 per cent).

Interestingly, the employer survey results also shed light on areas that are perceived as having less impact. Only 30 per cent of respondents thought there will be a sustainable production impact, and a modest 37 per cent see reskilling and upskilling workers as a significant impact. This could indicate a gap between the need for new skills to manage technological advancements and the industry’s current focus on such training initiatives.

73 In this context, the term “formal training” refers to structured educational or instructional programs that are primarily focused on imparting specific skills or competencies relevant to employment. This is distinct from “formal education,” which encompasses a broader, State-recognized system of learning that spans from primary to tertiary levels, including university degrees. Formal education typically covers a wide range of knowledge, often theoretical, and is designed to provide a comprehensive understanding of various subjects. Conversely, formal training, while also structured, is more practical in nature, targeting particular skills required for specific jobs or industries. It is commonly delivered in diverse settings, such as workplaces, vocational schools or through specialized training programmes and is generally of shorter duration compared to formal education. The survey’s findings pertain to this specific form of training, highlighting the correlation between such practical, skill-focused training and workers’ attitudes towards technological advancements in the automotive industry.
In terms of job creation, respondents recognized that new roles will emerge; however, a staggering 53 per cent of employers were unaware of what these roles might be. This suggests a lack of clarity or communication regarding future opportunities. Despite this uncertainty, there was acknowledgement of the need for roles in digital design, like computer-aided design and computer-aided manufacturing, or CAD and CAM (at 10 per cent), and electronic engineering (at 4 per cent), which highlights the industry’s turn towards more specialized technical positions. Data protection roles (at 2 per cent) also indicate an increasing awareness of the importance of cybersecurity. The workshop participants noted the growing demand for workers skilled in automation (box 2).

**Box 2. Identified hard skills in demand**

Discussions during the study highlighted a range of hard skills that are increasingly in demand within the industry. These skills are crucial for leveraging new technologies and ensuring that the workforce is equipped to meet future challenges:

- Computer-aided control (CAC) and hydraulics (base for implementing AI skills)
- Vision inspection and data analysis – dashboard
- Generative AI (such as ChatGPT)
- Machine learning (object detection)
- Maintenance skills of Internet of Things infrastructure.

The employer survey findings imply a transformative period for the Thai automotive industry, where adaptability to new technologies and evolving market demands is crucial. While the push towards efficiency and technology integration is prominent, there seems to be a lag in addressing workforce development to meet these new challenges, even though the business and human rights frameworks underline the need for investing in the skills of the workers and calls for businesses to take responsibility. To sustain growth and retain competitiveness, the industry may need to invest more in human capital, particularly in areas of reskilling and upskilling, to align the workforce capabilities with the upcoming technological and environmental changes.

**Figure 5. Impact factors on skill demands**

<table>
<thead>
<tr>
<th>Top impact factors</th>
<th>Significant impacts</th>
<th>New emerging jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer preferences 64%</td>
<td>Restructure supply chain 64%</td>
<td>No 53%</td>
</tr>
<tr>
<td>Trade patterns 63%</td>
<td>Diversified customer base 57%</td>
<td>Don’t know 29%</td>
</tr>
<tr>
<td>Digitalization 61%</td>
<td>Adopt new technologies 56%</td>
<td>Digital design like CAD/CAM and automation 10%</td>
</tr>
<tr>
<td>Industry 4.0 technologies 46%</td>
<td>Industry 4.0 technologies 45%</td>
<td>Electronic engineering 4%</td>
</tr>
<tr>
<td>Environmental concerns 32%</td>
<td>Increase efficiency 41%</td>
<td>Data protection (PDPA) 2%</td>
</tr>
</tbody>
</table>

**Lesser impact**

| Sustainable production 30% | Reskill workers 37% | Adopt new technologies 16% | Hire more workers 14% |
3.3 Integrating responsible business conduct into business practices

As Thailand’s automotive manufacturing sector moves towards sustainability and have advanced technology, integrating responsible business conduct principles into business practices become essential. This approach emphasizes human rights due diligence as a fundamental aspect of responsible business conduct, reflecting global standards and expectations, notably those outlined by the ILO in its Tripartite Declaration of Principles Concerning Multinational Enterprises and Social Policy. The push towards responsible business conduct standards in the world and in the ASEAN region, as exemplified by Japan’s guidelines on human rights in supply chains, signals a shift towards responsible business conduct as a standard business practice. This shift highlights the need for businesses to manage their impact on society responsibly, including labour rights, environmental protection and ethical dealings.

For Thai automotive companies, adopting responsible business conduct principles means actively engaging in practices that promote environmental stewardship, uphold labour rights and ensure ethical interactions. This commitment to responsible business conduct is intricately linked to developing and enhancing workforce skills, acknowledging that an informed and skilled workforce is crucial for navigating technological challenges and maintaining ethical business standards effectively. Responsible business conduct extends beyond compliance and embeds into the very fabric of organizational culture and operations. It entails a holistic approach to business, integrating human rights due diligence into corporate strategies to manage impacts responsibly across all aspects of operations, including labour practices, environmental sustainability and community relations.

The integration of responsible business conduct principles into business operations demands a forward-looking strategy that emphasizes continuous learning and skills development. Ensuring that employees are equipped to adapt to new technologies and methodologies is not merely a strategic advantage but a necessity in today’s fast-paced and ethically conscious market. This approach fosters a respectful and empowering work environment that meets ethical standards and enhances competitiveness and sustainability. By embedding responsible business conduct principles, including a strong focus on skills development, Thai automotive companies can better manage the complexities of international trade and meet the growing demands for transparency, accountability and ethical conduct. Demonstrating a commitment to responsible business conduct enhances a company’s reputation, builds trust with international partners and contributes to long-term business success. And neglecting skills development can have adverse outcomes, such as economic slowdowns, increased unemployment due to a shortage of workers proficient in emerging technologies, reduced productivity and decreased competitiveness for businesses.

Reflecting these policies, the National Action Plan on Business and Human Rights in Thailand also highlights the strategic importance of responsible business conduct. It points to the necessity for businesses to manage their impact on human rights proactively and to integrate this responsibility into their operations as a core business strategy. By adopting responsible business conduct practices, Thai automotive companies can better position themselves in international markets, especially where strict adherence to responsible business conduct principles is increasingly required.

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74 ILO 2022b.
76 See https://globalnaps.org/country/thailand/.
3.4 Workforce demographics and their impact on skills development

The study’s critical analysis of skills supply and demand in the Thai manufacturing subsector of the automotive sector revealed pressing needs and notable gaps that necessitate interventions. The current workforce, although skilled, is often characterized as insufficiently prepared for the rapid advancements in technology and the industry’s pivot towards more sustainable practices.

The feedback from industry stakeholders painted a picture of a workforce that is grappling with the pace of technological change. The interviews with workers revealed that those aged 40 and older find it challenging to keep up with new technologies, such as automation, robotics and advanced technology, which highlights the urgency for targeted support and transition strategies. This includes developing transition pathways that offer reskilling opportunities aligned with evolving industry needs and robust support systems, such as career counselling and job placement services tailored for older workers.

The evolving landscape of the sector calls for a nuanced approach to workforce management that recognizes the diverse needs and contributions of employees across all age groups. The consultations with the stakeholders and the inputs obtained during the qualitative data collection pointed to the following suggestions:

- **Incentivizing the older workforce**: Additional incentives should be considered for the older workforce, acknowledging their vast experience and skill set. By valuing their contribution, companies can motivate this demographic and ensure their continued engagement and productivity.

- **Promoting intergenerational teamwork**: Encouraging collaboration between different generations within the workforce can lead to enhanced diversity and sustainability. Such teamwork leverages the unique strengths and perspectives of each age group and fosters a more inclusive and dynamic work environment.

- **Recognition for learning and development**: Workers demonstrating eagerness to learn and adapt to new technologies and processes should be recognized. This acknowledgement serves as a catalyst for a culture of continuous improvement and learning and motivates others to develop and enhance their skill set.

- **Aligning skills and career development**: Aligning skills development with career advancement opportunities is essential. Tailoring training and development initiatives to match career trajectories ensures that employees are well prepared to progress and succeed in their roles.
The sector’s transition and changing demographics also necessitates a re-evaluation of social protection mechanisms to support the workforce through potential job displacements and transitions. ILO instruments highlight the need to align social security systems with skills development policies based on normative standards, including the Social Security (Minimum Standards) Convention, 1952 (No. 102) and the Social Protection Floors Recommendation, 2012 (No. 202). The ILO advocates social protection floors to ensure basic social security for all, stressing a cohesive approach that complements social security with active labour market policies, including vocational training. Enhancing access to flexible learning options that accommodate different life stages can help ease the transition for older workers, thus ensuring that they are not left behind as the sector evolves. Overall, these trends underscore the importance of continuous learning and adaptability in the workforce to meet the demands of a rapidly evolving industry, with focus on sustainability, digital transformation and effective management.

3.5 Emerging needs for soft skills and digital literacy

The study also identified substantial interest and need from both the demand and supply sides on soft skills development. In terms of the skills demanded by employers, the highly desired skill cited was teamwork, with 53 per cent of employers prioritizing this attribute. This highlights the importance of collaborative skills in the workplace and could reflect a trend towards more team-oriented project management within the industry. Analytical and data processing skills were the second-most sought after, with 43 per cent of employers looking for these capabilities, thus pointing to the increasing role of data in driving business decisions and the need for evidence-based management. Problem-solving skills were also highly valued (19 per cent), indicating that employers are looking for individuals who can navigate the complexities of the automotive industry and adapt to challenges. The need for employees who can manage a wider range of tasks (16 per cent) and have good communication skills (15 per cent) reflects the dynamic nature of roles in the industry, where versatility and clear communication are essential. Basic computer literacy and the ability to manage mechanical equipment, both at 15 per cent, indicated a baseline requirement for technical competency in the workforce. Foreign language skills were sought by 18 per cent of employers, suggesting a need for personnel who can communicate in the global business environment, which is particularly relevant for an export-oriented sector like automotive.

<table>
<thead>
<tr>
<th>Category</th>
<th>Skills needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical skills</td>
<td>Automation and robotics, advanced manufacturing technologies, electric and hybrid vehicle systems, mechatronics (including PLC and SCADA), advanced engineering skills, design and computer program proficiency</td>
</tr>
<tr>
<td>Soft skills</td>
<td>Teamwork, time management, creativity, problem-solving, communication, adaptability</td>
</tr>
<tr>
<td>Digital skills</td>
<td>Digital literacy, data analysis</td>
</tr>
<tr>
<td>Management skills</td>
<td>Leadership for sustainable practices, project management</td>
</tr>
<tr>
<td>Green jobs and sustainability skills</td>
<td>Knowledge and practices for sustainable development</td>
</tr>
</tbody>
</table>

78 ILO 2023.
When hiring, employers look for a balance between technical and soft skills. A private sector interviewee highlighted the importance of soft skills for new graduates: “For the new graduates, I want to focus more on soft skills, creativity, energy level and desire to learn more.” This underscores the trend towards a more holistic skill set in new recruits. Companies’ interview process increasingly focuses on assessing soft skills, which are crucial for adapting to the evolving workplace. Indeed, as another employer pointed out, one of the most urgent labour issues facing their company is “improving the skills of workers”.

Interviewed informants also indicated that companies should not limit soft skills training to just new hires, engineers and executives but extend it to the entire workforce. Making such training available to all levels could considerably improve the workforce’s overall skill set. There was agreement that while educational and training institutions could lay the theoretical foundations of soft skills, their practical application is best learned through hands-on experience, with Toyota’s eight-step analysis tool serving as a good example of how workers can effectively identify and solve problems. Moreover, the study’s discussions highlighted the importance of having training courses dedicated to specific soft skills, pointing to AHRDA’s Super Blue-Collar Course as a good practice, which is known for its extensive coverage of soft skills across 120 hours, as an effective way to develop a range of soft skills in the workforce.

Although they may not be categorized merely as soft skills, some cross-cutting skills also emerged as essential. These are skills for green jobs and sustainability, according to 83 per cent of Employer survey respondents. This suggests a strategic pivot towards sustainable practices within the sector and the need for leaders who can drive such initiatives. Following this strategic pivot, Mitsubishi Thailand is actively establishing a team focused on green policies, inspired by Mitsubishi Japan, to better manage energy within the organization and introduce new roles dedicated to promoting green trends. They are pioneering train-the-trainers programmes for electric vehicles, utilizing comprehensive electric vehicle toolkits that cover all necessary skills. To ensure coherence and effectiveness, training on green skills should be extended to every level of the supply chain, from those working on the shop floor to executives. The importance of green jobs in the context of global trade and their relationship to business and human rights frameworks, was emphasized in the interviews, along with the health and well-being concerns associated with pollutants from internal combustion engines. These perceptions underline the urgent need for increased awareness and proactive measures. Calls also were made for more robust support from governmental bodies, including the Ministry of Education and the Ministry of Labour, to strengthen these green initiatives and training programmes. Contrary to the industry direction, skills for green occupations seem to be the least valued by the surveyed employers and workers, thus pointing to the critical need for awareness-raising on these issues.

In addition to skills for green jobs, digital skills emerged as an important area, according to 78 per cent of the workers. This reflects the evolving nature of the workplace, which increasingly demands digital competency. The collected study data highlighted an urgent requirement for skills in mechatronics – a field that combines mechanical engineering with electronics, especially in the realms of programmable logic controller (PLC) and supervisory control and data acquisition (SCADA). These skills, often referred to as hard skills (with a digital focus), are crucial for the manufacturing subsector and possess the versatility to be transferable across various other industries.

The diversity of training interests among the surveyed workers – from robotics to sustainability – mirrored the multifaceted nature of the sector and the range of career paths it encompasses. This diversity is essential for fostering a versatile and innovative workforce capable of driving the industry forward. Reflecting this, the data also point to a balanced demand for both soft and hard skills among new recruits, with strong emphasis on team dynamics, data literacy and problem-solving abilities. This skill set combination indicates an industry that values adaptability, technical proficiency and a collaborative approach to work.
3.6 Addressing skill shortages: Recruitment practices, in-house training and cooperation with training institutions

The relevance of training to both current job responsibilities and future career goals cannot be overstated. This alignment of training with career development paths underscores the industry’s forward-thinking approach. While training is crucial for workforce advancement, employers frequently encounter budgetary constraints, insufficient equipment and scheduling conflicts that can impede effective training. These challenges necessitate innovative solutions to enhance the skills of the workforce while navigating resource limitations. Implementing various skills development measures offers a potential pathway for improvement. These skills development measures serve to actively assist workers in securing and retaining employment and improving access to better opportunities for underemployed workers.79

There was a stated preference for in-person training over online methods when dealing with complex and hands-on skills. All interviewees for this report agreed that in-person training is more effective and that online training should be used to understand basic skills. This method maximizes the benefits of direct interaction and practical experience, which are crucial components of effective learning. However, considering the cost-efficiency and the effectiveness in terms of its outreach capacity, online training methodologies were hailed as equally important and should be improved and encouraged to address skills development concerns and challenges. Similarly, the importance of on-the-job training integrated with theoretical knowledge was universally acknowledged. As one production worker emphasized, “On-the-job training is better for you to gain experience.” This approach ensures that employees can apply theoretical concepts in practical scenarios to solidify their understanding and skills.

In the employer survey findings, the primary source of new skills reported topped off with training (at 69 per cent), indicating a preference for developing talent in-house. This was followed by internal staff transfers (at 43 per cent) and recruiting trainees (at 40 per cent), suggesting that there is a blend of upskilling existing employees and bringing in new talent with the required competencies. The recruitment of already trained workers was less common (at 26 per cent), which may point to a competitive job market or a strategy to develop company-specific skills that are not readily available in the labour pool. Despite investing in the skills of their existing workforce, on one hand, a slight majority of employers (52 per cent) were actively recruiting new staff, reflecting an active job market within the industry. The employers interviewed estimated they would hire a total of 65 new staff members over the next five years, averaging between two and three new hires per employer. This suggests a moderate scale of recruitment activity, which may indicate growth or replacement in the workforce.

As for the most difficult jobs to fill, based on the data collected, mechanical engineers were the most cited as challenging to recruit, with 23 per cent of existing employees occupying these roles. This indicates a potential gap between demand and supply. Automotive engineers and designers also feature prominently, suggesting a high industry demand for technical and creative skills specific to automotive manufacturing and design.

The employer survey findings regarding recruitment challenges offer further insights. A significant 68 per cent of employers cited a shortage of applicants as a major hurdle due to a lack of qualified candidates. Required skills in high demand (50 per cent) and specialized skills short in supply (66 per cent) suggest a mismatch between the skills available in the labour market and those needed by employers.

Surveyed employers reported responding to these hurdles by implementing creative strategies, such as forming quality circles, which facilitate intergenerational learning and collaborative problem-solving among employees. A “quality circle” refers to a participatory management technique within enterprises, particularly in the workplace, where small groups of employees voluntarily come together to identify, analyse and solve

79 Karsli-Varol 2022.
work-related problems. Originating from Japanese management practices, quality circles have become a tool for improving productivity, enhancing employee skills and fostering a collaborative work environment. This approach not only encourages the sharing of knowledge while helping motivate older employees, who may otherwise struggle to adapt to new technologies. As a private sector participant insightfully remarked, “Training should be supported with complementary learning methods. One example could be to organize activities together, like a quality circle, to enable them to work together with the younger generation so they can change their mindset and how they work.” Such initiatives are crucial in fostering a culture of continuous learning and adaptability within the workforce.

There are benefits of using comprehensive training strategies that combine formal training programmes with practical, experiential learning opportunities, like the quality circle. This dual approach is key to developing a workforce that is technically proficient, adaptable and innovative. According to the ILO, training, especially when it is ongoing and evolves alongside industry demands, has a crucial role in equipping workers with the foundational knowledge and skills they need to engage effectively in more collaborative, hands-on learning environments.80

A majority of the surveyed workers reported receiving some form of training (figure 6), primarily from their current employer, which highlights the industry’s commitment to upskilling its workforce. The training provided was mostly on the job (92 per cent), which reflects the practical nature of skills development in the industry. Workers who had received formal training tended to have received an average of three different types of training. This comprehensive approach to training suggests a recognition of the complex skill sets required in the modern automotive industry.

The effectiveness of training was also evident in the comments from the interviewed workers, such as a male engineer who acknowledged that training had met the vast majority of his technical needs: “The employer allowed us to choose what training we’d like to attend so that we would have quality training according to our aptitude, which can be used to think and create projects for further development.”

Regarding the efficient addressing of skill needs, the survey findings highlighted a necessity for companies to re-evaluate their human resources development strategies. The survey findings from employers and workers suggested that approximately 50 per cent of roles lacked coverage by existing training programmes. This underscores the importance of integrating in-house training with collaborative efforts alongside training institutions. Such a dual approach may present a solution to the potential misalignment between educational institutions and industry demands, emphasizing the critical need for training programmes that are more closely aligned with actual job requirements in the real world (box 3).
Box 3. Role of educational institutions

On one hand, educational institutions need to invest more in ensuring that new graduates possess the skills demanded by the industry. This approach would alleviate the training responsibilities of companies and facilitate the transition of graduates into the workforce. The importance of updating education and training curricula to meet industry needs is required, wherein a closer collaboration between educational institutions and industry players is realized. On the other hand, the unpredictable nature of changes in the world of work makes it challenging for educational institutions to keep pace with the continuously evolving skill demands. This complexity requires policymakers to invest in developing systems capable of anticipating changes and generating information for identifying new skill needs.

The survey findings indicated a continuous collaboration with technical and vocational education and training (TVET) institutions though their shortcomings back up this solution proposal: the main types of collaboration involved receiving and guiding students (83 per cent), evaluating learning outcomes (78 per cent) and developing training curricula (67 per cent) (figure 7). Such collaborations ensure that training is relevant and that the skills taught are those required by the industry.

Figure 7. Type of training offered according to surveyed employers

Employers provided between 1 and 2 types of training, on average

For a skilled workforce, cooperation with training institutions and businesses should go beyond training delivery. The cooperation should address the various challenges in training, from outdated equipment to time constraints. This emerged as a concern during the study. As one male assembler noted, technology and equipment limitations sometimes hinder the training process: “For example, our old computer did not run certain design programs.” Another production worker summarized the unique value of practical training: “It is beneficial when I get to train with real equipment.”

Workers also voiced specific recommendations, such as updating training content to include new technologies and providing regular training “at least two times a year”, as one interviewee suggested. Training on new technologies should involve the use of digital simulation and virtual reality training, which allow workers to experience and interact with new technologies in a controlled, risk-free environment.
As Thailand’s automotive manufacturing industry navigates the transformative era characterized by rapid digitalization, the significant shift towards electric vehicles and a commitment to sustainable practices, it faces critical challenges and opportunities that will affect its strategic framework for development. This section offers an array of recommendations drawn from the study to better manage the supply-side and demand-side concerns within the industry. These recommendations propose actionable strategies for social partners and stakeholders, aimed at addressing current and future challenges in workforce and industry development and ensuring that workers’ skills align with evolving employer demands and industry standards. Recognizing the dynamic nature of the manufacturing subsector of the automotive industry, especially with the advent of electric vehicles and advancements in automation, these recommendations emphasize the importance of continuous skills development and the needs of a diverse workforce, including the ageing population and ensuring inclusivity.

4.1 Recommendations to meet employers’ demands

In response to the evolving landscape of the automotive manufacturing industry, particularly with the advent of electric vehicles and advancements in automation, this section outlines strategic recommendations to ensure that workforce skills align with current and future employer demands.
Real-time skill needs assessments

The dynamic nature of the manufacturing subsector of the automotive industry necessitates employers to regularly assess workforce skill needs. This is essential for aligning training with business objectives and industry evolution and for adhering to human rights principles in workforce management by ensuring access to lifelong learning opportunities, including but not limited to reskilling and upskilling initiatives. The ILO has also extensively documented the critical role of lifelong learning in workforce development. This includes promoting access to lifelong learning opportunities that support reskilling and upskilling initiatives, which are essential for managing skill gaps and enhancing workforce capabilities in response to changing industry requirements.81 As confirmed during the interviews, regular assessments enable employers to proactively identify and address skill gaps, thereby enhancing workforce capabilities in line with evolving industry requirements.

With these considerations, it becomes imperative for policy frameworks and mechanisms to be designed and implemented with the following objectives in mind.

- Encourage the formulation and adoption of mechanisms and policy frameworks that facilitate ongoing assessment of workforce skill needs and that reflect structural shifts within the industry. This should aim to harmonize with overarching business goals and human rights principles in workforce management.
- Highlight the significance of keeping pace with industry developments as a strategy for effectively identifying and bridging skill gaps. This approach aligns with the evolving needs of the automotive manufacturing industry and supports the broader goal of fostering a resilient and adaptable workforce.

Workforce reskilling and upskilling investments

The research clearly indicated that as the manufacturing subsector of the automotive industry, particularly the electric vehicle sector, continues to evolve, investing in reskilling and upskilling will be crucial for maintaining a workforce that is competent and competitive. Employers must prioritize training initiatives that target both new entrants and the existing senior workforce, thus ensuring their employability and bridging current skill gaps. In particular, tailored training programmes for senior workers are necessary to address the unique challenges and leverage the extensive experience this demographic brings to the automotive manufacturing sector. Additionally, fostering an environment of continuous learning and intergenerational collaboration can enhance innovation and knowledge sharing across the workforce. To echo the words of the employers during the focus group discussion, such investment is beneficial for the workforce and imperative for business sustainability and competitiveness. In response to these evolving needs, the following policies and practices are recommended to support and catalyse strategic actions.

- Encourage employers to proactively invest in reskilling and upskilling initiatives specifically designed to enhance the capabilities of both new entrants and the existing senior workforce. By addressing the prevailing skills gaps, these efforts will be fundamental in securing employability and ensuring that all members of the workforce are equipped to contribute effectively to the industry's advancement.
- Recognize the benefits of a continuously skilled workforce in maintaining the industry's competitiveness. Continuous investment in the workers' skills development is essential for their individual career progression and for maintaining the business's edge in a rapidly evolving market.
- Promote the importance of green skills, particularly in the context of the burgeoning electric vehicle market. As environmental considerations become increasingly central to automotive design and manufacturing, equipping the workforce with the necessary green skills will be key to navigating the transition towards sustainable mobility solutions.
Ageing workforce challenges

The automotive manufacturing sector’s ageing workforce presents unique challenges, especially with the rapid technological changes. As highlighted during the study, many workers leave the industry for early retirement around the age of 40–45 due to the speed of technological change. This affirms that targeted upskilling and reskilling programmes are vital to equip these workers with necessary skills, reduce their dependency on social protection systems and ensure their continued contribution to the industry's growth. The ILO also highlights the importance of integrating social protection with skills development to ensure effective transitions within the labour market. This approach facilitates the adaptation of workers to new technological realities and supports the broader goal of a human-centred future of work, where access to lifelong learning and reskilling and upskilling opportunities become cornerstones of both employment policies and the social protection system.82

To address these challenges and opportunities, it is recommended that targeted reskilling and upskilling programmes for existing workers in Thailand’s automotive manufacturing sector are embraced, focusing on navigating the challenges posed by an ageing workforce and rapid technological advancements. These initiatives should aim to equip workers with the latest skills required in the evolving automotive manufacturing landscape, thereby mitigating reliance on social protection systems. By fostering a skilled and adaptable workforce, these programmes will contribute to the sector’s sustainable growth and the broader objectives of economic resilience and worker welfare.

4.2 Enhancing the training supply side to meet evolving industry needs

To align the Thai manufacturing subsector of the automotive industry’s workforce development with the rapid pace of industry evolution and technological advancements, targeted strategies are essential for enhancing the training supply side. This encompasses addressing the diverse needs of the workforce, including those of women, people with disabilities and other disadvantaged groups and ensuring their comprehensive access to training opportunities. The following recommendations speak to these needs.

Responsible business conduct

It is crucial to integrate responsible business conduct training within the existing frameworks of workforce development. Businesses, especially the small and medium-sized enterprises (SMEs), in the automotive manufacturing sector should be encouraged to adopt responsible business conduct standards that encompass environmental stewardship and also ethical labour practices. To facilitate this, training modules specifically designed to educate on responsible business conduct principles should be developed. These modules should cover human rights, environmental impact, anti-corruption practices and community engagement. This training will help ensure that businesses comply with international standards and also become leaders in ethical business practices. To effectively promote and implement responsible business conduct within the automotive manufacturing sector, the following actions are recommended.

- Collaborate with industry experts and ethical compliance professionals to create detailed training curricula that cover responsible business conduct, including ethical sourcing, sustainable practices, labour rights and corporate responsibility towards communities and the environment.
- Encourage partnerships between automotive companies, governments at all levels and non-government organizations to promote responsible business conduct principles. These collaborations can lead to broader adoption of ethical practices and stronger enforcement of compliance standards.
- Specifically design support programmes for SMEs within the automotive manufacturing sector to adopt responsible business conduct practices. Provide them with access to training resources, consultation and possibly financial aid to help integrate the responsible business conduct principles into their operation.

82 ILO 2023.
Formal training and recognition

As indicated from the qualitative interviews, there is a mismatch between the training programmes that are being offered and the demands of the labour market. The promotion of accessible and industry-relevant formal training programmes is imperative. These programmes should cater to the current demands of the automotive manufacturing sector. Recognizing and certifying on-the-job or non-formally acquired skills is equally important because it validates the existing competencies of workers and enhances their career prospects and adaptability. It is crucial to integrate accessibility features and support mechanisms within these training programmes that are specifically tailored for individuals with disabilities. This approach ensures that all learners have equal opportunities to acquire industry-relevant skills and certifications regardless of physical or cognitive constraints. Providing adaptive learning materials, accessible facilities and personalized support services are important steps towards accommodating the diverse needs of learners, thereby fostering a more inclusive workforce capable of contributing to the automotive manufacturing sector’s growth and innovation.\(^3\) To further these objectives, the following actions are recommended.

- Advocate for the development of accessible and industry-relevant formal training programmes, including TVET and certified courses, to address the specific needs of the automotive manufacturing sector and its workforce inclusively.
- Promote the formal recognition and certification of skills acquired through on-the-job experiences or informal learning. This step is essential for acknowledging the value of diverse learning pathways and reinforcing the employability and versatility of workers in the manufacturing subsector of the automotive industry.
- Emphasize the need for comprehensive training that includes both hard and soft skills, thereby improving workers’ overall competencies and adaptability. This holistic approach to skills development is crucial for preparing the workforce to meet the dynamic challenges of the labour market effectively.
- Develop and implement training and certification programmes specifically designed for accessibility within the automotive manufacturing industry. These programmes should remove barriers for individuals with disabilities, thus ensuring that all members of the community have opportunity to contribute to and thrive within the automotive manufacturing sector.

\(^3\) Lange, Hofmann and Di Cara 2020.
Public-private partnerships

To facilitate the previous recommendation, collaborations between the public and private sectors can significantly enhance the quality and relevance of training programmes. Such partnerships can help ensure that training is demand-driven and closely aligned with the current and future needs of the industry, thereby creating a skilled workforce that effectively contributes to economic growth. They also exemplify the principle of shared responsibility that the ILO promotes for ensuring that workers have access to reskilling and upskilling opportunities. Considering this, the following actions are advised.

- Foster collaborations between the public and private sectors to develop and deliver training programmes that are directly influenced by industry demand. This collaborative effort will be instrumental in ensuring that the skills taught are immediately applicable and beneficial for both the workforce and the industry at large.
- Emphasize the critical role of these partnerships in creating a skilled and productive workforce that aligns with industry needs.
- Encourage joint ventures in research and development between academic institutions and industry to foster innovation in skills training. Such initiatives may bridge the gap between theoretical knowledge and practical application and foster a culture of continuous learning and adaptation that is vital for meeting the challenges of tomorrow's labour market.

Government support for SME training

SMEs have a crucial role in the skills development of the workforce in the manufacturing subsector of the automotive industry. A shared sentiment that emerged in the survey findings was the lack of resources available for reskilling and upskilling of workers. Government support in the form of financial incentives and tailored programmes is essential to enable SMEs to access and benefit from relevant training. Aligning these initiatives with the ILO's Paid Educational Leave Convention, 1974 (No. 140) ensures that SMEs are adequately supported in their efforts to upskill their workforce. Given this context, the following actions are recommended.

- Support from the Government in providing financial support and tailored incentives to assist SMEs in accessing relevant training. This financial backing is crucial for these enterprises to overcome barriers for training and development, thereby enhancing their competitive edge in the automotive manufacturing industry.
- Promote the integration of SMEs into formal training frameworks along with TVET systems and certification programmes to uplift the overall skill profile of the workforce. This integration ensures that the training needs of SMEs are systematically addressed and contributes to a more cohesive and capable industry workforce.
- Advocate for government policies, including financial incentives aligned with the ILO's Paid Educational Leave Convention, ensuring that SMEs receive financial aid and incentives for workforce training. This approach would facilitate access to essential skills development, particularly in evolving sectors.

Training needs of highly skilled workers

The survey findings from employers indicated a need for qualified engineers to fill the current and upcoming gap in the sector. Continuous and accessible training for highly skilled professionals, such as engineers, is vital. Lifelong learning and professional development for technical engineers are critical for adapting to technological advancements and evolving industry practices. In this light, the following strategies are recommended.

- Ensure that all skilled workers, such as engineers, have the resources they need to grow and adapt within their fields.
- Align training programmes with sector-specific demands and industry requirements and ensure that diverse groups have equal opportunities in skills development.
Emphasize the importance of lifelong learning and continuous professional development for technical engineers to adapt to technological advancements and evolving industry practices.

Trade union involvement in training

The study’s findings demonstrate a mismatch between the industry trend and current skills-development initiatives; for instance, transitions to green and electric vehicle technology is expected; however, the urgency and value of green skills are not widespread among workers. Trade unions, including enterprise representatives, could be more actively involved in facilitating access to training opportunities for workers. Their role in advocating for equitable skills development policies is crucial. And their engagement in international and regional dialogue on labour practices will enhance the adoption of fair and rights-based workforce development strategies globally. To support these objectives, the following actions are recommended.

- Encourage trade unions to take on a facilitating role in providing access to training opportunities for workers. This role is crucial for bridging the gap between workers and the training they need to advance in their careers and for ensuring that all workers have the opportunity to develop their skills and contribute more effectively to their industries.
- Invest in the capacity development of trade unions as advocates for fair and equitable skills development policies. Strengthening the advocacy skills of trade unions is key to ensuring that workers’ needs and interests are effectively represented in national and sectoral policymaking processes. This investment will empower trade unions to negotiate for policies that prioritize comprehensive and accessible training programmes and align workforce development with equitable labour practices.
- Encourage trade unions to engage in international dialogues, advocating for the global adoption of fair labour practices and rights-based workforce development strategies, in accordance with the Business and Human Rights Framework.

Rights-based \textsuperscript{84} training opportunities

Pressure to align with international standards was a main discussion point during the focus group discussion. To increase competitiveness and better align with international demands within the supply chain, developing training modules focused on rights-based approaches in the workplace is essential. Such programmes should emphasize business and human rights principles, promoting equity, inclusivity and fair treatment for all participants. This approach aligns with the global commitment to sustainable and ethical business practices. The following recommendations would support this approach.

- Explore opportunities for developing specific training modules for workers and employers that focus on understanding and implementing rights-based approaches in the workplace and that emphasize Business and Human Rights principles.
- Highlight the significance of training programmes that prioritize equity, inclusivity and fair treatment for all participants.

Enhancing inclusive workforce development

For the automotive manufacturing industry in Thailand to fully embrace the evolving global trends and technological advancements, it is crucial that skills development policies actively promote inclusivity. This means ensuring that training opportunities are accessible to everyone, including women, people with disabilities and

\textsuperscript{84} In this context, “rights-based” refers to approaches and methods that integrate the norms, standards and principles of the international human rights and international labour standards into the development, implementation and evaluation of training programmes. This perspective ensures that training emphasizes the inherent dignity of all participants, aims to meet their capacity and development needs and actively involves them in making decisions that affect their lives, thereby promoting individual empowerment and compliance with human rights standards.
other disadvantaged groups. An inclusive approach to workforce development recognizes the diverse needs within the workforce, especially in lower tiers, and seeks to remove barriers that prevent full participation in training programmes. To foster an environment in which every worker has the opportunity to thrive and contribute to the industry’s growth, the following strategies are recommended.

- Develop and implement policies that require training programmes to be designed with inclusivity at their core. This would involve tailoring content and delivery methods to accommodate the needs of diverse groups, including women and people with disabilities, ensuring they can fully participate and benefit from skills development opportunities.
- Partner with organizations that specialize in inclusivity and accessibility to refine training programmes. These collaborations can help identify and eliminate potential barriers, making training more accessible and effective for all participants.
- Raise awareness among all stakeholders about the importance of inclusivity in skills development. Advocacy efforts should highlight the benefits of a diverse and skilled workforce and the role of inclusive training in achieving this goal.
- Establish mechanisms to monitor and evaluate the inclusivity of training programmes. Feedback from diverse participants should be used to continuously improve the accessibility and relevance of training, ensuring that it meets the evolving needs of the workforce.

As Thailand’s automotive manufacturing industry undergoes the significant transformations that rapid digitalization, the increasing adoption of electric vehicles and a commitment to sustainable practices are driving, a holistic and proactive approach to workforce development becomes crucial. The recommendations offered here emphasize the need for a proactive, inclusive approach to skills development that looks to ensure that the workforce remains adept and aligned with the evolving demands of employers and industry standards.

The findings in chapter 3 highlight the necessity for continuous skills development in response to the technological advancements and shifting market demands. The transition towards electric vehicles, coupled with the integration of Industry 4.0 technologies, necessitates a workforce that is not only technically proficient yet adaptable to new tools and processes. The emphasis on responsible business conduct within business practices highlights the need for training that encompasses ethical standards and human rights so that all levels of the workforce can navigate the complexities of a globally connected market. Additionally, the demographic shifts within the workforce, particularly the challenges faced by older employees, and the differing skills exposure across generations, call for targeted training programmes. These programmes should foster intergenerational collaboration and leverage the rich experience of older workers while enhancing digital literacy and soft skills across the board. Such an inclusive approach to skills development will ensure that all employees can remain productive and engaged as the industry evolves. The critical demand for soft skills and digital literacy reflects the industry’s move towards more sophisticated and integrated operations. Employees must excel in interpersonal communication, problem-solving and teamwork to thrive in the technologically complex environments.

Addressing these emerging needs through comprehensive and continuous training programmes will improve individual and organizational performance and also support the industry’s competitiveness in the global market. Finally, addressing the skill shortages through effective recruitment, robust in-house training and strategic partnerships with educational institutions is essential for developing a skilled workforce that can deliver on current and future demands. The collaboration between the public and private sectors along with support from government policies are vital for fostering an ecosystem conducive to ongoing learning and development.

As the automotive manufacturing sector continues to adapt to these significant shifts, following through on the recommendations will be prudent for ensuring the industry’s sustainable growth and resilience. By fostering a skilled, adaptable and ethically grounded workforce, Thailand can maintain its competitive edge in the global automotive market and contribute positively to the broader economic and social fabric of the nation.
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## Annex 1. Courses and seminars provided by organizations and institutes in Thailand

<table>
<thead>
<tr>
<th>No.</th>
<th>Institution</th>
<th>Course or seminar offered</th>
<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.</td>
<td>Thailand Professional Qualification Institute (public organization)</td>
<td>- Auto Body Repair Levels 1–4&lt;br&gt;- Car Painting Levels 1–4&lt;br&gt;- Automotive mechatronics Level 3</td>
<td><a href="https://e-training.tpqi.go.th/">https://e-training.tpqi.go.th/</a></td>
</tr>
</tbody>
</table>
## Annex 2. Types of collaboration in Thailand

<table>
<thead>
<tr>
<th>No.</th>
<th>Title and link</th>
<th>Year</th>
<th>Collaboration</th>
<th>Activities</th>
</tr>
</thead>
</table>
| 1. | ศูนย์พัฒนาและรับรองทักษะกำาลังแรงงานสาขาช่างซ่อมตัวถังและสีรถยนต์ เพื่อรองรับการขยายตัวอุตสาหกรรมยานยนต์ และการเจรจาอุตสาหกรรม 4.0 | 2018 | Ministry of Labour and Toyota Motor Thailand Co., Ltd. | 1. Training programmes that elevate technical expertise in basic automotive body repair, expanding the knowledge and dissemination to the workforce.  
2. Share knowledge with the workforce; collaborative efforts are made to organize training and conduct skills standard testing for the national labour force in various fields, such as automotive body repair technicians, automotive painters, distance inspectors and other related disciplines. |
| 2. | องค์การร่วมกับกระทรวงแรงงานเปิดหลักสูตรระยะสั้นผลิตกำาลังคนอาชีวศึกษาสาขานำหน้าผลิตชิ้นส่วนยานยนต์ | 2017 | Ministry of Labour and Committee of Public–Private Partnership for Vocational Education and Workforce Development | 1. Specialized personnel and instructors with expertise in various professional fields and the development of industry trainers in the workplace, following the vocational and cooperative education model.  
2. Develop the curriculum for vocational education management in Science Foundation Schools at the certificate level (Vocational Certificate 1–3), where students will continue their studies at the university upon completion and to accommodate students entering the sixth grade of primary school in the professional track.  
3. Develop vocational students at each educational level, ensuring that their abilities in communication, English language proficiency, technology and ethics are prepared for entering the workforce in accordance with the policies set by the Ministry of Education, whereby students are expected to be “diligent, eager to learn and possess good moral character”, including learning about Thai national history and more. |
<table>
<thead>
<tr>
<th>No.</th>
<th>Title and link</th>
<th>Year</th>
<th>Collaboration</th>
<th>Activities</th>
</tr>
</thead>
</table>
| 3.  | 3 กระทรวงฯ ผนึกกำลังพัฒนาบุคลากรด้านยานยนต์สมัยใหม่ ยกระดับขีดความสามารถการแข่งขัน ภาคอุตสาหกรรม | 2020 | Ministry of Industry, Ministry of Education, and Ministry of Higher Education, Science, Research and Innovation (National Science and Technology Development Agency) | 1. Foster collaboration in analysing and synthesizing advanced vocational and academic skills, establishing professional qualification frameworks, curriculum guidelines, and teaching management to develop a skilled and advanced workforce aligned with the development of the new automotive industry.  
2. Promote and support academic activities for teachers, instructors, students and relevant individuals and aimed at enhancing skills to meet the demands of new investments in the automotive industry.  
3. Create a centralized platform for exchange between industrial and educational institutions, serving as a central database for workforce quantity and skills gap information in the new automotive industry. |
2. Eastern Economic Corridor model type B: Short-course training to add workforce instantly with 50:50 public and private cost-sharing. |
| 5.  | Mitsubishi Motors Thailand uplifts vocational students’ skills | 2021 | Engines from various Mitsubishi Motors models, such as Triton, Pajero, Mirage, Attrage and Outlander plug-in hybrid electric vehicles are donated to the Automotive Center of Excellence (Chonburi Technical College) to uplift the vocational students' skills to cultivate hands-on skills and experience through a study with the real engines. |
| 6.  | Automotive and Advanced Transportation Engineering: A2TE | | A master's degree programme in automotive engineering was established jointly to produce highly qualified engineers. |
Annex 3. Eastern Economic Corridor Model type A and type B

**Type A:** A course that earns a degree or professional certificate (vocational). The goal is answering industry needs and developing personnel for the industry in the long term.

**Type B:** Short-term training to reskill or upskill to keep pace with new technological changes.

### Eastern Economic Corridor model type A
**Model:** Educational institutions and entrepreneurs closely collaborate to provide programmes

<table>
<thead>
<tr>
<th>Institution</th>
<th>Number of students</th>
<th>Examples of collaboration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher education institutions</td>
<td>120</td>
<td>Robotic Industry Programme, Rajamangala University of Technology Tawan-ok</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Future Automotive Industry Programme, Rajamangala University of Technology Tawan-ok</td>
</tr>
<tr>
<td>Vocational schools</td>
<td>3 471</td>
<td>Smart Electronic Programme, Bankhai Technical College</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Future Automotive Industry Programme, Chonburi Technical College</td>
</tr>
<tr>
<td>Private institutes</td>
<td>1 069</td>
<td>Merchant Marine Industry Programme, Asian Maritime Technological College</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Future Automotive Industry Programme, Eastern Technological College</td>
</tr>
</tbody>
</table>

### Eastern Economic Corridor model type B
**Model:** Short-course training with 50:50 public and private cost-sharing

<table>
<thead>
<tr>
<th>Courses</th>
<th>Number of courses</th>
<th>Number of workers trained</th>
<th>Institutions and companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robotics industry</td>
<td>54</td>
<td>212</td>
<td>Burapha University, Energy Absolute Public Company Limited, Rajamangala University of Technology Tawan-ok and Somboon Group</td>
</tr>
<tr>
<td>Future automotive industry</td>
<td>25</td>
<td>3 520</td>
<td>Burapha University, Energy Absolute Public Company Limited, Rajamangala University of Technology Tawan-ok and Somboon Group</td>
</tr>
<tr>
<td>Smart electronics industry</td>
<td>4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The goal is to develop personnel in the industrial sector to support new technologies.

### Period: 2018–20

<table>
<thead>
<tr>
<th>Eastern Economic Corridor model type</th>
<th>Total amount of trained students</th>
<th>Number of trained students in next-generation automotive</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>4 660</td>
<td>1 511</td>
<td>32.4</td>
</tr>
<tr>
<td>B</td>
<td>3 732</td>
<td>3 520</td>
<td>94.3</td>
</tr>
</tbody>
</table>
Annex 4. terms and definitions

Electric vehicle: An electric vehicle can be powered by an electric motor that draws electricity from a battery (all-electric vehicle) and is capable of being charged from an external source. Or it is a vehicle that can be powered by an electric motor that draws electricity from a battery and by an internal combustion engine (plug-in hybrid electric vehicle).

Skill: The ability to carry out the tasks and duties of a given job. Skill level is a function of an occupation's complexity and range of tasks and duties.

Soft skills: Core competencies with capabilities that are important for success in employment and life. Other terms used for soft skills include competencies, essential skills, transferable competencies, employability skills or core skills. Employers increasingly seek these skills. Soft skills are built through primary education, such as reading and writing, acquiring the technical skills needed to perform specific duties and professional and personal attributes, such as honesty, reliability, punctuality, attendance and loyalty. Soft skills are categorized under four broad headings: learning to learn, communication, teamwork and problem-solving.

High-skill labour: This type of work typically involves the performance of complex technical and practical tasks that require an extensive body of factual, technical and procedural knowledge in a specialized field. Examples of specific tasks performed include: (a) ensuring compliance with health, safety and related regulations; (b) preparing detailed estimates of quantities and costs of materials and labour required for particular projects; (c) coordinating, supervising, controlling and scheduling the activities of other workers; and (d) performing technical functions in support of professionals. Occupations at this skill level generally require a high level of literacy, numeracy and well-developed interpersonal communication skills. These skills may include understanding complex written materials, preparing a factual report and communicating verbally under challenging circumstances.

Semi-skill labour: This type of work typically involves the performance of such tasks as: (a) operating machinery and electronic equipment; (b) driving vehicles; (c) maintenance and repair of electrical and mechanical equipment; and (d) manipulation, ordering and storage of information. For almost all occupations, the ability to read information such as safety instructions to make written records of work completed and accurately perform simple arithmetical calculations are essential. Many occupations at this skill level require relatively advanced literacy, numeracy and good interpersonal communication skills. In some occupations, these skills are necessary for a major part of the work.

Low-skill labour: This type of work typically involves the performance of simple and routine physical or manual tasks. It may require handheld tools, such as shovels, or simple electrical equipment, such as vacuum cleaners. It involves such tasks as cleaning, digging, lifting and carrying materials by hand, sorting, storing or assembling goods by hand (sometimes in the context of mechanized operations) and operating non-motorized vehicles. Many occupations may require physical strength and/or endurance.

Motor vehicle: A motor vehicle is a self-propelled road vehicle designed to carry passengers or goods. It typically includes automobiles, trucks and buses and operates on internal combustion engines or electric motors.

Passenger vehicle: A passenger vehicle is designed primarily for the transportation of passengers. It includes sedans, hatchbacks, SUVs and minivans, usually seating between two and nine occupants.

Commercial vehicle: A commercial vehicle is a type of motor vehicle used for transporting goods or paid passengers. This category includes trucks, vans, coaches, buses, taxis, and other vehicles used specifically for business and revenue-generating purposes.
Definition of terms used for automotive manufacturing supply chain

**Original equipment manufacturer (OEM):** A company that produce parts and equipment that may be marketed by another manufacturer. In the automotive industry, OEM refers to the company that manufactures the final vehicle, such as Ford, Mazda and Nissan, because they use parts from various other manufacturers.

**Tier 1 supplier:** A tier 1 supplier is a company that directly supplies components or modules or subsystems to the OEM. These suppliers usually specialize in certain areas, such as engines, transmissions or interior systems, and have direct relationships with the automotive manufacturers. Examples of specialization areas for tier 1 suppliers include powertrain solutions, thermal systems, electrical drives, car multimedia, electronics, chassis and interior and braking systems as well as specific components like seating, driving assistant systems, cockpits and door systems.

**Tier 2 supplier:** A tier 2 supplier is a company that provides parts subsystems or materials to a tier 1 supplier. They typically specialize in more specific parts or materials that tier 1 suppliers then use to manufacture the subsystems or components needed by the OEM. Examples of such specializations could include fasteners, electrical wiring harnesses, rubber seals, plastic mouldings, steel or aluminium components and various types of sensors.

**Tier 3 supplier:** A tier 3 supplier is a company that provides (semi) raw materials or basic components to tier 2 suppliers. They are often involved in the initial stages of the manufacturing process, providing essential materials that are subsequently used in the production of more complex parts and systems. Examples of the types of raw materials or basic components they supply include nuts and bolts, wiring for harnesses, switches, rubber for seals or sheet metal.

Definition of terms used for education qualifications

**Formal education:** Education that is institutionalized, intentional and planned through public organizations and recognized private bodies and – in their totality – constitutes the formal education system of a country. Thus, formal education programmes are recognized by the relevant national education authorities or equivalent authorities, for example, any other institution cooperating with the national or subnational education authorities. Formal education consists mainly of initial education. Vocational education, special needs education and some parts of adult education are often recognized as part of the formal education system.

**Non-formal education and training:** Education that is institutionalized, intentional and planned by an education provider. The defining characteristic of non-formal education is that it is an addition to, alternative to and/or complement to formal education within the lifelong learning process of individuals. It is often provided to guarantee all the rights to access education. It caters to people of all ages but does not necessarily apply a continuous pathway structure. It may be short in duration and/or low-intensity, and it is typically provided in short courses, workshops or seminars. Non-formal education mostly leads to qualifications not recognized as formal or equivalent to formal qualifications by the relevant national or subnational education authorities or to no qualifications at all.

**Informal learning:** Forms of learning that are intentional or deliberate but are not institutionalized. It is consequently less organized and less structured than formal or non-formal education. Informal learning may include learning activities in the family, workplace, local community and daily life on a self-directed, family-directed or socially directed basis. Like formal and non-formal education, informal learning can be distinguished from incidental or random.
Definition of terms used for skill landscape

**Skill mismatch:** An encompassing term referring to different types of skill gaps and imbalances such as overeducation, undereducation, overqualification, underqualification, over-skilling, skill shortages and surpluses, skills obsolescence and so forth. Hence, skill mismatch can be qualitative and quantitative, thus referring to situations where a person does not meet the job requirements and when there is a shortage or surplus of persons with a specific skill. Skill mismatch can be identified at various levels from the individual, the employer, the sector or the economy. Several types of skill mismatches can coincide.

**Skill needs anticipation:** There is no uniform definition of skill needs anticipation. It usually refers to any forward-looking diagnostics of skill needs expected on future labour markets performed by any method, be it quantitative or qualitative, including interaction, exchange and signalling between labour market actors.

**Skill needs forecasting:** There is no uniform definition of skill needs forecasting. It is often used in a common sense of “predicting” skill needs. In technocratic circles, however, the term usually refers to medium- or long-term employment projections based on econometric models that quantify employment outlook by industry and occupation.

**Skill obsolescence:** Skills previously used in a job are no longer required or are less important.

**Skill shortage:** An overarching term that refers to both skill gaps and labour shortages. It is a genuine lack of adequately skilled individuals available in the accessible labour market with the type of skill being sought and which leads to difficulty in recruitment.

**Skill surplus:** Occurs when the supply of a particular type of skill exceeds the demand of people with that skill.

**Skill:** Ability to carry out a manual or mental activity acquired through learning and practice. The term “skills” is an overarching term for the knowledge, competence and experience needed to perform a specific task or job.

**Skills development:** Understood broadly to mean basic education, initial training and lifelong learning.

**Skills foresight studies:** Typically multidisciplinary qualitative and quantitative analyses that assume that alternative futures are possible. Foresight studies may include alternative scenarios. Foresight activities may also consider the actions that should be taken to shape the future.

**Skills gaps:** Describes the qualitative mismatch between the supply or availability of human resources and the requirements of the labour market. Skills gaps exist where employers think that their existing workforce has inadequate skill types or levels to meet their business objectives or where new entrants to the labour market are apparently trained and qualified for occupations but still lack a variety of the skills required.

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85 DTI, ÖSB and IER 2010.
86 ibid.
87 NSTF 1998.
88 EEO 2001b.
89 NSTF 1998.
90 DTI, ÖSB and IER, 2010.
91 Adapted from ILO 2006.
92 ILO 2000.
93 DTI, ÖSB and IER 2010.
94 NSTF 1998.
Navigating transformational changes and transitions

Advancing social justice, promoting decent work