Harnessing AI: Transforming Southeast Asia's workforce

In collaboration with Access Partnership
January 2025

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The employment landscape in Southeast Asia has experienced significant shifts in recent years. Emerging technologies, especially artificial intelligence (AI) and generative artificial intelligence (GAI), are poised to bring about even more profound changes at an unprecedented rate.

By 2030, AI has the potential to add approximately US$1 trillion to Southeast Asia's combined GDP.[1] This is estimated to represent a 13% uplift to the overall GDP for the year. To fully harness the AI opportunity, an AI-ready workforce will be critical for Southeast Asia.

This report utilizes anonymized and aggregated data from the LinkedIn platform in 2024, which serves over a billion members worldwide, to examine the impact of AI on the Southeast Asian economy and workforce. The report also leverages publicly available data and labor force surveys to analyze the regional impact of AI.

The report covers six Southeast Asian countries – Indonesia, Malaysia, Philippines, Singapore, Thailand and Vietnam.

The first chapter, "The AI talent landscape", evaluates the adoption of specialized technical skills necessary for developing and implementing AI technologies among Southeast Asian workers. The second chapter, "The impact of GAI on Southeast Asia's workforce", explores the jobs, demographic groups, and industries that will undergo the most significant transformations as GAI adoption accelerates.

In the third chapter, "The current educational landscape", we analyze secondary sources to find that current workforce development approaches are insufficient to harness the AI opportunity. In the final chapter, "A skills-based roadmap for an AI economy", we offer a set of policy recommendations, anchored in a skills-based approach, to unlock opportunities and shape AI into a powerful leveler for the region.

We believe that by breaking down talent pools, jobs, and industries into the specific skills they are composed of, we can gather actionable insights that will inform policies, programs, and investment decisions. This approach is critical to fully harness the transformative power of AI in the region.

Key findings

Southeast Asia's AI talent is growing, but still small

In the six Southeast Asian countries covered in this report, the proportion of AI talent has tripled between 2016 and 2024. The compounded annual growth rate was between 5% and 17%. However, much of the region's AI talent is small compared to other emerging and high-income countries.

There is a strong demand for AI talent across the region

Between 2021 and 2023, the number of job postings that mention AI or GAI increased by over 2.4 times. Applications to these jobs increased by 1.7 times. This indicates a growing demand for AI talent, as well as a growing worker interest in these roles.

The adoption of AI technologies, including Generative AI (GAI) is accelerating the move towards a skills-based labor market

Between 2016 and 2024, the skill profile of any given job has changed by as much as 40%. With GAI adoption, we expect the pace of skill changes to accelerate by as much as 72% by 2030. This means that the skill composition of jobs will look drastically different. This calls for an urgent focus on skilling the region's workforce.

While most jobs will require skills that can be performed by GAI technologies, not every job will be affected the same way

This study estimates that 57% of all job roles in Southeast Asia could be augmented or disrupted by GAI. This will potentially impact around 164m workers in the six Southeast Asian countries.

There will likely be a disproportionate impact of AI on women and younger workers

Women and younger workers are likely to be disproportionately impacted by GAI. Jobs that are expected to be disrupted by AI and tend to be held by women include medical clerk, customer service representative, and sales operation assistant. In the short-term, younger workers may be disproportionately impacted by GAI. Almost 80% of Gen Z workers in some countries could see GAI augmenting or disrupting their roles.

Current training and educational approaches are not sufficient to meet needs of a changing labor market

Other studies find that the region lacks foundational digital skills and more advanced technical skills. For example, only 8% of Indonesia's youth are enrolled in Science, Technology, Engineering and Mathematics (STEM) university programs, while 57% of youth are not enrolled in any degree program.

A skills-based approach to workforce development is critical to harness the AI opportunity

The significant gaps faced by current training and educational programs suggest that a new approach is necessary. Through a skills-based approach, talent pools can expand by as much as 9 times in Southeast Asia. The approach also increases opportunities for women and workers without university degrees.

As GAI continues to rapidly change skill composition of jobs, upskilling the workforce through shorter and just-in-time, modular skilling programmes can prepare the workforce for these opportunities.

Chapter 1: The AI talent landscape

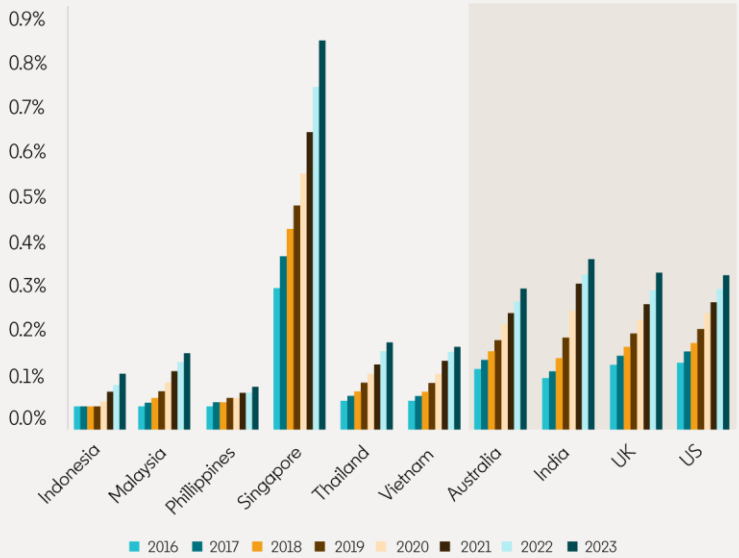
Key definitions

AI skills: There are over 41,000 standardized skills in LinkedIn's skills taxonomy, of which more than 100 have been designated by experts as AI skills. Examples include machine learning, natural language, and deep learning.

AI talent: This group consists of members who are or have been employed in an AI job (like machine learning engineer, for example) or list at least two AI skills on their LinkedIn profiles.

Southeast Asia's AI talent pool is growing but remains small. The proportion of AI talent – "AI talent concentration" – has tripled across Southeast Asia. As of January 2024, the regional AI talent concentration was 0.32%. Singapore has the highest rate of members who have added AI skills between 2016 and 2024. However, when compared with other high-income and emerging markets, the region's AI talent concentration is lower.

AI talent concentration, 2016-2023, %, selected countries



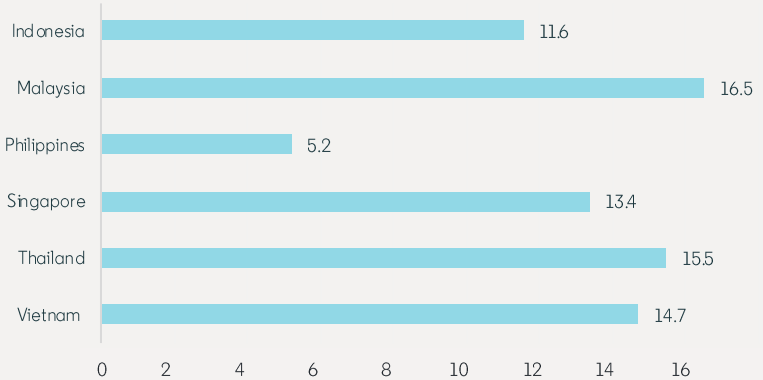
Source: LinkedIn Economic Graph

Key definitions

AI talent concentration: This measures the share of LinkedIn members classified as AI talent. By indexing to a baseline year, we can compare growth across countries.

Southeast Asian workers are increasingly building skills and experience to tap onto the economic opportunity presented by AI. AI talent concentration has grown between 5% and 17% annually between 2016 and 2024. This growth may also be a result of AI skill development plans and policies across the region.

AI talent concentration
Compounded Annual Growth Rate (CAGR), 2016-2024, %



Source: LinkedIn Economic Graph and Access Partnership

AI-related skill development programs

Across Southeast Asia, governments have developed plans and programs to develop AI talent. Examples include Indonesia's Stranas KA, Philippine's Philippine Development Plan, and Singapore's National AI Strategy 2.0.

Indonesia: One of the key missions in Indonesia's Stranas KA (Strategi Nasional Kecerdasan Artifisial) is to develop a remarkable generation of AI talents. Indonesia aims to equip these AI talents with comprehensive training and education, empowering them to excel amidst global competition.[2]

Philippines: The Philippine Development Plan 2023-2028 sets out the policy groundwork to support economic development in the Philippines by embracing digitalization and upskilling the workforce. The plan also advocates for digital training programs in areas such as advanced manufacturing, AI, and blockchain.[3]

Singapore: Singapore's National AI Strategy 2.0 serves as a vision for Singapore to be a place where AI serves as a force for good, and where AI can be harnessed to uplift and empower its people and businesses. Part of this strategy is a strong focus on people and communities. Specifically, it aims to boost the pool of tech workers with the skillsets to create, implement, and deploy AI systems, models, and algorithms to 15,000 by scaling up AI-specific training programs, technology and AI talent pipelines, and remaining open to global tech talent.[4]

Key definitions

Fastest growing AI skills: This is a list of skills that experienced the fastest growth in terms of being added by members as compared to the previous year.

Machine Learning and Deep Learning have emerged as top AI skills in LinkedIn profiles globally. Across the globe, top AI skills that LinkedIn members are adding to their profiles include highly technical skills such as Machine Learning, Deep Learning, Natural Language Processing, and Computer Vision. As the pool of skilled AI talent in the Southeast Asia expands, it is crucial for workers to ensure their AI technical competencies remain globally competitive.

Top AI skills in LinkedIn member profiles globally, 2023

1	Machine Learning
2	Artificial Intelligence (AI)
3	Deep Learning
4	Natural Language Processing (NLP)
5	Computer Vision
6	TensorFlow
7	Image Processing
8	PyTorch
9	Scikit-Learn
10	Predictive Modeling
11	Neural Networks
12	OpenCV
13	Keras
14	Artificial Neural Networks
15	Pattern Recognition
16	Convolutional Neural Networks (CNN)
17	Generative AI
18	Reinforcement Learning
19	Microsoft Azure Machine Learning
20	Algorithm Development

Source: LinkedIn Economic Graph

There is a growing demand for AI talent in Southeast Asia. We've seen a 2.4x increase in job posts mentioning AI or Generative AI (GAI) and a 1.7x increase in applications for jobs mentioning AI or GAI over the past two years. This surge reflects the region's growing recognition of AI's transformative potential and the increasing demand for AI-related skills across various industries, including finance, healthcare, manufacturing, logistics, and retail.

Between August 2021 – July 2023

2.4x

Job postings mentioning AI or GAI increased by 2.4 times across Southeast Asia

1.7x

Applications for jobs mentioning AI or GAI increased by 1.7 times across Southeast Asia

Source: "Global Talent Trends 2024: Southeast Asia", LinkedIn Talent Solutions

The region's AI talent supply and demand is gaining momentum

Insights from the LinkedIn platform indicate that while the region's AI talent pool supply remains relatively small, it is expanding.This growth aligns with the increasing employer demand for AI skills and supported by regional skill development initiatives and policies aimed at harnessing the economic opportunities presented by AI.

The increase in demand and supply also reflects the region's growing recognition of AI's transformative potential. Industries like finance, healthcare, manufacturing, logistics, and retail see the fastest growth in demand. As the talent pool expands, it is crucial for workers to stay competitive globally by developing key AI skills such as Machine Learning, Deep Learning, and Natural Language Processing.

> To realize the full promise of AI productivity gains depends on the diffusion of skills across geographies, industries, and talent. AI adoption and optimization of its use will of course take time, but at this early stage it appears that the pace of diffusion is getting underway.
> The brightest global economic outcome is one where innovation can scale borders and boost productivity growth for all.

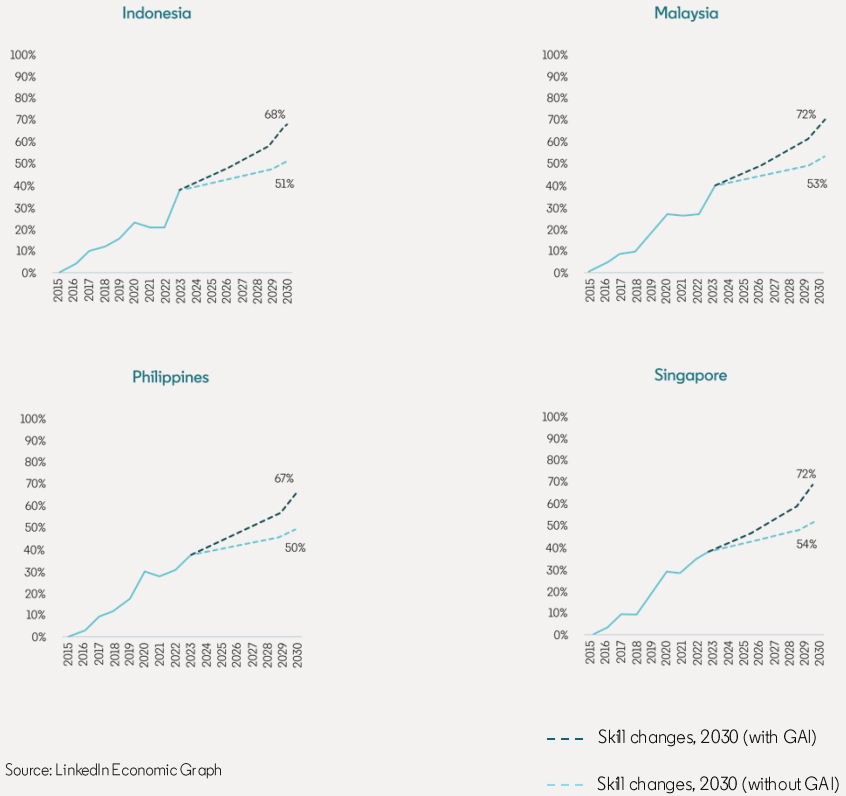
Karin Kimbrough
LinkedIn Chief Economist

Chapter 2: The impact of GAI on Southeast Asia's workforce

Given its potential to perform tasks and enhance human productivity, GAI is poised to have a profound impact on the global workforce. GAI is a technology that uses AI models to create new content. GAI can write text, compose music, design visuals, and perform other functions that were, until recently, the sole domain of humans. At the same time, GAI can also boost human productivity and efficiency—driving a growing number of employees and organisations to experiment with it.

The skills that workers need are always in flux, but GAI will likely accelerate this movement. Between 2015-2023, skills needed for a given job changed by ~40% across the region. With GAI adoption, we expect the pace of skill changes to accelerate by as much as 72%. In a scenario with no GAI impact, skills used to do a given job will change by 51% by 2030 in Indonesia. With GAI, this is expected to increase to 68%.

Percentage change in worker skills, with or without GAI impact (indexed to 2015), %



Source: LinkedIn Economic Graph

While most jobs will require skills that can be performed by GAI technologies, not every job will be affected the same way. To assess how GAI is likely to affect different segments of Southeast Asia's workforce, we developed a framework based on LinkedIn's taxonomy of over 41,000 skills. By analyzing data on the skills listed by LinkedIn members through the lens of GAI's evolving capabilities, we identified:

- The roles, population segments, and industries that rely most heavily on skills that GAI is likely to replicate—potentially increasing the urgency of reskilling, upskilling, and other future-proofing efforts.

- The segments that stand to benefit the most from investing in skill-building efforts that 1) boost workers' ability to leverage AI technologies, and/or 2) strengthen employees' skills in areas that are unique to humans and will remain important.

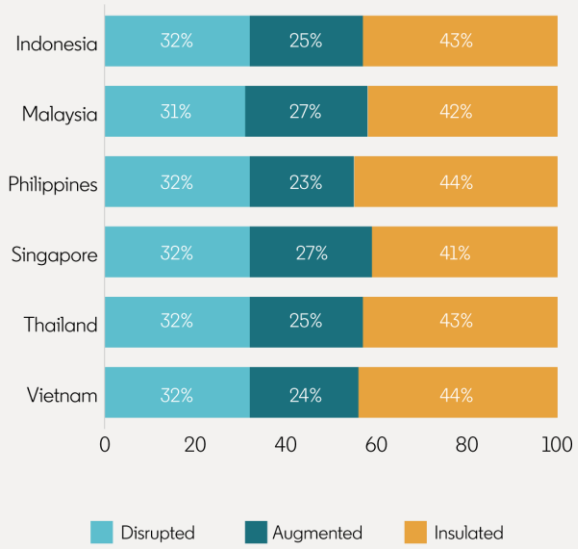
We estimate that as much as 57% of workers in Southeast Asia will see their jobs change due to GAI.
We have grouped occupations into three categories, based on skill composition.

Augmented by GAI. These jobs require a significant share of both GAI-replicable and people skills. Data analysts, for example, can use GAI to automate the computation and interpretation of metrics— allowing them to focus on complementary people skills like cross-functional influencing and stakeholder engagement. **Our analysis suggests that between 23-27% of Southeast Asia's LinkedIn members are in occupations that could be augmented by GAI.**

Disrupted by GAI. These jobs require a large share of GAI-replicable skills but a relatively low share of people skills—meaning that those who hold them will likely need to adapt their skills relatively quickly. Language translators, for example, may shift from doing translations from scratch to reviewing and certifying machine-generated translations, or to specializing in, for example, legal or literacy domains that require more nuance. **We estimate that between 31-32% of Southeast Asia's LinkedIn members are in jobs that could be disrupted by GAI.**

Insulated from GAI. These jobs require a relatively small share of GAI-replicable skills. Real estate agents, for example, might use GAI to write enticing descriptions of houses—but their relationship management skills are unlikely to be replicated by GAI. Some jobs in this category may be susceptible to other forms of automation, like robotics. **This study estimates that between 41-44% of Southeast Asia's LinkedIn members are in jobs that are insulated by GAI.**

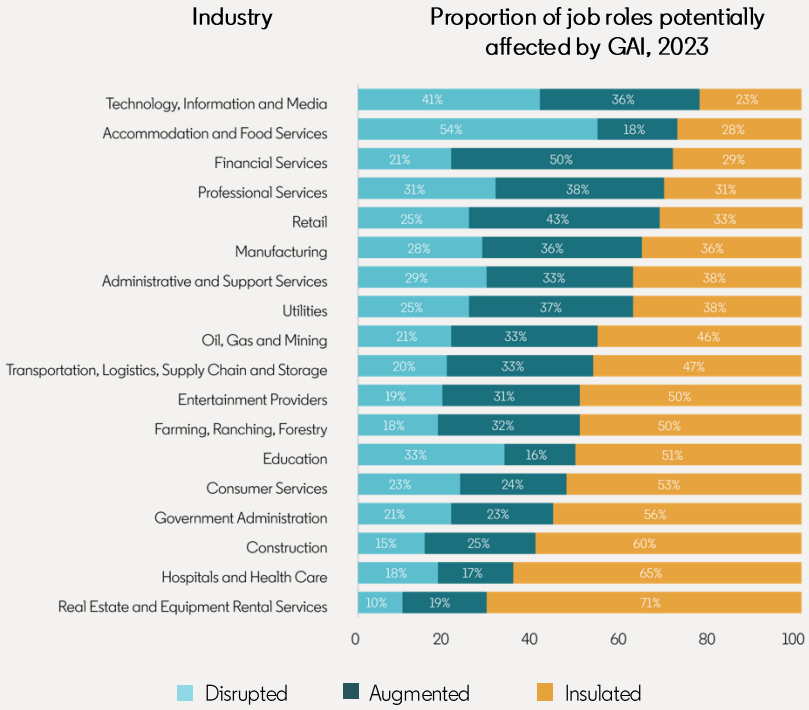
Baseline potential impact of GAI on job roles, 2023



Source: Access Partnership
Note: Analysis based on LinkedIn Economic Graph and ILOSTAT database. The error range for the above results is estimated at +/-5%. These shares were calculated based on LinkedIn Economic Graph analysis of GAI by industry (global). See methodology for further notes.

Industry lens

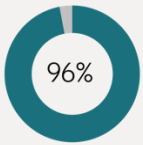
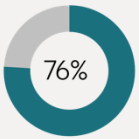
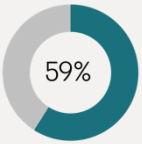
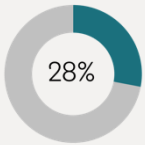
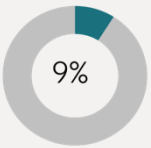
As GAI evolves and adoption increases, jobs across all sectors are likely to change. While the Technology sector has moved more quickly than others to amass AI talent, GAI's impact will extend well beyond the tech world. Our analysis estimates that in Southeast Asia, around 164 m job roles (~57% of all roles) may be impacted by GAI.



Estimated number of job roles potentially impacted across Southeast Asia	164 million

Source: LinkedIn Economic Graph, ILOSTAT, Access Partnership

The potential impact on GAI on different industries and job roles will vary widely

	Software Engineer	Customer Service Rep	Cashier	Project manager	Driver
% of skills potentially augmentable by GAI					
Skills that could be partly performed by GAI	Jenkins, Docker Products, AngularJS, TypeScript, Git	Phone Etiquette, Typing, Customer Support	Food Service Planning, Merchandising	Scrum, Submittals, Software Development Life Cycle (SDLC), Agile Methodologies, Agile Project Management	Warehouse Operations, Logistics Management, Freight Transportation Planning
People / Specialized Skills	Jira, Agile Methodologies, Microsoft Azure	Warranties, Food and Beverage Operations, Stocking, Hospitality Service, Dispatching	Stocking, Fast Food, Waiting Tables, Food and Beverage Operations	Construction Management, Project Estimation, Pre-Construction, Value Engineering, Change Orders	Truck Driving, Professional Driving, CDL Class A, CDL, Commercial Driving

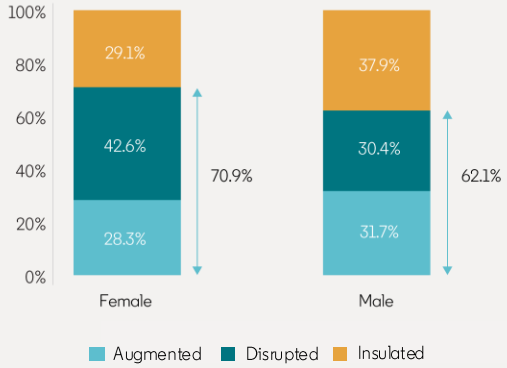
Source: LinkedIn Economic Graph

Demographics lens

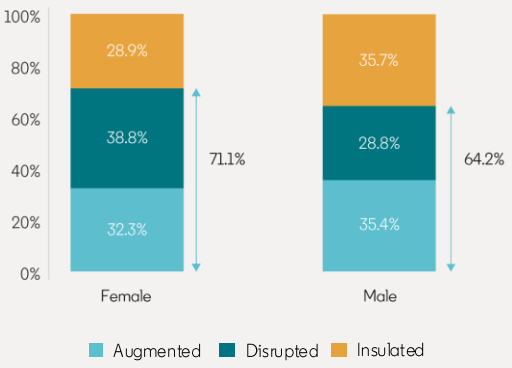
Historically, women tend to be overrepresented in certain types of jobs, and many of these jobs stand to change due to new technologies. Jobs that are likely to be disrupted by AI and tend to be held by women include medical clerk, customer service representative and sales operation assistant. In Indonesia and Singapore, over 70% of women are in roles that may be augmented or disrupted by GAI, compared with 62-64% of men.

In the short-term, younger workers may be disproportionately impacted by GAI. Between 73% and 76% of Gen Z workers in Indonesia and Singapore respectively are in job roles that may be augmented or disrupted by GAI.

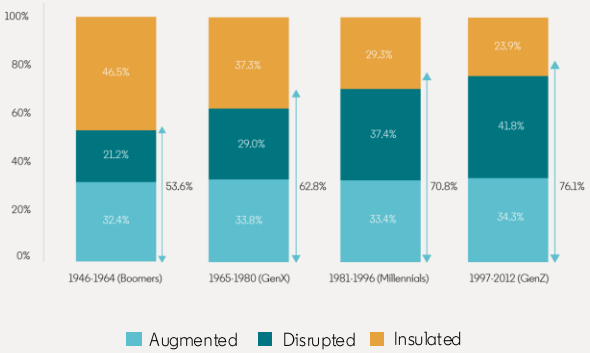
Proportion of job roles potentially affected by GAI, by gender, Indonesia



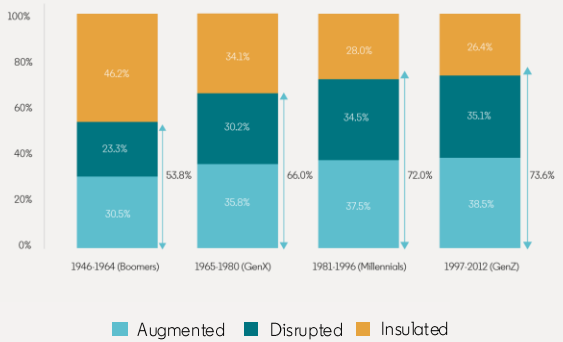
Proportion of job roles potentially affected by GAI, by gender, Singapore



Proportion of job roles potentially affected by GAI, by generation, Indonesia



Proportion of job roles potentially affected by GAI, by generation, Singapore



Source: LinkedIn Economic Graph
Note: Data not available for Malaysia, Philippines, Thailand, and Vietnam.

As GAI transforms jobs, people skills will become increasingly valued by employers. The demand for people skills is already growing. Communication emerged as the most in-demand skill by employers across Southeast Asian countries in 2024 while Leadership was within the top five most in-demand skills across most countries.

Most in-demand skills across selected Southeast Asian countries, 2024

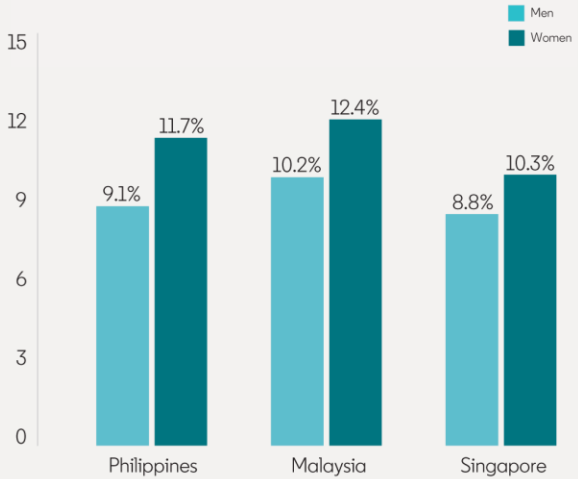
Communication and people skills

Rank	Indonesia	Malaysia	Philippines	Singapore	Thailand	Vietnam
1	Communication	Communication	Communication	Communication	Communication	Communication
2	Analytical Skills	Analytical Skills	Analytical Skills	Project Management	Analytical Skills	Analytical skills
3	Leadership	Project Management	Customer Service	Analytical Skills	Project Management	Teamwork
4	Project Management	Leadership	Project Management	Leadership	Management	Problem solving
5	Management	Management	Leadership	Management	Leadership	Project Management
6	Marketing	Problem Solving	Problem Solving	Customer Service	Marketing	Leadership
7	Teamwork	Customer Service	Management	Sales	Problem Solving	Sales
8	Problem Solving	Teamwork	Sales	Problem Solving	Customer Service	Management
9	Negotiation	Sales	Accounting	Teamwork	Sales	Customer Service
10	Sales	Engineering	Data Analysis	Marketing	Negotiation	Negotiation

Source: LinkedIn Economic Graph

Women workers tend to showcase more people skills, which could support their career journey in an AI-driven world. As GAI accelerates the change in skills, many of the new skills that roles will demand will be soft, interpersonal skills that help us work well together, such as team leadership, strategic leadership and collaboration. Across Southeast Asian countries, women consistently list more such skills than men, presenting an opportunity to close the gender gap.

Listing of soft skills on LinkedIn members profiles as a proportion of all skills listed, 2024, %



Source: LinkedIn Economic Graph
Note: Data not available for Indonesia, Thailand, and Vietnam.

GAI will fundamentally change the workplace

The long-term impact of GAI on jobs is uncertain, but it will likely lead to fundamental changes in the workplace.

In the near-term, GAI will replace some skill sets critical for jobs today and make other types of skills more important. It will reduce time spent on certain tasks while emphasizing others. The impact across different industries and job roles will vary widely.

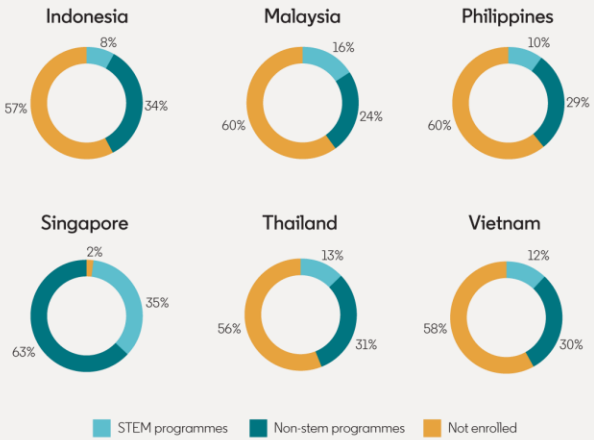
In Southeast Asia, GAI will accelerate changes in skills needs across all job roles between now and 2030. The impact of GAI will be particularly pronounced due to the potential for key industries in the region to be impacted, creating significant opportunity for regional economies to benefit from GAI, but also making reskilling and upskilling across the workforce more urgent.

The adoption of GAI will increase the importance of communication and people skills could give women workers an advantage to pull-ahead in an AI-driven world.

Chapter 3: The current educational landscape

A large pool of Southeast Asian workers have not been enrolled in tertiary programmes. Specific to enrolment for Science, Technology, Engineering and Mathematics (STEM) university programs, secondary sources find that countries lack a robust pipeline of workers with the technical skills and knowledge necessary to develop and implement AI technologies. For example, only 8% of Indonesia's tertiary youth are in STEM courses, and 57% of the country's youth are not enrolled in any tertiary programme.

Gross enrolment ratio in tertiary STEM programmes, 2022



Source: UNESCO, World Bank, and Access Partnership
Note: Estimates may not sum due to rounding; Data on proportion of STEM graduates for Indonesia is from 2018, data for Philippines and Singapore is from 2021.

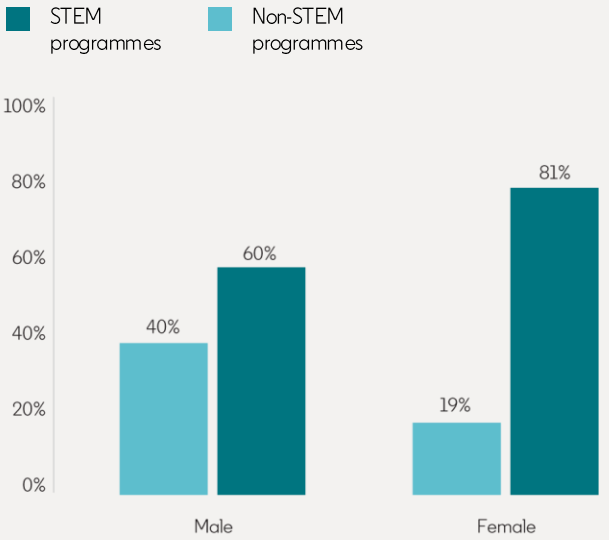
There are also socio-economic barriers tertiary education participation. In the Philippines, students from the lowest income bracket are 11.7 times less likely to complete four years of tertiary education as compared to their counterparts from the highest income brackets.

Percentage of people aged 25 to 29 who have completed at least four years of higher education, latest available year[1]

Source: UNESCO and Access Partnership
Note:
1. Data for Indonesia and the Philippines is from 2017 and data for Thailand is from 2019.
2. Households are classified into five groups based on per capita income.

Equal opportunities across genders poses a further issue. Only 19% of women graduates obtain STEM degrees, as compared to 40% for men, making them less likely to be equipped to take on digital jobs. Common challenges highlighted by women in Southeast Asia when it comes to developing AI skills include a lack of knowledge on possible career paths or available training programmes, and a lack of financial resources.

Gross enrolment ratio in tertiary STEM programmes by gender, all Southeast Asian countries



Source: ASEAN-USAID Inclusive Growth in ASEAN through Innovation, Trade and E-Commerce

Southeast Asia is at a critical stage in setting its future growth agenda

Southeast Asia is at a critical juncture in its growth journey. But its current approaches to workforce development are not able to support the growing demand for broad-based AI skills, prepare workers for the changing nature of job roles and ensure equitable access to benefits of AI for all workers.

Negotiations for the ASEAN Digital Economy Framework Agreement (DEFA) are underway with the goal of establishing an inclusive and sustainable regional digital economy. The development of tech-ready talent has been highlighted as a critical focus area for the DEFA by public and private sector stakeholders in ASEAN and included in the Framework for Negotiating DEFA.[6]

In parallel, ASEAN has started work in setting its post-2025 vision. The ASEAN Community Vision 2045 ASEAN Connectivity Strategic Plan will set the development agenda for the next two decades. It is critical for these long-term plans to focus on strengthening collaboration in building a future-ready workforce for ASEAN that will harness the opportunities created by digital transformation and AI.[7]

A new approach towards skills development is critical to support Southeast Asia in meeting its digital transformation and economic development goals.

Chapter 4: A skills-based roadmap for an AI economy

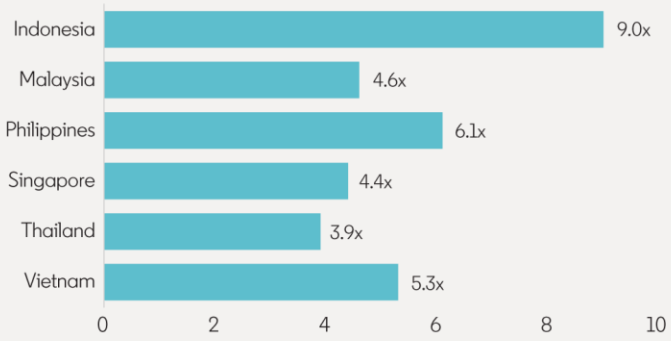
Key definitions

Skills-based hiring: The recruitment strategy of focusing on a candidate's skills to do the job, whether or not they meet typical education, prior employer, or job title requirements. In this analysis, we focus on the impact of removing prior job title requirements. Prioritizing skills does not ignore traditional hiring and development systems but enhances them to better match talent with opportunity.

Our recommendation is for Southeast Asia to adopt skills-based hiring as a key component of workforce development policy to harness the AI opportunity. The significant gaps faced by current training and educational programs suggest that a new approach is necessary. When we focus on worker skills, instead of traditional qualifications and job experience, we are able tap on a wider talent pool. This includes underrepresented workers such as women and workers without traditional four-year university degrees.

A skills-based approach to hiring may expand talent pools by up to 9 times in Southeast Asian countries, unlocking larger talent pools to drive economic growth in the region.

Skills-based talent pool increase by country

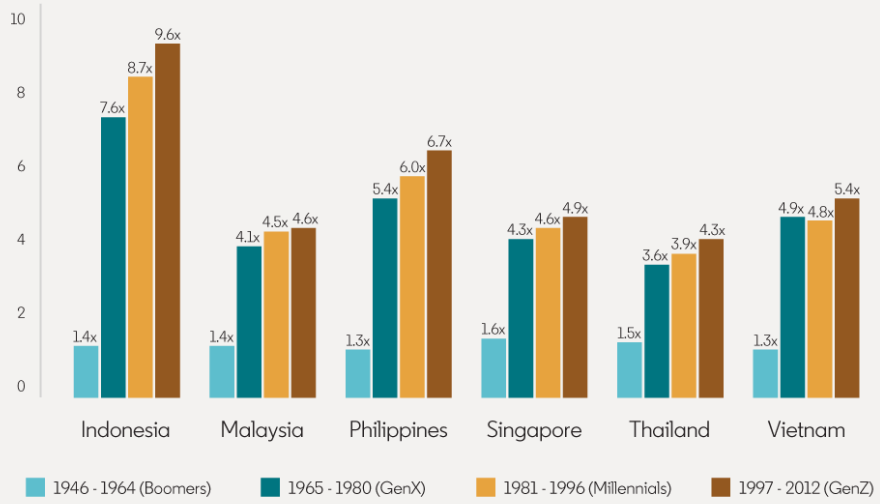


Source: LinkedIn Economic Graph

Impact of skills-based hiring for workers, by generation

AI will change the nature of all jobs and is accelerating the move towards a skills-based labor market (see Chapter 2). This has an important impact younger workers in Southeast Asia, where around 60% of the workforce is under 30 years old.[8] In Southeast Asia, skills-based hiring can increase the talent pool of Gen Z workers by up 9.6 times. While younger workers may not have the same breadth of job experience as older generations, they are still developing skills that are valuable across various roles, particularly those at lower seniority levels. A skills-based approach to hiring offers younger workers greater flexibility as they navigate a changing labor market, helping them build resilience against economic disruptions.

Skills-based talent pool increase, by generation



Source: LinkedIn Economic Graph

Impact of skills-based hiring, by education level

Despite Southeast Asia's low tertiary enrolment (see Chapter 3), a skills-based approach may increase talent pools. In countries such as Indonesia and Thailand, LinkedIn data suggests that there is a substantial pool of skilled workers without formal degrees who, though lack specific job titles, possess the relevant skills needed for various roles. Through skills-based hiring, the talent pool increase for workers without university degrees can be as much as 7.7x, which is a 17.7% increase compared to the increase for workers with degrees (6.5x).

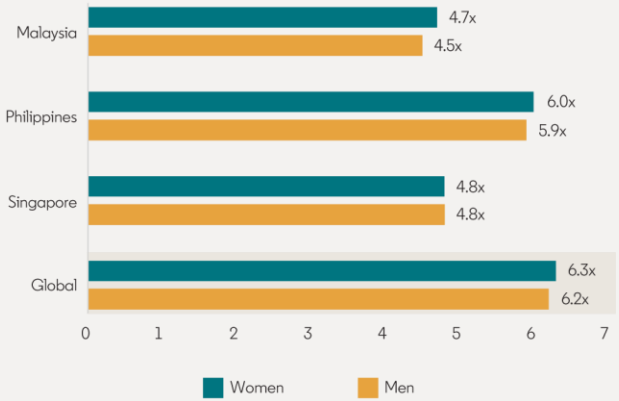
Country	Talent pool increase, workers with degrees	Talent pool increase, workers without degrees	Percentage difference
Indonesia	6.5x	7.7x	17.7%
Malaysia	4.6x	4.4x	-4.1%
Philippines	4.2x	4.7x	10.7%
Singapore	4.2x	4.6x	10.1%
Thailand	3.6x	4.3x	21.2%
Vietnam	3.4x	3.5x	2.6%

Source: LinkedIn Economic Graph

Impact of skills-based hiring, by gender

Traditional hiring methods can reinforce gender disparities, particularly in fields where women are underrepresented. Degree requirements and job titles tied to historically male-dominated roles may inadvertently exclude qualified female candidates, limiting access to opportunities. With skills-based hiring, we could see an increase in gender diversity across talent pools. And in occupations where women are most underrepresented, a skills-based approach could increase female representation in talent pools by 12% globally.

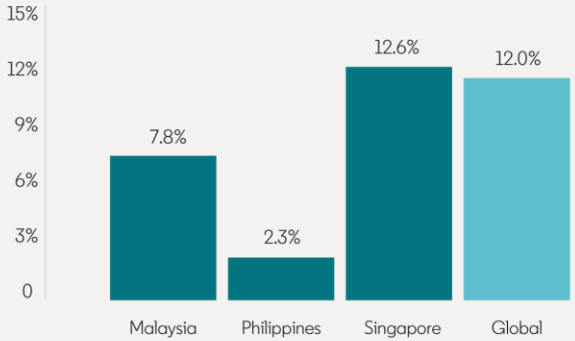
Skills-based talent pool increase, by gender



Source: LinkedIn Economic Graph
Note: Data for Indonesia, Thailand and Vietnam not available.

Increase in female representation through skills-based hiring, %

Occupations where women are most underrepresented



Source: LinkedIn Economic Graph
Note: Data for Indonesia, Thailand and Vietnam not available.

Impact of skills-based hiring, AI occupations

Skills-based hiring allows companies to tap into a broader talent pool, including individuals who have gained relevant skills through non-traditional pathways such as bootcamps, online courses, or self-study. This approach can be particularly beneficial in rapidly evolving fields like AI, where the demand for specific skills often outpaces the supply of formally qualified candidates (see Chapter 1). In AI roles, a skills-based approach could increase the talent pool by 7.4x globally, 27% higher than the increase for non-AI jobs. It could also lead to a 12% increase in female representation in AI occupations.

For AI occupations (global)

Skills-based hiring leads to:

Talent pool increase, Non-AI roles

Talent pool increase, AI roles

Skills-based hiring increases females in talent pool by:

Source: LinkedIn Economic Graph

Southeast Asia needs a skills-based roadmap to prepare for an AI economy

As AI accelerates the velocity of skills change across Southeast Asia, skills-based hiring can support organisations unlocking talent that might otherwise not even participate in the labour market. Across Southeast Asian countries, a skills-based approach can expand talent pools by up to 9 times.

By moving away from formal academic qualifications, this approach can create opportunities for more individuals of to participate in the labour market and increase the diversity of candidates for a given role. Globally, in jobs where women are underrepresented, the proportion of women in the talent pool would increase 12% more than it would for men with a skills-based approach. In some Southeast Asian countries, a skills-based approach could also increase the talent pool of workers without university degrees by up to 21% more than workers with degrees.

In collaboration with Access Partnership, we developed the 1-4-10 Skills-based Roadmap for an AI economy. This roadmap seeks to provide guidance for national governments and ASEAN Secretariat to harness the region's workforce potential in the age of AI.

The 1-4-10 Skills-Based Roadmap for an AI economy

1 Skills-Based Roadmap

4 Key Pillars

Building a common skills language

Data-driven insights for informed decisions

Strengthening collaboration for talent development

Lifelong learning for a future-proof workforce

10 Strategic Initiatives

1. Develop a regional skills taxonomy for AI
2. Develop competency frameworks for key sectors
3. Establish a regional labor market data platform
4. Develop national skills gap analyses to identify priority skills needs
5. Facilitate regular dialogues between academia and industry
6. Develop skills training programs based on identified needs
7. Promote internship and apprenticeship programs for on-the-job skills development
8. Establish a network of lifelong learning institutes across Southeast Asia
9. Develop micro-credentialing frameworks to recognize non-traditional learning
10. Implement training incentives and funding mechanisms for employers

Building a common skills language

1. Develop a regional skills taxonomy for AI
Develop a regional skills taxonomy that defines and organises relevant AI competencies. Promote efforts to validate these competencies on a global scale through international collaboration on the recognition of credentials tied to AI skills in greatest demand. Create National AI Skilling Banks, through which governments, along with the private sector and philanthropic organisations, leverage and coordinate contributions that support individuals seeking access to high-quality AI skilling opportunities, including by providing resources for those negatively impacted by AI.

2. Develop competency frameworks for key sectors
Develop competency frameworks for key sectors where AI skills are expected to play a critical role. Create AI Upskilling Sector-Based Collaboratives, through which governments fund efforts that bring together companies that use the same or similar AI technologies in order to help train workers more efficiently and at scale, which would be especially beneficial to SMEs that may not otherwise have the infrastructure to establish AI training programs.

Data-driven insights for informed decisions

3. Establish a regional labor market data platform
Establish a regional labor market data platform to collect, analyze, and share information on skill demand and supply, including for AI skills. This will provide insights on skill gaps, trends, and opportunities, ensuring inclusivity across various market segments, such as youth, women, migrants, and informal workers. Align with ASEAN initiatives like the Labour Market Information System and the ASEAN Digital Integration Index.

4. Develop national skills gap analyses to identify priority skills needs
Develop national skills gap analyses using regional data, assessing priority skills needs for digital skills across industries. Commit to implementing policies which involve partnering with employers to jointly identify needs and support workers AI training. Such efforts could include individual countries targeting specific sectors and demographics.

Strengthening collaboration for talent development

5. Facilitate regular dialogues between academia and industry
Facilitate regular dialogues between academia and industry to align education with current and future labor market needs. Assist educational institutions to safely and confidently integrate AI tools into academic environments for learning and AI literacy development, including by highlighting best practices, to ensure students graduate with baseline knowledge and understanding of AI to succeed in the new AI economy.

6. Develop skills training programs based on identified needs
Develop skills training programs based on identified needs, including AI needs, by fostering collaboration between academia and industry, and focusing on developing industry-endorsed, life-long-learning initiatives. For example, Singapore's Industry Transformation Maps (ITMs) set out the digital transformation of different industries and how skills training can support these changes.[9]

7. Promote internship and apprenticeship programs for on-the-job skills development
Promote internship and apprenticeship programs for on-the-job skills development by creating standardized frameworks and guidelines for internship and apprenticeship programs across Southeast Asia. Integrate internships and apprenticeships into national education policies and consider policies and agreements that allow students and apprentices to gain experience in other Southeast Asian countries, enabling short-term labor mobility.

Lifelong learning for a future-proof workforce

8. Establish a network of lifelong learning institutes across Southeast Asia
Establish a network of lifelong learning institutes across Southeast Asia to provide accessible and affordable opportunities for workers, including vulnerable groups, to acquire new skills, including AI and Generative AI skills, or upgrade existing ones.

9. Develop micro-credentialing frameworks to recognize non-traditional learning
Develop micro-credentialing frameworks to recognize and validate non-traditional learning that are recognized across Southeast Asia. Integrate micro-credentials into national skills development frameworks and policies to enable businesses and individuals to benefit from formal recognition of such credentials, including for AI skills. Academia will also need to invest in digital platforms that facilitate the issuance, management, and verification of micro-credentials.

10. Implement training incentives and funding mechanisms for employers
Implement training incentives and funding mechanisms to encourage private sector skilling investment. Offer tax incentives or subsidies to employers to help offset the cost of AI skills training. Provide direct payments to employers to cover a portion of on-the-job training, including apprenticeships.

Looking ahead

The 1-4-10 Skills-Based Roadmap for an AI Economy provides a starting point to further conversations on adopting skills-based approaches across Southeast Asia.

By working collaboratively, Southeast Asian governments, industry and civil society, we can create a thriving skills ecosystem that benefits both businesses and individuals, fostering a more competitive and inclusive regional economy. This will drive the next stage of the region's growth journey as we continue to harness the opportunity with AI and GAI technologies.

At LinkedIn, we are committed to using our data-rich economic platform to give policymakers, business leaders, and workers detailed visibility into the momentum underway. We hope to be a resource for Southeast Asian governments and its citizens, to ensure that AI technology is a net benefit to the region.

Appendix
Data sources

LinkedIn Economic Graph is the primary source of data for this report

1B
Global members

69M
Companies

41K
Skills

136K
Schools

The LinkedIn Economic Graph analyses LinkedIn's global membership of over 1bn individuals and 69m companies. Through a prism of 41,000 standardized skills self-reported by LinkedIn members on their LinkedIn profiles, we are able to gather real-time and granular insights on the labor market. Analysis using LinkedIn Economic Graph has unique strengths in that it enables new insights into emerging digital sectors and skills, like AI and its impact. Many knowledge-intensive industries have good coverage across income levels and geographic locations, which allows for global benchmarking.

Limitations: LinkedIn Economic Graph data have some limitations. While rendered anonymous before being aggregated, the data are influenced by how individual members use the platform, which varies by professional, social, and regional culture, as well as according to site accessibility. The data are neither a random sample of a country's workforce nor fully representative either of industries or professions. This is because people who are familiar with the internet and possess basic digital literacy are more likely than others to use LinkedIn. Some occupations and industries are better represented on LinkedIn than are others. Further, as skill data are self-reported, members may inflate their skills or present them differently, rendering data not entirely comparable across members and occupations.

For more information, please visit https://economicgraph.linkedin.com/

LinkedIn's membership across Southeast Asia

LinkedIn has 323 million members across APAC countries, and over one-fifth of this member base is in Southeast Asia.

LinkedIn data are best at representing skilled labour in the knowledge-intensive, and tradable sectors. Although LinkedIn may have better coverage in developed than developing countries, there are certain knowledge-intensive and tradable sectors, such as information and communication; professional, scientific, and technical activities; financial and business services; arts and entertainment; manufacturing; and mining and quarrying, that have good LinkedIn coverage globally.

For further validation of LinkedIn's data, please see this validation report conducted by World Bank.

To complement insights from LinkedIn Economic Graph, this report referenced other publicly available data

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Methodology

Skills
Refers to the 41,000+ skills that are sourced from LinkedIn members (skills explicitly listed on member profiles, or inferred from other aspects of members' profiles, such as job titles, fields of study, etc.) or from job postings on LinkedIn. Skills are the main building blocks of the insights in this report.

Gender classification
Gender identity is not binary, and we recognise that some LinkedIn members identify beyond the traditional gender constructs of "man" and "woman." If not explicitly self-identified, we have inferred the gender of members included in this analysis either by the pronouns used on their LinkedIn profiles or inferred based on first name. Members whose gender could not be inferred as either man or woman were excluded from any gender-centered analyses. We define 'occupations where women are most underrepresented' as those occupations that are in the bottom quartile for their country in terms of share of women employed in the last five years.

Generation classification
A LinkedIn member's generation (Gen Z, Millennial, Gen X, Baby Boomer) is inferred based on graduation years listed on their LinkedIn profile. We follow the Pew Research Center's definition for each generation as Gen Z being born between 1997 and 2012, Millennials being born between 1981 and 1996, Gen X being born between 1965 and 1980, and Baby Boomers being born between 1946 and 1964.

Jobs or occupations
LinkedIn member titles are standardized and grouped into approximately 15,000 occupations. These are not sector or country specific. These occupations are further standardized into approximately 3,600 occupation representatives. Occupation representatives group occupations with a common role and specialty, regardless of seniority.

Skills Genome
For any entity (occupation, country, industry, etc.), the skills genome is an ordered list of the 50 'most characteristic skills' of that entity. These most characteristic skills are identified using a TF-IDF algorithm to identify the most representative skills of the target entity while down-ranking ubiquitous skills that add little information about that specific entity (e.g., Microsoft Word).

AI skills and AI talent
LinkedIn members self-report their skills on their LinkedIn profiles. Currently, more than 41,000 distinct, standardized skills are identified by LinkedIn. These have been coded and classified by taxonomists at LinkedIn into 249 skill groupings, which are the skill groups represented in the dataset. We track 121 AI skills, and the top skills that make up the AI skill grouping are machine learning, natural language processing, data structures, AI, computer vision, image processing, deep learning, TensorFlow, Pandas (software), and OpenCV, among others. AI talent refers to members who are or have been employed in an AI job (like machine learning engineer, for example) or list at least two AI skills on their LinkedIn profiles.

AI jobs and AI-related jobs

Jobs with AI or Machine Learning in their job title and/or as part of their required skills. In this report, we use the term "AI jobs" to refer to technical jobs (e.g. Machine Learning Engineer) and AI-related jobs to refer to non-technical jobs (e.g. salesperson knowing how to use AI products).

Impact of GAI on the workforce

LinkedIn researchers identify GAI-replicable and GAI-complementary skills, combining generative AI tools with skill embeddings and matching techniques, and map it to occupations using their skills genome. This way, each occupation on LinkedIn is classified as augmented, disrupted or insulated from GAI based on the medians of this metric. These occupations are further mapped to LinkedIn members and their selected characteristics across countries to estimate the share of members in each group that fall within each category.

GAI-replicable and GAI-complementary skills

We identify GAI-replicable and GAI-complementary skills with the following steps:

1. We ask ChatGPT 3.5 (Feb 2023) the following prompts: a. "What are the 100 top skills that AI technologies (ChatGPT, Dall-E, LaMDA, etc.) can perform very well?" b. "What are the 100 top skills that can currently exclusively be performed by humans?" We map these lists to LinkedIn's taxonomy with LinkedIn's taxonomy API, and we refine matches manually.
2. We expand coverage further by applying skill similarities based on skill embeddings to score skills that are similar to those flagged in each list, and by manually reviewing the skills in the popular skill groups containing the skills from the previous steps.
3. For external validation, we ingest and map to our taxonomy three exposure scores from the academic literature (Webb (2019); Felten, Raj, & Seamans (2023), and Felten, Raj, & Seamans (2021)). We use these scores to train a model that learns which skills contribute more to these three rankings, and we use this model to score all skills in LinkedIn's taxonomy.

Occupations exposed to GAI and complementary skills

To calculate the percentage of skills that are exposed to GAI by occupation, we use each occupation's skills genome. An occupation's skills genome is the ranking of its top 30 most relevant skills based on a TF-IDF model. In this model, skills are relevant when they tend to be disproportionately added by members in this occupation compared to other occupations. The thresholds for classifying occupations into high and low exposure to GAI and to GAI-complementary skills are based on the metrics' medians.

Segments exposed to GAI and complementary skills

Based on the classification of occupations by GAI-complementary exposure, we compute the share of LinkedIn members in each category as a share of all members in that segment, gender, generation group, etc. We report these shares and we run linear regressions to compare GAI exposure against dimensions of interest, such as skill type, industry, education, and experience.

Impact of GAI on the workforce in Southeast Asia

Access Partnership completed analysis on GAI impact by industry to estimate impact on the workforce in Southeast Asia. The team conducted the analysis in the following steps:

1. Collected labor force employment by industry from International Labor Organization (ILOSTAT database) for each Southeast Asian country.
2. Applied global estimate of GAI impact by industry (as published in "Preparing the Workforce for Generative AI: Insights and Implications, LinkedIn Economic Graph Research Institute, August 2023) to determine proportion of workforce in each industry and country by exposure (augmented, disrupted or insulated).
3. Aggregated workforce by exposure to determine country-level GAI impact (p.11) and regional-level GAI impact (p.12).

Talent pool
The number of potential skilled candidates for a certain job. We consider all active members with valid skill listings, regardless of their job searching status.

Prior job title talent pool
The number of potential candidates considered when hiring for an open job looking at workers who have held that target job title in the past five years. Job titles include exact matches (e.g., an employer is searching for a Recruiter and the worker has experience as a Recruiter) as well as equivalent matches (e.g., the worker has experience as a Recruiting Specialist).

Skills-based talent pool
The number of potential candidates considered when hiring for an open job looking at workers who have held jobs in the last five years with a large skill overlap (50%+ shared top skills) with the target job and meet a threshold of similar worker transitions. For example: a Nurse may have a large skill overlap with a Doctor, but that isn't a common transition due to the high level of retraining, so Nurses wouldn't be included in the skill-based talent pool if the open role is for a Doctor.

Skills-based talent pool increase
The ratio of the number of potential candidates for a given job identified using a skills-based talent pool approach to the number of eligible workers for that job identified using the direct jobs experience talent pool approach. Country and industry-level aggregates are defined by taking the median talent pool increase across occupations in the given segment.

This report was developed in collaboration with Access Partnership

About Access Partnership

Making innovation work for the world.

Across 200 markets worldwide, Access Partnership helps businesses navigate complex regulatory challenges, optimise how their technologies can be used, and accelerate growth, and supports governments in designing policies and rules that attract investment.

With specialist knowledge that runs deep across all areas of digital technology and life sciences innovation, Access Partnership advises and drives every step of the journey: setting strategy, designing policy, achieving and maintaining compliance, and measuring success.

Through the powerful partnership of transformative technology and purposeful policy, Access Partnership is creating a world where people everywhere can benefit from equitable access to innovation.


LinkedIn