

BUILDING DIGITAL SKILLS FOR THE CHANGING WORKFORCE IN ASIA PACIFIC AND JAPAN (APJ)

AWS APJ DIGITAL SKILLS STUDY

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commissioned by Amazon Web Services



BUILDING DIGITAL SKILLS FOR THE CHANGING WORKFORCE IN ASIA PACIFIC AND JAPAN

DIGITAL SKILLS, ESPECIALLY THOSE RELATED TO CLOUD, ARE RAPIDLY RISING IN IMPORTANCE



88%

of organizations report improved employee productivity after training them in digital skills



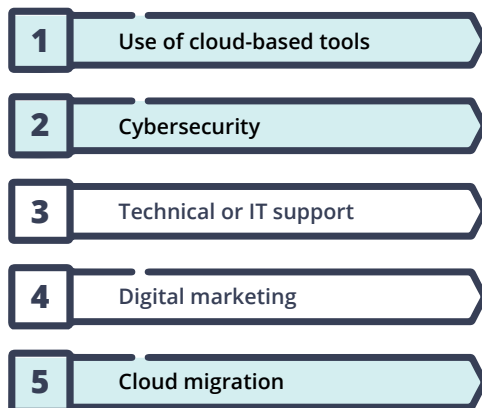
88%

of workers say that since the COVID-19 pandemic started, they need more digital skills in their jobs

BY 2025, 3 OF THE TOP 5 DIGITAL SKILLS EXPECTED TO BE MOST DEMANDED IN WORKPLACES ARE CLOUD-RELATED

Top 5 in-demand digital skills by 2025

■ Cloud-related skills



BUT WORKERS ARE NOT GETTING TRAINED FAST ENOUGH



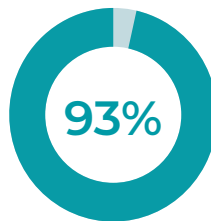
2 in 3

workers are not confident that they are gaining digital skills fast enough to meet future career needs



86 million

workers in Asia Pacific and Japan¹ are predicted to need digital skills training over the next year alone, in order to keep pace with technological advancement



However, 93% of workers and organizations face barriers to digital skills training

A COLLECTIVE EFFORT IS NEEDED TO UNLOCK FUTURE WORKFORCE POTENTIAL



GOVERNMENTS

Promote high-demand digital skills courses through online "Skills Portals"



EMPLOYERS

Leverage free training courses provided by industry to upskill their workers



TRAINING PROVIDERS

Work with tech industry to develop courses that meet industry standards



WORKERS

Earn micro-credentials through short-term courses to bridge urgent skill gaps

1. The 7 APJ countries covered in this study are: Australia, India, Indonesia, Japan, New Zealand, Singapore, and South Korea



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Important Notice on Contents

This report has been prepared by AlphaBeta (part of Access Partnership), commissioned by Amazon Web Services (AWS). All information in this report is derived or estimated by AlphaBeta analysis using both data from a proprietary survey of employers and workers across 7 countries included in this study (Australia; India; Indonesia; Japan; New Zealand; Singapore; South Korea), and from publicly available information. Where information has been obtained from third party sources, this is clearly referenced in the footnotes. This report should be cited as follows: "AlphaBeta, part of Access Partnership (commissioned by Amazon Web Services) 2022, Building Digital Skills for the Changing Workforce in Asia Pacific and Japan.

GLOSSARY

TERM	DEFINITION IN THE CONTEXT OF THIS STUDY
Digital skills	The abilities, knowledge, and know-how required to apply digital technologies for tasks in the workplace. These range from basic digital skills, referring to the ability to use digital software and hardware, to advanced digital skills, which entail the ability to draw upon emerging technologies to create new digital tools and applications – for instance, converting organizations to “cloud native” architectures through the use of cloud tools for core storage, compute, and database management (e.g., Amazon Elastic Compute Cloud).
Cloud-related skills	The ability to build, maintain, or work with cloud computing technology.
Cloud computing	The on-demand delivery of IT resources over the Internet. Instead of buying, owning, and maintaining physical data centers and servers, one can access technology services, such as computing power, storage, and databases, on an as-needed basis from a cloud provider.
Cloud-based tools	Software-as-a-Service tools, such as cloud-based communication software, accounting software, and customer relationship management software, as well as cloud developer tools used to host code, build, test, and deploy applications.
Cybersecurity skills	The ability to develop or deploy protocols, tools, software, and techniques to maintain the security of organizations’ digital systems and data.
Technical support skills	The ability to diagnose and troubleshoot technical problems relating to software and hardware.
Digital marketing skills	This includes basic and advanced digital marketing skills. Basic digital marketing skills entail the ability to utilize digital channels to reach, engage, and convert audiences, such as developing social media content for advertising. Advanced digital marketing skills include the ability to run digital advertising campaigns and conduct data analysis to measure the performance of marketing strategies implemented in digital platforms.

GLOSSARY

TERM	DEFINITION IN THE CONTEXT OF THIS STUDY
Computer networking skills	The ability to link multiple digital devices to share information and software resources in an immediate way.
Artificial Intelligence (AI) and Machine Learning (ML) skills	The ability to integrate, apply, and develop artificial intelligence models, such as machine learning and deep learning models, for business operations.
Internet-of-Things (IoT) skills	The ability to integrate software and electronic components to establish connections and enable data exchange between digital devices and software through the internet without human interference.
Managing transition from on-premises facilities to the cloud	The ability to plan, design, and execute the migration of data and services from on-premises facilities to the cloud. This ranges from analyzing existing applications and infrastructure to determine the suitability and customization required for the cloud infrastructure, to integration work, security analysis and remediation, and end-user training for a smooth transition to the new cloud solution.
Software development skills	The ability to create, design, deploy, and support software. This includes tasks such as working across functional teams to transform business needs into features, managing development teams and processes, and conducting software testing and maintenance.
Cloud architecture design skills	The ability to design the components and subcomponents required for cloud computing. These components consist of a front-end platform, back-end platform, a cloud-based delivery, and a network.

GLOSSARY

TERM	DEFINITION IN THE CONTEXT OF THIS STUDY
Website development skills	The ability to develop a website for the Internet. This ranges from developing a simple static page to complex web applications, electronic businesses, and social network services.
Computer hardware design skills	The ability to design new computer hardware, covering all elements relating to the look and function, test completed models, analyze the performance, as well as oversee the manufacturing process.
Data mining, engineering, and science techniques	Data mining skills refer to the ability to analyze data to identify hidden patterns and systemic relationships that can be used to predict future behaviors. Data engineering skills refer to the ability to build and maintain database systems, find warehousing solutions, use ETL (extract, transfer, load) tools, and make use of machine learning models and algorithms. Data science encompasses skills ranging from statistics, data analysis and visualization, data mining, AI/ML to derive insights and meaning from data.
Computer graphic design skills	The ability to generate visual content using computers to create unique concepts and messages for products, publishing, and/or advertising. Computer graphic design is widely used in digital photography, film, video games, mobile phone and computer displays, and many digital applications. Designers typically utilize software such as Adobe Photoshop and Illustrator.
Workers	Individuals engaged in formal, full-time employment.
Digitally skilled workers	Workers who need to apply digital technologies in order to do their jobs. These workers can be technology or non-technology workers.

GLOSSARY

TERM	DEFINITION IN THE CONTEXT OF THIS STUDY
<p>Technology workers ("Tech workers")</p>	<p>Workers in occupations that require specialized technology expertise either to develop new technological products, services, and applications (e.g., software engineers, data scientists), or to bridge technological products and services to people and organizations (e.g., technology product managers).</p>
<p>Non-technology workers ("Non-tech workers")</p>	<p>Workers in occupations that do not require specialized technological knowledge and skills but need some basic technological skills such as knowing how to use word processing software and smartphones (e.g., administrative staff, café owners, human resources managers).</p>
<p>Employers</p>	<p>Business managers, information technology (IT) managers, and IT decision makers. Business managers are defined as professionals in middle and senior management who perform hiring and/or people management roles. IT managers are middle and senior management executives with a strong focus on the company's technology-related function. IT decision makers are workers who play a significant role in the selection and implementation of IT solutions for their organization.</p> <p>In this report, this term is sometimes used interchangeably with "organizations" as employers represent the views of their organizations.</p>
<p>Organizations</p>	<p>Entities that workers are employed in. These can be public, private, or not-for-profit organizations.</p>
<p>Underserved communities</p>	<p>Underserved communities refer to a subset of the population that have fewer privileges, advantages, and opportunities than the average population in a country. Examples of such communities include people with disabilities, racial minorities, unemployed individuals, and low-income individuals.</p>

EXECUTIVE SUMMARY



Advancements in cloud computing, artificial intelligence (AI), robotics, and other emerging technologies are happening in increasingly shorter cycles, changing the nature of jobs faster than before.¹ In our age of rapidly emerging technological innovations, workforces across the globe, including Asia Pacific and Japan (APJ), are faced with the need to regularly upgrade their digital skills and knowhow. As new roles emerge and skill requirements evolve, workers will need to adopt a mindset of lifelong learning and build a habit of regular training.

In this study, “Building Digital Skills for the Changing Workforce in Asia Pacific and Japan (APJ)”, we explore the dynamics behind digital skills training: How often do workers undertake training? Are employers providing their workers with the opportunity to do so? What benefits can organizations and workers achieve from training? Which digital skills will become more important in the future and will be crucial to learn now? What are the challenges related to training? We define “digital skills” as the abilities and know-how to apply digital technologies in the workplace; these range from basic software use, to more advanced skills in emerging technologies like cloud computing, Artificial Intelligence, and the Internet-of-Things.

To answer these questions, we conducted large-scale surveys of 2,166 employers and 7,193 workers across 17 industries spanning the public, private, and not-for-profit sectors to understand current behaviors and attitudes towards digital skills training in seven APJ countries: **Australia, India, Indonesia, Japan, New Zealand, South Korea,**

and Singapore. Employers that were targeted for the survey included business managers, IT managers, and IT decision makers. Workers that were targeted included full-time workers who require some form of digital skills to do their jobs. Unless specified, all findings in this report reflect aggregate survey results across countries, sectors, and industries.

Drawing upon insights from the surveys, this report:

1. Contextualizes the need for digital skills training from the perspectives of employers and workers today and in a post-pandemic world;
2. Uncovers how much training is being undertaken and for which digital skills;
3. Investigates the barriers faced by employers and workers to undertaking more training; and
4. Provides a call to action on how governments, industry, employers, and workers can fulfil workforce digital skills training needs.

Given that skills take time to build, employers and workers need to be forward-looking and start building skills early. However, this study finds **a significant training shortfall in APJ: digital skills training efforts today are not sufficient to meet evolving business needs.**

1. World Economic Forum (2019), “The digital skills gap is widening fast. Here’s how to bridge it.” Available at: <https://www.weforum.org/agenda/2019/03/the-digital-skills-gap-is-widening-fast-heres-how-to-bridge-it/>

KEY FINDINGS INCLUDE:

THE NEED TO ACCELERATE DIGITAL SKILLS TRAINING

- 1. Digital skills, especially cloud-related skills, are increasingly demanded in workplaces across APJ.** Digital skills refer to the ability, knowledge, and know-how to apply digital technologies for tasks in the workplace. In particular, cloud-related skills² are three of the top five most demanded digital skills by employers by 2025 – reflecting an urgent need to scale up the training in cloud technologies over the next three years.
- 2. The COVID-19 pandemic has accelerated the need for digital skills training.** 88 percent of workers report that they now need more digital skills to cope with changes in their jobs due to the COVID-19 pandemic. Employers agree, with 86 percent of them reporting that the COVID-19 pandemic has accelerated the pace of digital adoption in their organizations.
- 3. As organizations increasingly undergo digital transformation, investing in employees' digital skills training has become an imperative to achieve their business goals.** According to the International Data Corporation (IDC), by 2025, 75 percent of business leaders in Asia Pacific and Japan will leverage digital platforms to adapt their value chains to new markets.³ Ensuring that employees can implement this successfully has thus become an imperative. Our survey shows that digital skills training has helped fast-tracked digitization goals for 85 percent of organizations in the region. Organizations have also experienced numerous other benefits, including improved employee productivity (reported by 88 percent of employers), cost efficiencies (85 percent), and increased revenue (82 percent). Investing in digital skills training can also help small and medium sized enterprises (SMEs)⁴ scale and become more efficient, with 88 percent of SMEs reporting



increased employee productivity and 82 percent experiencing increased revenue after doing so.

- 4. Digital skills training in workplaces can help boost worker retention.** While it is in no way a silver bullet, this study finds that providing support for digital skills training in workplaces can be a helpful employee retention tool, with 83 percent of employers reporting higher employee retention after doing so. 80 percent of workers also report higher job satisfaction after undertaking digital skills training.
- 5. Digital skills training can open up new career pathways for workers.** Beyond helping workers meet the needs of their jobs, learning digital skills can open up new career development opportunities, including in their organizations. This benefit is not just experienced by tech workers, but also non-tech workers.⁵ 82 percent of tech workers and 76 percent of non-tech workers who have undergone digital skills training feel that such training has boosted their ability to take on new roles within or outside their organizations.

2. Cloud-related skills are defined as the ability to build, maintain, or work with cloud computing technology.

3. International Data Corporation (2020), "IDC predicts 65% of APAC GDP will be digitalized reaching US\$1.2 trillion in spending by 2022". Available at: https://www.idc.com/getdoc.jsp?containerid=prAP46972820&utm_medium=rss_feed&utm_source=Alert&utm_campaign=rss_syndication

4. SMEs in the context of this research includes all companies with less than 999 employees – "small-sized" companies are those with fewer than 100 employees, while "medium-sized" companies are those with between 100 and 999 employees.

5. Tech workers refer to those in occupations that require specialized technology expertise to develop new technological products, services, and applications. Non-tech workers refer to those in occupations that do not require specialized technological knowledge and skills but need some basic technological skills such as knowing how to use word processing software. Refer to glossary in this report for more detail.

6. **An estimated 86 million⁶ more people across the seven countries in APJ will need to undertake digital skills training over the next year alone.⁷** This number accounts for 14 percent of the total workforce in these countries. These workers will need to undergo training to keep pace with technological advancements and gain new digital skills to succeed in their careers. 64 percent of workers in APJ also feel that they will require training in cloud-related skills by 2025 to progress in their careers.
7. **A digital skills training shortfall exists today: although 97 percent of organizations see a need to train their workers on digital skills, only 29 percent have implemented a plan to do so.⁸** The majority of organizations are not investing sufficient resources to achieve the amount of training they say is required. This training shortfall is concerning, particularly with two-thirds of workers in the region admitting that they are not confident that they are gaining digital skills fast enough to meet their future career requirements.
8. **Overcoming the barriers faced to training can help to reduce the training shortfall.** 93 percent of organizations and workers face barriers to accessing the digital skills they need to remain competitive. The two most common barriers faced to digital skilling are the limited awareness of training options available (a major barrier faced by 72 percent of employers and workers), and the lack of time to pursue training (71 percent).
9. **There is also an opportunity to provide more skills training to underrepresented communities and those who are unemployed.** Underserved communities such as women, at-risk youth, unemployed individuals, rural communities, and low-skilled migrant workers tend to face larger challenges in accessing digital skills training opportunities. This is due to factors such as the lack of financial resources to access digital devices and the Internet, as well as being left out of employer support given their unemployment state.⁹

6. This estimate differs from that in AlphaBeta's 2021 study (commissioned by Amazon Web Services) titled "Unlocking APAC's Digital Potential: Changing Digital Skill Needs and Policy Approaches" in 3 ways. Firstly, the estimate in this study applies to workers in 7 APAC countries while the 2021 study applies to workers in 6 APAC countries. Secondly, the estimate in this study applies only to current and future workers, while the estimate in the 2021 study applies to 3 types of workers (current workers, future workers and disenfranchised workers). Lastly, the estimate in this study is only for the next year while that in the 2021 study is for 5 years between 2020 and 2025.

7. This estimate comprises both digitally skilled workers who will need to refresh their digital skills more regularly in order to keep pace with future digital skill needs, as well as non-digitally skilled workers who are assumed to need training over the next year as they progress into jobs requiring digital skills. For details of how this number was estimated, please refer to the Appendix.

8. This means that the organization has fully implemented a digital skills training program in the organization, which involves having a clear set of strategic objectives for the training, a clear curriculum, training scope, employee communications, mechanism for regular updates to the training program and curriculum to maintain relevance to emerging digital skill needs, and securing the needed resources to implement the program.

9. Sources include: Borgen Magazine (2021), "How the Digital Divide Affects Poverty in India Amid COVID-19." Available at: <https://www.borgenmagazine.com/digital-divide-in-india/>; CNA (2021), "Commentary: COVID-19 has revealed a new disadvantaged group among us - digital outcasts." Available at: <https://www.channelnewsasia.com/commentary/covid-19-has-revealed-digital-divide-literacy-singapore-933441>; ILO (2018), Digitalization to promote decent work for migrant workers in ASEAN. Available at: http://www.oit.org/wcmsp5/groups/public/---asia/---ro-bangkok/---sro-bangkok/documents/publication/wcms_713546.pdf



There is an opportunity for governments, training providers, employers, and workers to address the barriers faced to digital skilling. The barriers faced by organizations and workers to digital skills training can be tackled through the following actions:

- **Promote courses for high-demand digital skills through official government platforms or portals.** A limited awareness of the available training options is the most common barrier faced in pursuing digital skilling, with 72 percent of employers and workers in the seven countries citing this. To address this barrier, governments can broaden the awareness of industry-led courses available by consolidating and promoting them on online platforms or portals, and work with training providers to develop one-stop training platforms on digital skills courses.



- **Promote on-demand micro-courses and credentials.** The lack of time to pursue training is the second most commonly faced barrier, with 71 percent of workers in the seven countries citing this. To address this barrier, workers can take courses in modular, micro-skills that are available on-demand, while governments can work with industry to develop these micro-skills training courses.
- **Develop digital skills frameworks to guide employers and workers on the types of digital skills needed by sector and occupation.** 66 percent of workers and employers feel that they lack awareness of the digital skills needed. To overcome this challenge, governments can develop digital skills frameworks that inform organizations on the technology impacts, career pathways, skills required for different occupations, and reskilling options for different industries.
- **Provide financial support and leverage free training courses.** 65 percent of workers and employers feel that the costs of digital skills training courses are prohibitive. To tackle this barrier, governments can provide reskilling grants to organizations and training credits to workers, while employers can also provide financial support for their employees through loans and subsidies. Workers, on the other hand, can take advantage of free or subsidized training courses provided by industry.
- **Work with technology experts and industry to develop high-quality training courses.** 64 percent of workers feel that digital skills training courses in their country are not high-quality. To overcome this challenge, training providers can collaborate with certified tech experts to ensure that their courses meet industry standards, while workers and employers can look to courses developed by certified tech experts such as those from educational institutions and tech companies.



- **Provide targeted support for underserved communities.** Underserved communities such as women, at-risk youth, unemployed individuals, and low-skilled migrant workers tend to face more challenges in accessing digital skills training opportunities. To address this issue, governments, the training sector, and employers can collaborate to provide targeted digital skilling programs for these communities.
- **Demonstrate the cost-benefit analysis of training to employers.** Together with the training sector, governments can advocate for firms to invest in employee training. A large variety of research has demonstrated the net-positive impact of training investments to organizations. For instance, the World Economic Forum (WEF) has demonstrated that the benefits

of funding reskilling programs in workplaces outweigh their costs.¹⁰ These benefits include productivity boosts and avoided severance and rehiring costs. Moreover, employers benefit from increased talent retention – 83 percent of employers surveyed reported higher employee retention after implementing such training in the workplace.

Digital skills training is no longer a luxury - it has become a necessity. In revealing the perspectives of workers and employers across the diverse APJ region, this report brings to light why it is important to act now, and we hope it will inspire collaborative efforts between the government, industry, and workers to build viable and inclusive pathways for digital skills training across the region.

10. World Economic Forum (2019), *Towards a Reskilling Revolution*. Available at: [WEF_Towards_a_Reskilling_Revolution.pdf](https://www.weforum.org/reports/towards-a-reskilling-revolution) (weforum.org)

TOP INSIGHTS

1

Digital skills, especially cloud-related skills, are increasingly demanded in workplaces across APJ.

Digital skills refer to the ability, knowledge, and know-how to apply digital technologies for tasks in the workplace. 3 of the top 5 most demanded digital skills by 2025 are cloud-related skills – using cloud-based tools such as SaaS and developer tools (1st), cybersecurity skills (2nd), and cloud migration (5th)

2

The COVID-19 pandemic has accelerated the need for digital skills training. 88% of workers feel that they now need more digital skills to cope with changes in their jobs during the COVID-19 pandemic. 86% of employers also say that the COVID-19 pandemic has accelerated the pace of digital adoption in their organizations.

3

An estimated **86 million** more people in APJ (**14%** of the total workforce) will need to undertake digital skills training over the next year alone to keep pace with technological advancements.

4

There is a digital skills training shortfall in APJ today. Although **97%** of organizations see a need to train their workers on digital skills, only **29%** have implemented a plan to do so.

5

Investing in digital skills training can help organizations improve and meet their business objectives. 88% of organizations that invest in digital skills training report improved employee productivity, **83%** experienced higher employee retention and **82%** saw increased revenue.

NOTE: The findings in this study are based on results of employer and worker surveys conducted in 7 countries: Australia, India, Indonesia, Japan, New Zealand, Singapore and South Korea.

SOURCE: AlphaBeta survey of 7,193 workers and 2,166 employers in 7 countries (Australia, India, Indonesia, Japan, New Zealand, Singapore, South Korea) in August 2021; AlphaBeta analysis

THE NEED TO ACCELERATE DIGITAL SKILLS TRAINING

INSIGHT #1:

Digital skills, especially cloud-related skills, are increasingly demanded in workplaces across APJ.

Digital skills refer to the ability, knowledge, and know-how to apply digital technologies for tasks in the workplace. In particular, cloud-related skills¹¹ are three of the top five most demanded digital skills by employers by 2025 – reflecting an urgent need to scale up the training in cloud technologies over the next three years.

The ability to use cloud-based tools for work, referring to the use of Software-as-a-Service (SaaS) tools and developer tools, **emerged as the digital skill that employers say will be most in-demand by 2025** (Exhibit 1). Examples of cloud-based tools which are already commonly deployed in workplaces include Salesforce, a CRM tool used by 83 percent of Fortune 500 companies,¹² and Adobe, a software suite for digital content creation, which is used by 90 percent of creative professionals globally.¹³

Cybersecurity skills¹⁴ will be the second most demanded digital skill by employers by 2025. The need for cybersecurity skills has become more urgent with increased digitization in organizations and usage of cloud infrastructure and applications. A robust cloud cybersecurity strategy is essential to ensure a secure environment, prevent data loss, and help organizations maintain compliance with data privacy regulations.

More advanced cloud-related skills will also be in high demand – two such skills are represented in the Top 10 list: **cloud migration skills** (the ability to transition organizations from on-premises facilities to the cloud) are predicted to be the 5th most demanded skill by employers by 2025, and **cloud architecture design skills** are predicted to be the 8th.

11. Cloud-related skills are defined as the ability to build, maintain, or work with cloud computing technology.

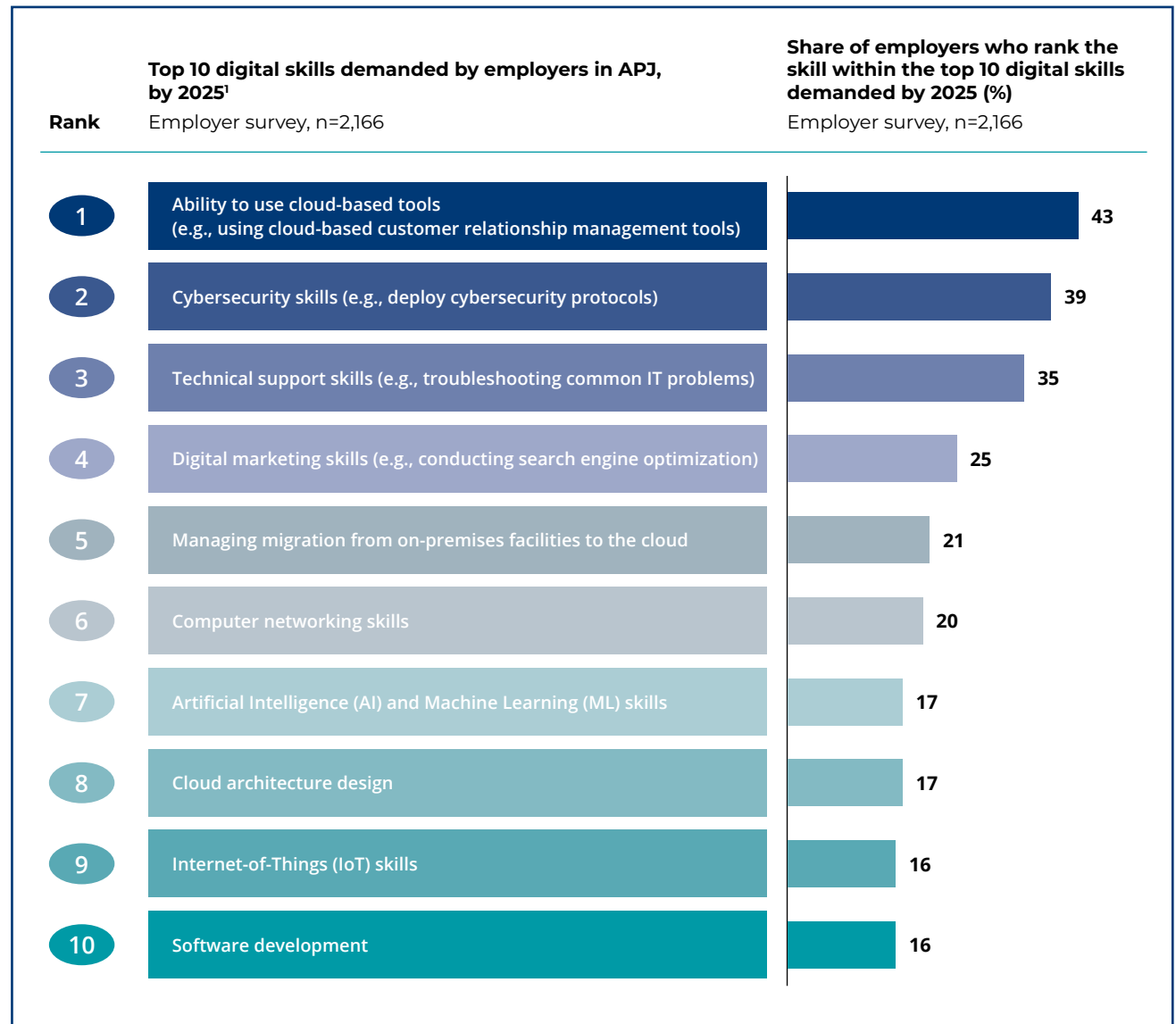
12. Accurate as of June 2019. Source: Forbes (2019), "Salesforce now has over 19% of the CRM market". Available at: <https://www.forbes.com/sites/louiscolombus/2019/06/22/salesforce-now-has-over-19-of-the-crm-market?sh=5c3362ed333a>

13. Adobe, "Adobe fast facts." Available at: <https://www.adobe.com/about-adobe/fast-facts.html>

14. Cybersecurity skills refer to the ability to develop or deploy protocols, tools, software, and techniques to maintain the security of organizations' digital systems and data.

EXHIBIT 1:

CLOUD AND CYBERSECURITY SKILLS ARE INCREASINGLY DEMANDED ACROSS WORKPLACES IN APJ



1. This list of top digital skills demanded by employers in APJ was derived based on analysis of employer survey results. Respondents were asked to rank the top 5 digital skills they believe will be in highest demand by 2025. The rank of each skill was estimated based on the share of respondents who rank this skill to be within the top 5.

SOURCE: AlphaBeta survey of 7,193 workers and 2,166 employers in 7 countries (Australia, India, Indonesia, Japan, New Zealand, Singapore, South Korea) in August 2021; AlphaBeta analysis

INSIGHT #2:

The COVID-19 pandemic has accelerated the need for digital skills training.

Digital adoption has taken a quantum leap during the COVID-19 pandemic. A global survey of business executives conducted by McKinsey & Company in 2020 found that the COVID-19 pandemic has accelerated the digitization of business operations by three to four years.¹⁵ Furthermore, respondents expect most of these changes to be long lasting and are already making the kinds of investments that all but ensure they will stick.

Rapid digitization is not only taking place in the private sector (e.g., e-commerce adoption in the retail industry), but also in the public sector. Government departments are now seeing heightened interest in offering citizens online services in the “remote-by-default” era, leading to an unprecedented increase in cloud adoption, especially for government-to-citizen (G2C) services.¹⁶

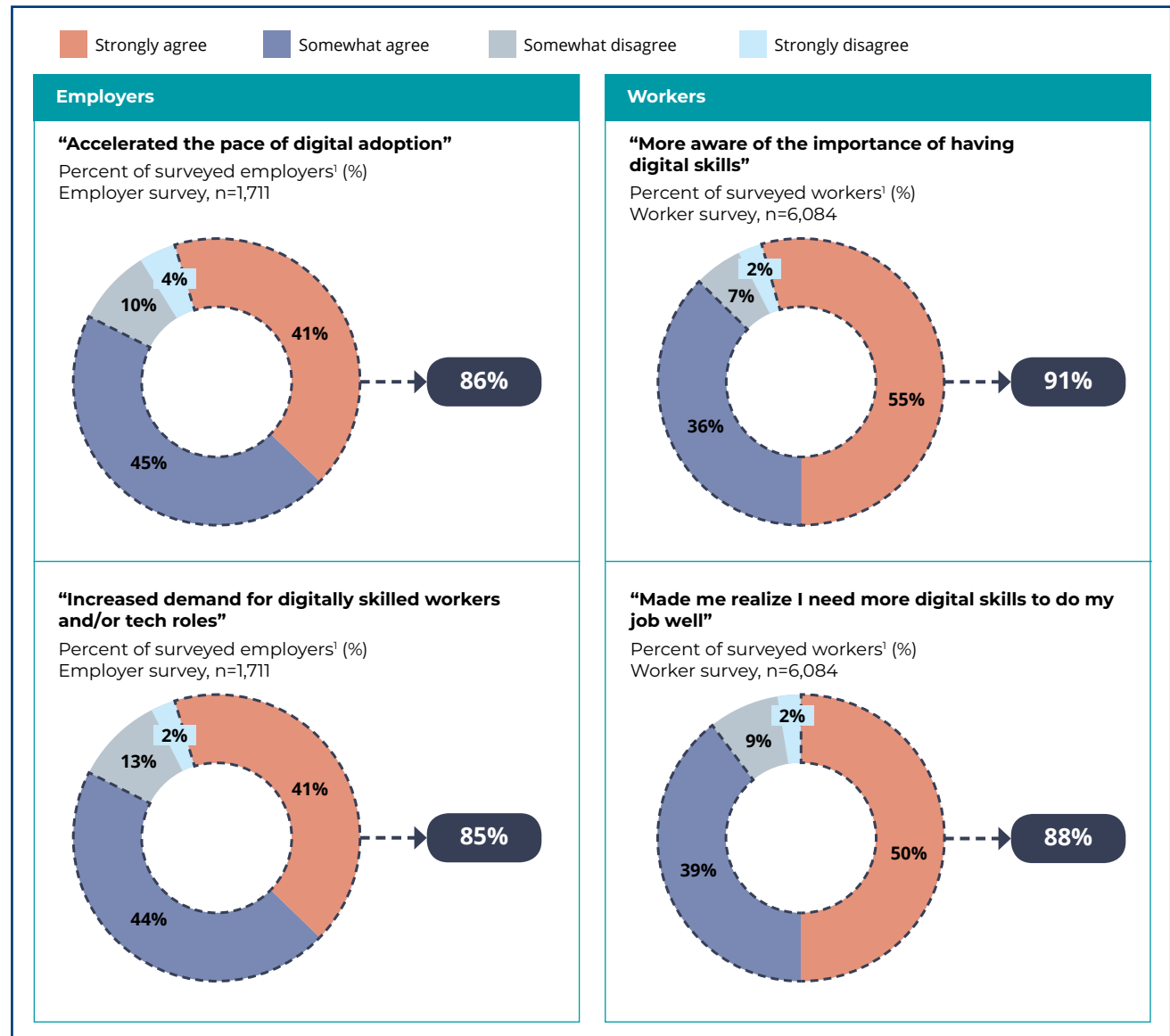
86 percent of employers across public, private and non-profit sectors surveyed in this study report that the COVID-19 pandemic has accelerated the pace of digital adoption in their organizations (Exhibit 2). What this means is a further heightened need for training in digital skills. **85 percent of employers also say that the COVID-19 pandemic has increased their demand for digitally skilled workers and/or tech roles.** Workers are cognizant of this too – **for 91 percent of them, the COVID-19 pandemic has heightened their awareness of the importance of digital skills. 88 percent feel that they now need more digital skills to cope with changes in their jobs due to the COVID-19 pandemic** (Exhibit 2). This realization is evident among workers with non-tech backgrounds too: 89 percent of non-tech workers confirm the need to cope with digitally-driven changes in their jobs due to the pandemic.

15. McKinsey & Company (2020), *How COVID-19 has pushed companies over the technology tipping point – and transformed business forever*. Available at: <https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/how-covid-19-has-pushed-companies-over-the-technology-tipping-point-and-transformed-business-forever>

16. In Singapore, for example, public agencies tapped into “postman.gov.sg,” an omnichannel cloud-based communication tool, to send bulk messages with critical updates to citizens. As of November 2020, the tool had been used to share over 1.3 million messages. Sources: Forbes (2021), “How the pandemic has accelerated cloud adoption”. Available at: <https://www.forbes.com/sites/forbestechcouncil/2021/01/15/how-the-pandemic-has-accelerated-cloud-adoption/?sh=612627736621>; Deloitte Insights (2021), “Accelerated digital government: COVID-19 brings the next generation of digitization to government”. Available at: <https://www2.deloitte.com/xe/en/insights/industry/public-sector/government-trends/2021/digital-government-transformation-trends-covid-19.html>

EXHIBIT 2:

MOST EMPLOYERS AND WORKERS AGREE THAT THE COVID-19 PANDEMIC HAS MADE DIGITAL SKILLS TRAINING MORE IMPORTANT



1. Percentages may not total to 100 due to rounding.

SOURCE: AlphaBeta survey of 7,193 workers and 2,166 employers in 7 countries (Australia, India, Indonesia, Japan, New Zealand, Singapore, South Korea) in August 2021; AlphaBeta analysis

INSIGHT #3:

As organizations increasingly undergo digital transformation, investing in employees' digital skills training has become an imperative to achieve business goals.

Organizations across APJ are increasingly adopting digital technologies for better customer outreach, product and service diversification, and operational efficiencies. According to the International Data Corporation (IDC), by 2025, 75 percent of business leaders in APJ will leverage digital platforms and ecosystems to adapt their value chains to new markets.¹⁷

Ensuring that workers can implement digital transformation successfully has thus become an imperative for employers. Our survey shows that digital skills training has helped fast-tracked digitization goals for 85 percent of organizations in the region. Organizations have also experienced numerous other benefits, including improved employee productivity (reported by 88 percent of employers), cost efficiencies (85 percent), and increased revenue (82 percent). Adopting new technologies can also help organizations meet their sustainability goals. Box 1 demonstrates how cloud adoption can lead to more sustainable business practices.

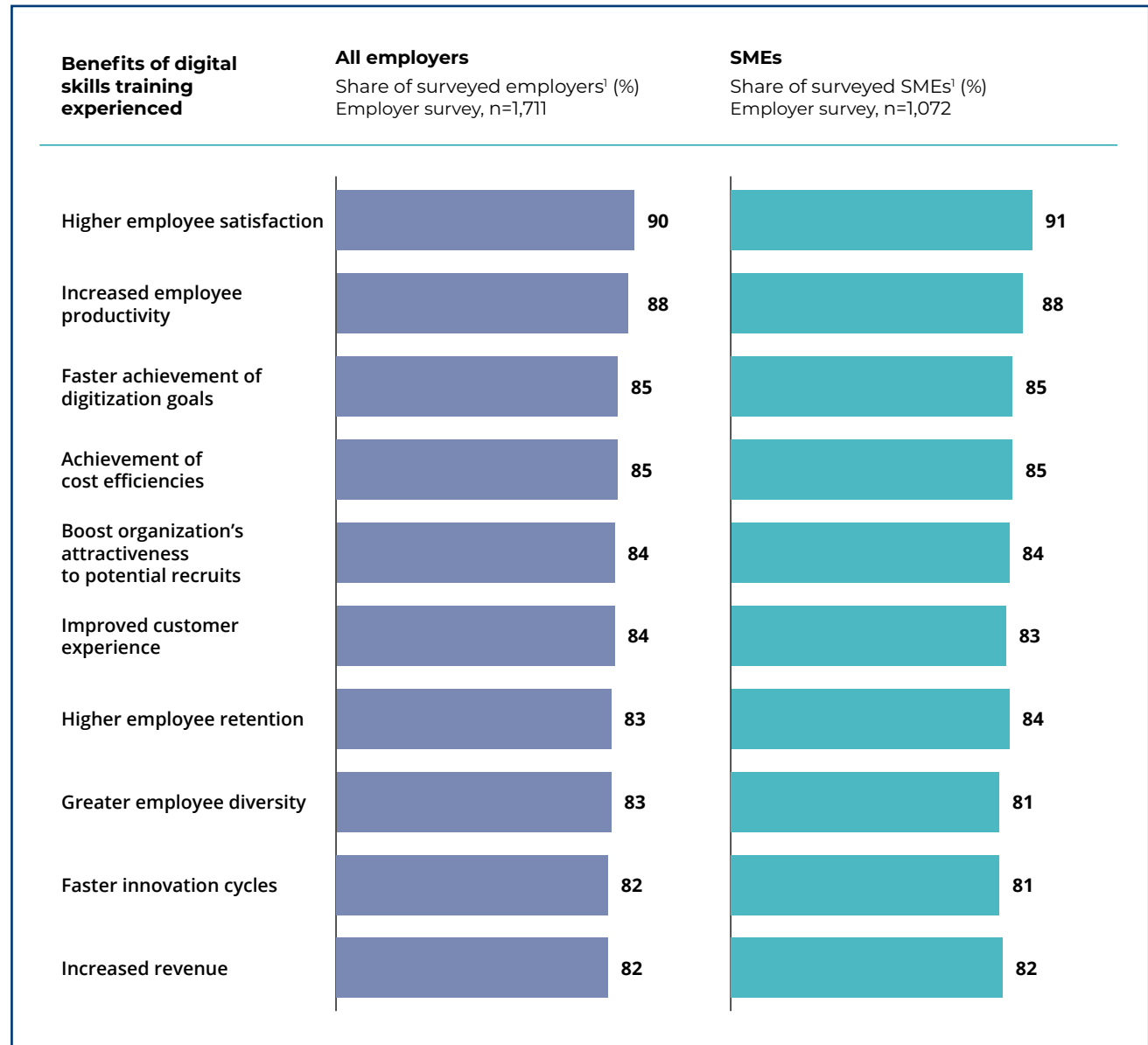
Investing in digital skills training is also critical for small and medium sized enterprises (SMEs) to grow and be more efficient. SMEs¹⁸ that have invested in digital skills training for their employees saw the following benefits: increased employee productivity (88 percent of SMEs report this benefit), cost efficiencies (85 percent), improved customer experience (83 percent) and increased revenue (82 percent).

17. International Data Corporation (2020), "IDC predicts 65% of APAC GDP will be digitalized reaching US\$1.2 trillion in spending by 2022". Available at: https://www.idc.com/getdoc.jsp?containerId=prAP46972820&utm_medium=rss_feed&utm_source=Alert&utm_campaign=rss_syndication

18. SMEs in the context of this research includes all companies with less than 999 employees – "small-sized" companies are those with fewer than 100 employees, while "medium-sized" companies are those with between 100 and 999 employees.

EXHIBIT 3:

DIGITAL SKILLS TRAINING CAN HELP ORGANIZATIONS ACHIEVE BUSINESS OBJECTIVES



1. Based on the share of surveyed employers who somewhat or strongly agree that they had experienced the benefit from implementing digital skills training.

SOURCE: AlphaBeta survey of 2,166 employers in 7 countries (Australia, India, Indonesia, Japan, New Zealand, Singapore, South Korea) in August 2021; AlphaBeta analysis

BOX 1: **LEVERAGING THE CLOUD TO INCREASE ENVIRONMENTAL SUSTAINABILITY**

In Asia Pacific and Japan, migrating business applications from on-premises facilities to the cloud can lead to energy savings of close to 80 percent.¹⁹ This is achieved through higher server utilization, power and cooling efficiency, custom data center design, and usage of renewable energy by cloud providers. On average, AWS customers are found to use 77 percent fewer servers, 84 percent less power, and obtain a 28 percent cleaner power mix from using the AWS Cloud instead of operating their own data centers.²⁰

Writing efficient and accurate codes can also lead to better energy utilization – Amazon’s CodeGuru machine learning, for instance, helps the company identify codes that hinder application performance, resulting in a 325-percent increase in Central Processing Unit (CPU) utilization between 2017 and 2018.²¹

AWS has recently launched a Sustainability Pillar as part of the AWS Well-Architected framework,²² to help organizations improve their sustainability in the cloud.²³ The Pillar helps developers and cloud architects evaluate the trade-offs between efficiency and energy consumption, and highlight patterns and best practices for environmental sustainability – for example, through selecting an efficient programming language, adopting modern algorithms, using efficient data storage techniques, and deploying correctly sized and efficient infrastructure.

19. 451 Research (2021), *The Carbon Reduction Opportunity of Moving to the Cloud for APAC*. Available at: <https://assets.aboutamazon.com/2b/73/4/5c2c684e1b8461b217fe4ea138/aws451researchapocjuly2021.pdf>

20. AWS (2015), “Cloud Computing, Server Utilization & the Environment.” Available at: <https://aws.amazon.com/blogs/aws/cloud-computing-server-utilization-the-environment/>

21. Accenture (2021), *The green behind the cloud*. Available at: <https://www.accenture.com/us-en/insights/strategy/green-behind-cloud>

22. The AWS Well-Architected Framework describes key concepts, design principles, and architectural best practices for designing and running workloads in the cloud. Source Amazon Web Services. Available at: <https://aws.amazon.com/architecture/well-architected/?wa-lens-whitepapers.sort-by=item.additionalFields.sortDate&wa-lens-whitepapers.sort-order=desc>

23. AWS (2021), “New – Sustainability Pillar for AWS Well-Architected Framework.” Available at: <https://aws.amazon.com/blogs/aws/sustainability-pillar-well-architected-framework/>

INSIGHT #4:

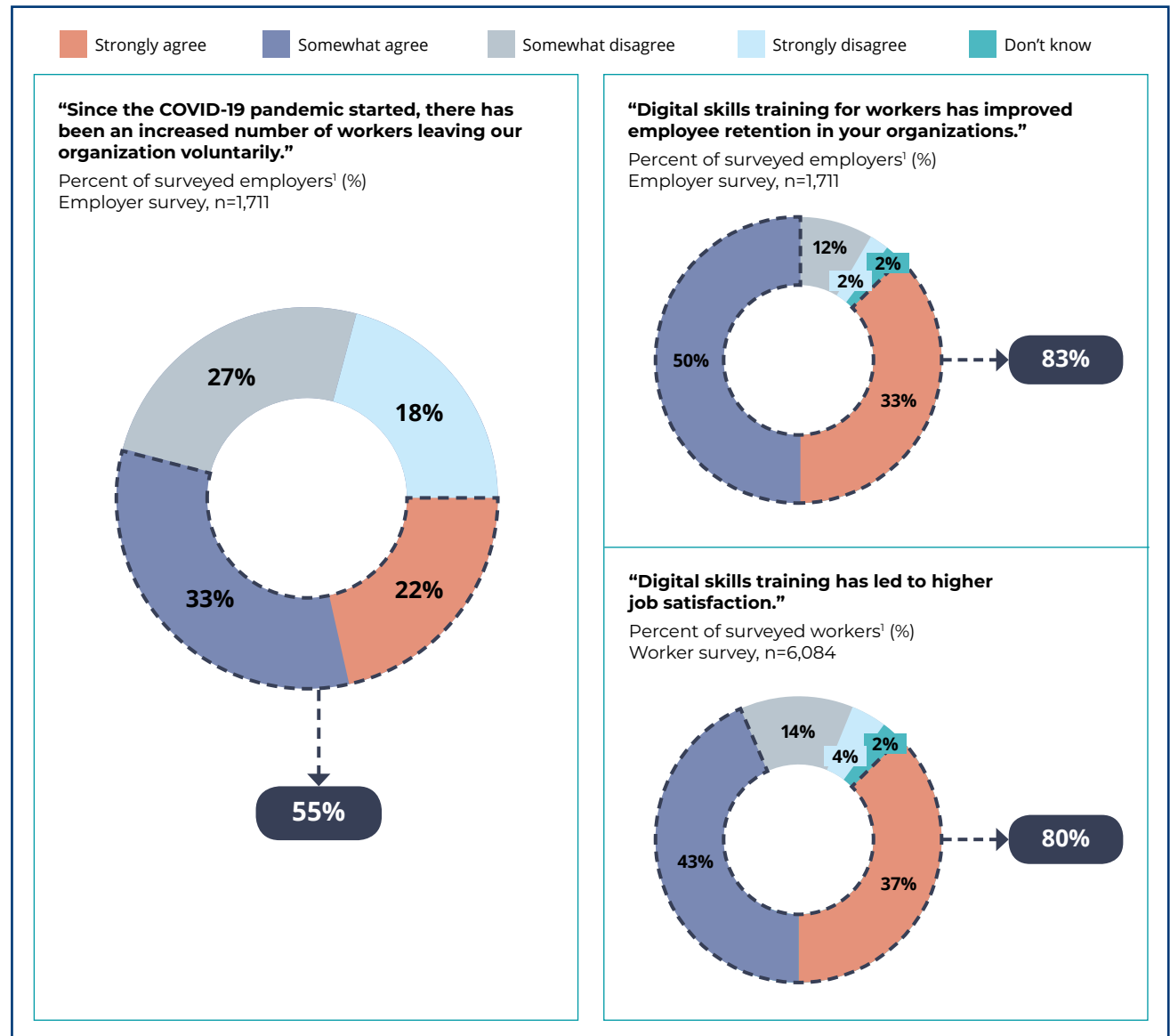
Digital skills training in workplaces can help boost worker retention.

55 percent of employers in APJ report increased worker resignations since the COVID-19 pandemic started (Exhibit 4). Other research finds that this is driven by factors ranging from the desire to make a career switch, greater job opportunities in emerging industries, to workers feeling burnout, dissatisfaction with their working conditions, and disruptions due to the pandemic.²⁴ This trend is especially pronounced in Singapore, where 65 percent of employers report increased worker resignations – the highest across all seven countries studied.

While it is in no way a silver bullet, this study finds that providing support for digital skills training in workplaces can be a helpful employee retention tool, with **83 percent of employers reporting higher employee retention** after implementing digital skills training in the workplace. **80 percent of workers also report higher job satisfaction** upon undertaking digital skills training. Other research has also shown that workers who constantly learn new skills in their jobs are more engaged, more satisfied with their career direction, and feel a stronger sense of loyalty and belonging.²⁵

EXHIBIT 4:

WHILE IT IS NO WAY A SILVER BULLET, IMPLEMENTING DIGITAL SKILLS TRAINING IN THE WORKPLACE CAN BOOST EMPLOYEE ENGAGEMENT AND RETENTION



1. Percentages may not total to 100 due to rounding.

SOURCE: AlphaBeta survey of 7,193 workers and 2,166 employers in 7 countries (Australia, India, Indonesia, Japan, New Zealand, Singapore, South Korea) in August 2021; AlphaBeta analysis

24. Sources include: BBC (2021), “What we’re getting wrong about the great resignation.” Available at: <https://www.bbc.com/worklife/article/20211028-what-were-getting-wrong-about-the-great-resignation>; The Washington Post (2021), “The ‘Great Resignation’ goes global.” Available at: <https://www.washingtonpost.com/world/2021/10/18/labor-great-resignation-global/>

25. Biz Library (2021), “What’s the real cost of employee training programs?” Available at: <https://www.bizlibrary.com/blog/training-programs/cost-of-training-employees/>

INSIGHT #5:

Digital skills training can open up new career pathways for workers.

Beyond helping workers meet requirements in their jobs, learning digital skills can open up new career development opportunities and pathways, including within their current organizations. This benefit is not just experienced by tech workers, but also non-tech workers.²⁶ **82 percent of tech workers and 76 percent of non-tech workers who have undergone digital skills training feel that such training has improved their employability** (Exhibit 5).

Other benefits experienced by both types of workers include: greater efficiency in doing their jobs (indicated by 86 percent of tech workers and 88 percent of non-tech workers); greater personal satisfaction (85 and 84 percent); and a greater ability to make career switches (78 and 67 percent).

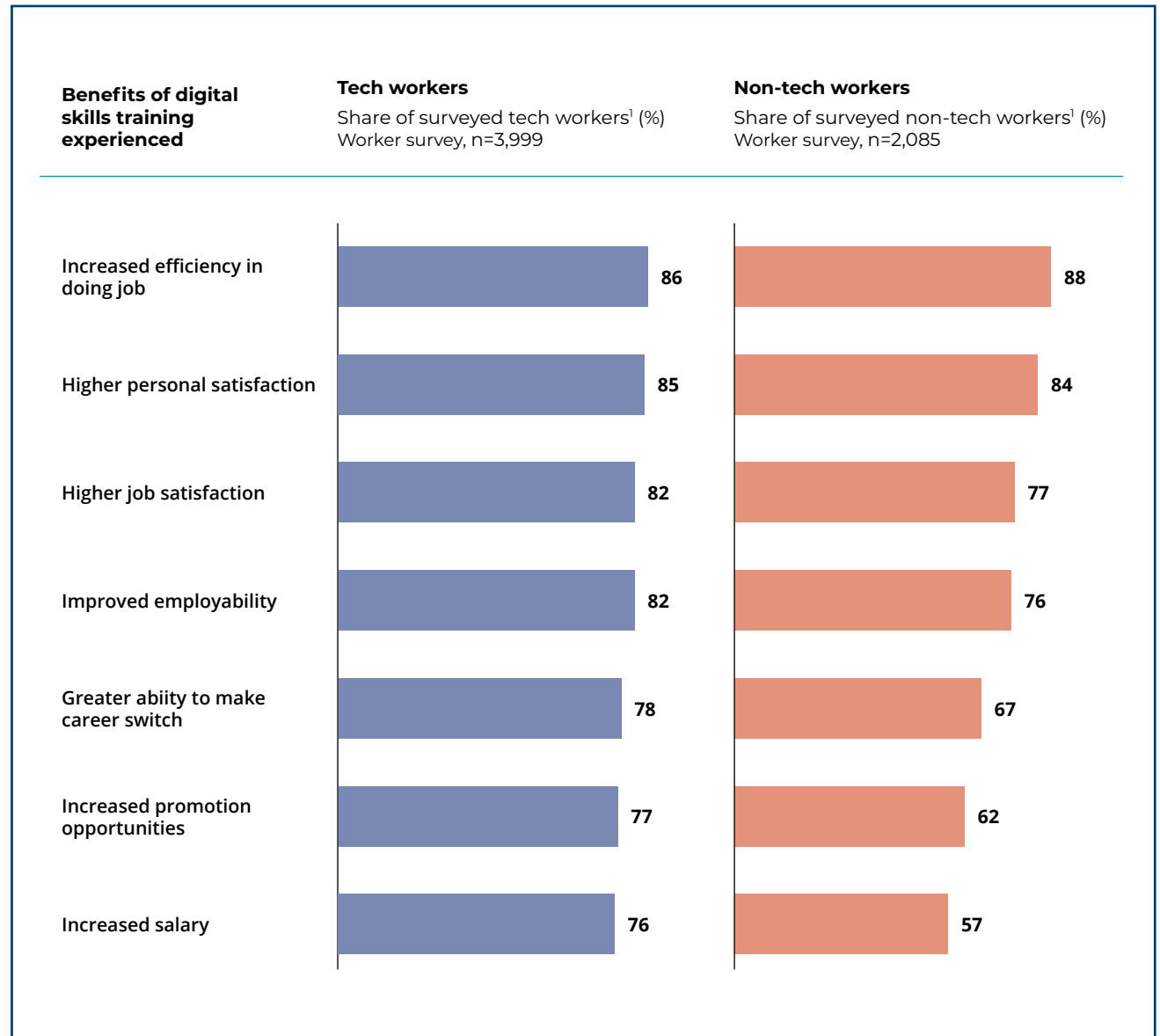
The benefits of digital skills training apply to all worker age groups as well: 78 and 77 percent of workers aged 40 and below report that undertaking digital skills training has resulted in increased salary and promotion opportunities respectively. 87 percent of workers aged above 40 said that they have become more efficient in their work upon undertaking training.

Upskilling can be mutually beneficial. Workers want to work at organizations that invest in their career development. At the same time, organizations enjoy both greater employee retention and the ability to harness new skills for innovations. **84 percent of employers report that providing digital skills training support for workers has boosted their organizations' attractiveness to potential recruits, while 83 percent report increased employee retention.** To capitalize on workers' newly acquired skills, employers should create opportunities for them to apply these skills at work.

26. Tech workers refer to those in occupations that require specialized technology expertise to develop new technological products, services, and applications. Non-tech workers refer to those in occupations that do not require specialized technological knowledge and skills but need some basic technological skills such as knowing how to use word processing software. Refer to glossary in this report for more detail.

EXHIBIT 5:

DIGITAL SKILLS TRAINING BENEFITS BOTH TECH AND NON-TECH WORKERS



1. Based on the share of surveyed tech/non-tech workers who somewhat or strongly agree that they had experienced the benefit from undergoing digital skills training.

SOURCE: AlphaBeta survey of 4,272 tech workers and 2,921 non-tech workers in 7 countries (Australia, India, Indonesia, Japan, New Zealand, Singapore, South Korea) in August 2021; AlphaBeta analysis

THE TRAINING SHORTFALL IN APJ

INSIGHT #6:

An estimated 86 million more people across the seven countries in APJ will need to undertake digital skills training over the next year alone.

As new roles emerge and skill requirements evolve rapidly, the workforce will need to adopt a mindset of lifelong learning and build a habit of regular training.

Assuming that digitally skilled workers who do not currently undertake regular digital skills training start doing so, and that the number of workers who require digital skills to do their jobs grows at the same pace as observed over the past five years, an estimated 86 million²⁷ more people in the seven countries will require training over the next year (Exhibit 6).²⁸ In other words, **86 million more people will require digital skills training over the next year alone in order to keep pace with technological advancements.**

This number comprises two groups of workers: digitally skilled workers who need to refresh their digital skills to remain relevant and advance in their careers, and non-digitally skilled workers who need to meet the changing demands of their jobs or access new jobs requiring such skills. 86 million people constitutes 14 percent of the total workforce across the seven countries.²⁹

64 percent of workers in APJ also feel that they will require training in cloud-related skills by 2025. Among these workers, 54 percent believe they will need to learn how to make use of cloud-based tools in their work as well as maintain safe and secure digital systems, 33 percent believe they will need to learn how to migrate on-premises facilities to the cloud, and 27 percent believe that they will need to get trained on cloud architecture design to progress in their careers.³⁰

27. This estimate differs from that in AlphaBeta's 2021 study (commissioned by Amazon Web Services) titled "Unlocking APAC's Digital Potential: Changing Digital Skill Needs and Policy Approaches" in 3 ways. Firstly, the estimate in this study applies to workers in 7 APAC countries while the 2021 study applies to workers in 6 APAC countries. Secondly, the estimate in this study applies only to current and future workers, while the estimate in the 2021 study applies to 3 types of workers (current workers, future workers and disenfranchised workers). Lastly, the estimate in this study is only for the next year while that in the 2021 study is for 5 years between 2020 and 2025.

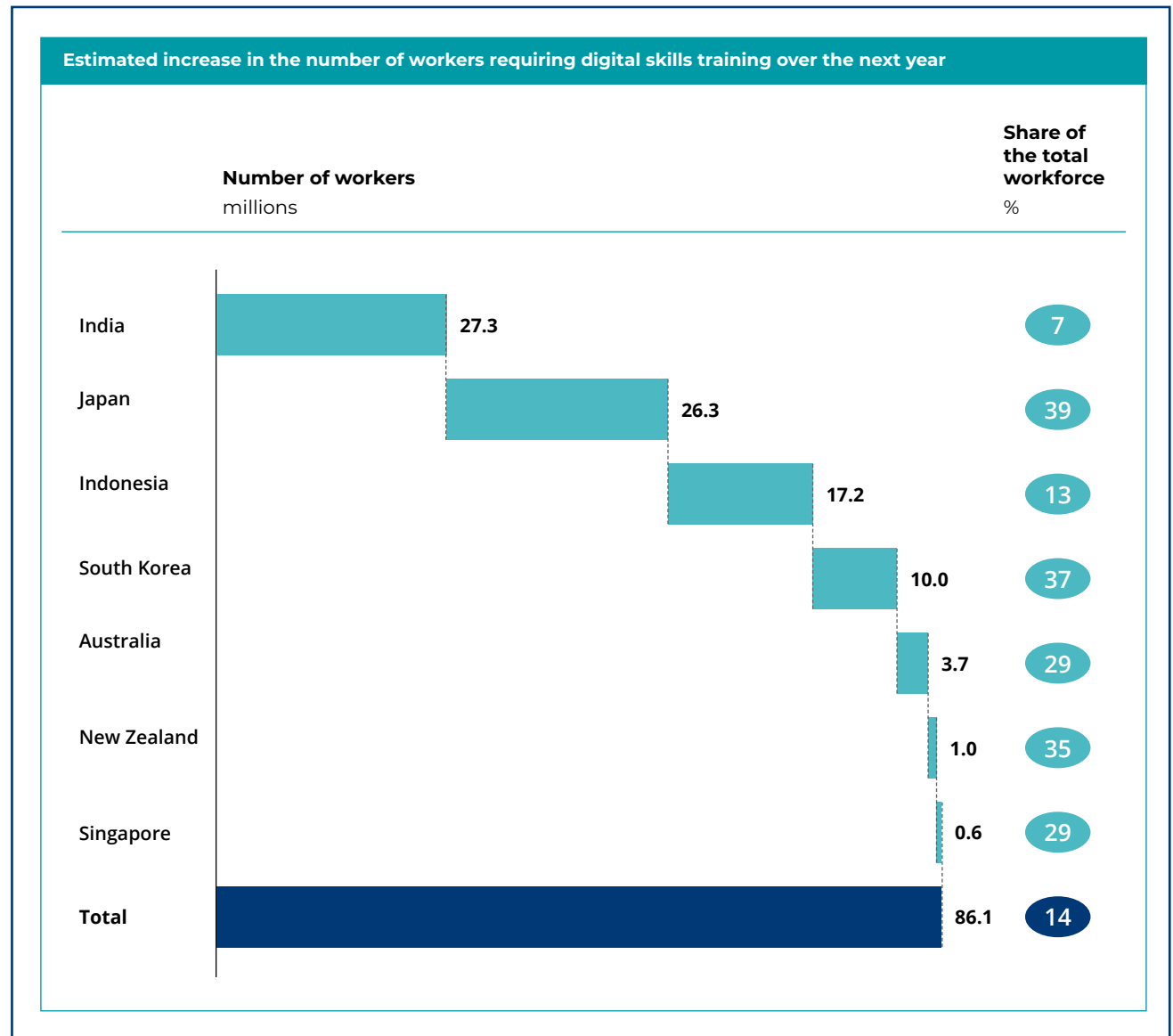
28. This estimate comprises both digitally skilled workers who will need to refresh their digital skills more regularly in order to keep pace with future digital skill needs, as well as non-digitally skilled workers who are assumed to need training over the next year as they progress into jobs requiring digital skills. For details of how this number was estimated, please refer to the Appendix.

29. Industrial Labor Organization (2021). *Labor force by sex and age*. Available at: <https://ilostat.ilo.org/topics/population-and-labour-force/>

30. Note that these percentage figures do not add up to 100 percent, as some workers that they will need to learn more than one type of cloud-related skills by 2025.

EXHIBIT 6:

ACROSS THE 7 COUNTRIES IN THIS STUDY, AN ESTIMATED 86 MILLION MORE PEOPLE WILL REQUIRE DIGITAL SKILLS TRAINING OVER THE NEXT YEAR



NOTE: Refer to Appendix for how these estimates were derived.

SOURCE: AlphaBeta survey of 7,193 workers in 7 countries (Australia, India, Indonesia, Japan, New Zealand, Singapore, South Korea) in August 2021; AlphaBeta analysis

INSIGHT #7:

A digital skills training shortfall exists today: although 97 percent of organizations see a need to train their workers on digital skills, only 29 percent have implemented a plan to do so.

As skills take time to build, employers and workers need to be forward-looking and start building their skills today. AlphaBeta's 2021 study showed that on average, workers in the APAC region will need to learn seven new digital skills by 2025 in order to keep pace with technological change.³¹ Building on this finding, this study finds a significant training shortfall in APJ today: **although 97 percent of organizations see a need to train their workers on digital skills, only 29 percent have implemented a plan to do so – reflecting a 68 percent training shortfall** (Exhibit 7).³²

This training shortfall is evident in all countries, ranging from 52 percent in India to 80 percent in Japan (Exhibit 7). This variation is driven by the difference in training levels, which is in turn affected by factors such as organizational stances on developing in-house tech capabilities and workers' attitudes towards upskilling.

This training shortfall is concerning, particularly with **two-thirds of workers in the region admitting that they are not confident about learning digital skills fast enough to meet their future career requirements. This lack of confidence appears more prominent with age** – 83 percent of older workers (aged 55 and above) feel that they are not building digital skills fast enough for future skill needs, as compared to 75 percent of middle-aged workers (aged 40-55) and 60 percent of younger workers (aged 40 and below).

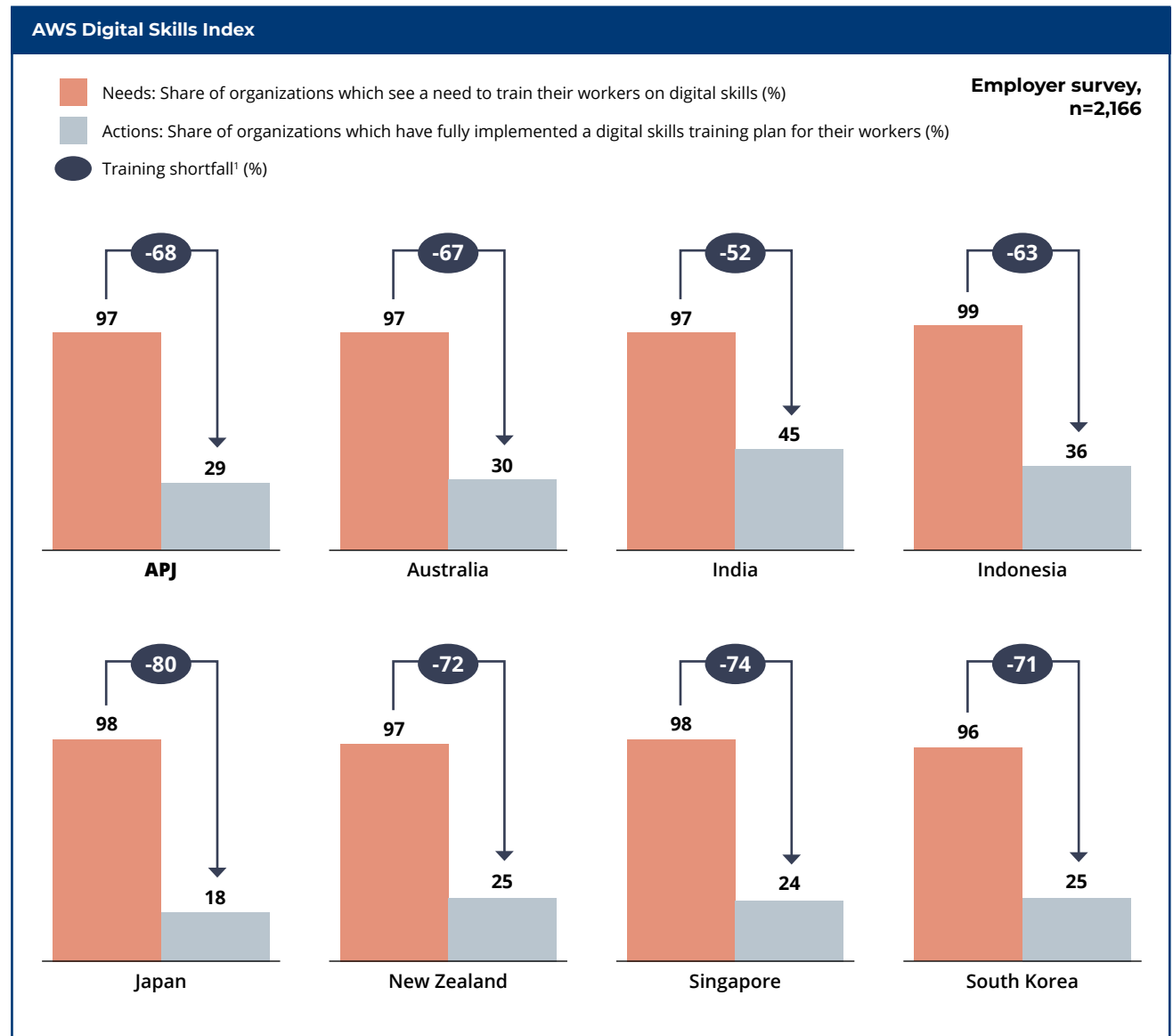
The lack of confidence among older workers is likely be contributed by the low levels of training among them. Only 46 percent of older workers (aged 55 and above) undertake digital skills training at least once a year, as compared to 58 percent of middle-aged workers (aged 40-55) and 71 percent of younger workers (aged 40 and below).

31. AlphaBeta (commissioned by Amazon Web Services), 2021, Unlocking APAC's Digital Potential: Changing Digital Skill Needs and Policy Approaches. Available at: <https://alphabeta.com/our-research/unlocking-apacs-digital-potential-changing-digital-skill-needs-and-policy-approaches/>

32. This means that the organization has fully implemented a digital skills training program in the organization, which involves having a clear set of strategic objectives for the training, a clear curriculum, training scope, employee communications, mechanism for regular updates to the training program and curriculum to maintain relevance to emerging digital skill needs, and securing the needed resources to implement the program.

EXHIBIT 7:

A TRAINING SHORTFALL EXISTS IN APJ TODAY – THERE IS A GAP BETWEEN DIGITAL TRAINING ACTIONS AND TRAINING NEEDS



1. Difference between the share of surveyed employers who identified the need to train their workers on digital skills, and the share that implement digital skills training.

SOURCE: AlphaBeta survey of 2,166 employers in 7 countries (Australia, India, Indonesia, Japan, New Zealand, Singapore, South Korea) in August 2021; AlphaBeta analysis

INSIGHT #8:

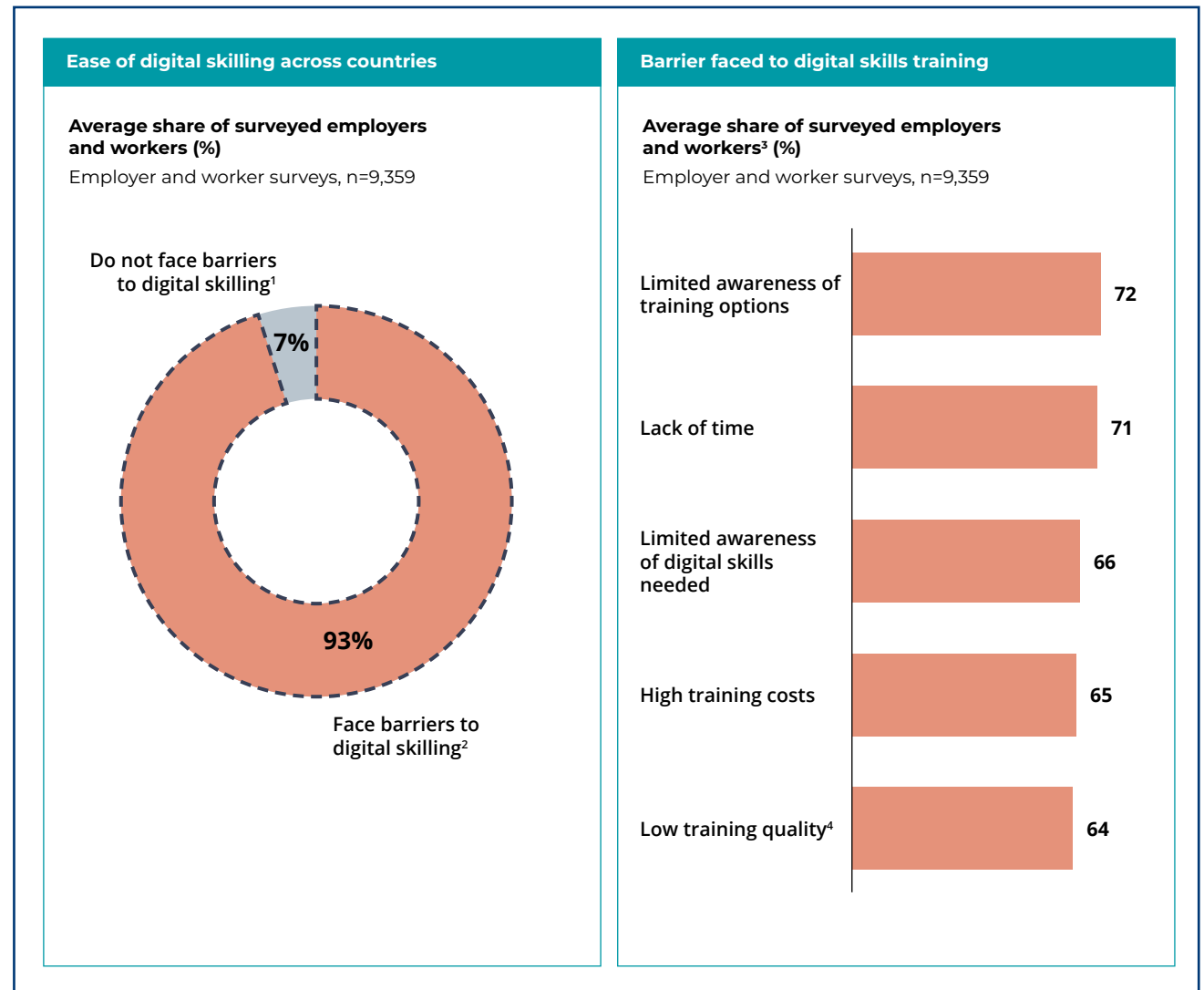
Overcoming the barriers faced to training can help to reduce the training shortfall.

Across the seven countries, 93 percent of workers and employers face barriers to accessing digital skills training for themselves or their organizations today (Exhibit 8). Although the specific share of the workforce that faces hurdles to digital skills training varies by country, it is consistently high across all countries – from 91 percent in South Korea to 96 percent in Indonesia.

The two most common barriers faced are the limited awareness of training options available (indicated by 72 percent of employers and workers), and the lack of time to pursue training (indicated by 70 percent of workers) (Exhibit 8). The limited awareness of training options available may be driven by the concentrated marketing of such training courses in niche platforms, which are not widely used by all workers within a country. Employers and workers who cite the lack of time as a barrier could also be adopting the mindset that pursuing training requires workers to take an extended time off from their full-time employment or are unaware of the widely available on-demand courses.

EXHIBIT 8:

MOST EMPLOYERS AND WORKERS FACE BARRIERS TO ACCESSING DIGITAL SKILLS TRAINING



1. Average share of surveyed employers and workers who somewhat or strongly disagree that they face any barriers in supporting/undertaking digital skills training.

2. Average share of surveyed employers and workers who somewhat or strongly agree that they face at least 1 barrier in supporting/undertaking digital skills training.

3. Average share of surveyed employers and workers who somewhat or strongly agree that they face the barrier in supporting/undertaking digital skills training.

4. This barrier applies only to worker respondents in the study, as workers are the "end users" of such training and are deemed to have a better gauge of training quality.

SOURCE: AlphaBeta survey of 7,193 workers and 2,166 employers in 7 countries (Australia, India, Indonesia, Japan, New Zealand, Singapore, South Korea) in August 2021; AlphaBeta analysis

BOX 2:

INDUSTRY-SPECIFIC INSIGHTS FROM THE SURVEYS

Across the seven countries, the five industries with the highest number of responses for both the employer and worker surveys are: information and communication technology (ICT); financial services; professional services; retail trade; and manufacturing. Below are some key insights that are distinctive across the five industries.

- **Basic cloud skills are required across all industries, but the types of advanced cloud-related skills needed differ.** The ability to use cloud-based tools is the top-ranked in-demand skill in all sectors except the retail industry, where it is the second most in-demand skill (after cybersecurity skills). The types of advanced cloud-related skills needed differ across industries. In the manufacturing sector, cloud migration skills are particularly important, where it is ranked the 4th most in-demand skill by 2025. In the ICT and professional services sectors, cloud architecture design skills are highly demanded, ranking 4th in both industries. This reflects growing cloud adoption in the manufacturing sector, and also a growing sophistication of cloud use in the ICT and professional services sectors.
- **The training shortfall is most pronounced in the manufacturing and retail industries.** While 100 and 98 percent of employers in both industries respectively believe that digital skills training is necessary, only 23 and 21 percent currently implement digital skills training in the workplace. These are the largest training gaps observed across industries, reflecting a need for policies to focus on both sectors.
- **Among the five industries, workers in the professional services, manufacturing, and retail industries feel the least confident about their ability to meet future digital skill needs of the economy.** 73 percent of workers in both the professional services and trade industries, followed closely by 72 percent of workers in the manufacturing industry, do not feel confident that they are acquiring digital skills fast enough to meet future needs. A similar lack of confidence also exists in the other two industries, but to a smaller extent. This highlights the need for employers and workers in these industries to heighten their digital skills training efforts.



BOX 3:

DIFFERENCE IN SURVEY FINDINGS ACROSS PUBLIC AND PRIVATE SECTORS

This study surveyed 631 and 1,438 employers from the public and private sectors respectively, as well as 1,831 and 4,989 workers in each sector. Below are notable insights across the two sectors:

- **Cloud skills are highly demanded by employers in both public and private sectors.** In both sectors, the ability to use cloud-based tools and migrate on-premises facilities to the cloud are predicted to be the top and 5th most in-demand digital skills by employers by 2025, respectively. Meanwhile, cloud architecture design is ranked as the 10th likely most demanded digital skill by employers in public organizations by 2025, and ranked 8th by the private sector. This highlights the pervasive nature of cloud adoption across both sectors, and a need to prioritize cloud skills training in digital skills regimes.
- **Workers in the private sector feel less confident about their ability to meet future digital skill needs of the economy.** The share of private sector workers who feel that they are not acquiring digital skills fast enough to meet future needs is five percentage points higher than those in public organizations. These shares are 64 percent in the public sector and 69 percent in the private sector. This could be contributed by the more competitive environment and greater extent of digitization in private organizations – the share of private organizations that fast-tracked their digitization efforts due to the pandemic is higher than that of public organizations, at 88 and 82 percent respectively. While private sector workers need to accelerate training to meet future skill demands, the imperative also exists for public sector workers so as to drive digitization in their workplace.
- **The main barrier to digital skills training for public sector workers is the limited awareness of available training courses, while that for private sector workers is the lack of time.** The limited awareness of available training courses is the barrier that most public sector workers face (73 percent cite this); for private sector workers, this is the lack of time to pursue training (71 percent). Policy approaches to increase skilling rates for both sectors will thus need to take these into account.



INSIGHT #9:

There is also an opportunity to provide more skills training to underserved communities and those who are unemployed.

Underserved communities such as women, at-risk youth, unemployed individuals, rural communities, and low-skilled migrant workers tend to face larger challenges in accessing digital skills training opportunities. This is due to factors such as the lack of financial resources to access digital devices and the Internet, as well as being left out of employer support given their unemployment state.³³ Exhibit 9 shows examples of communities in each of the seven countries who lack access to digital technology and skills training.








This is a major concern given that digital inclusion is an important step for economies to fully unlock the benefits of digital transformation. **83 percent of employers in this study report that providing digital skills training in the workplace has resulted in greater employee diversity in their organizations, as they are able to retain and attract workers with more diverse demographics and skillsets.** Past research has shown that companies with more diverse management teams observe 19 percent higher revenues due to increased innovation.³⁴

33. Sources include: Borgen Magazine (2021), "How the Digital Divide Affects Poverty in India Amid COVID-19." Available at: <https://www.borgenmagazine.com/digital-divide-in-india/>; CNA (2021), "Commentary: COVID-19 has revealed a new disadvantaged group among us – digital outcasts." Available at: <https://www.channelnewsasia.com/commentary/covid-19-has-revealed-digital-divide-literacy-singapore-933441>; ILO (2018), *Digitalization to promote decent work for migrant workers in ASEAN*. Available at: http://www.ilo.org/wcmsp5/groups/public/-/asia/-/ro-bangkok/-/sro-bangkok/documents/publication/wcms_713546.pdf; The New York Times (2021), "Japan Needs a Lot More Tech Workers. Can It Find a Place for Women?" Available at: <https://www.nytimes.com/2021/09/01/business/japan-tech-workers-women.html>

34. Boston Consulting Group (2018), *How Diverse Leadership Teams Boost Innovation*. Available at: <https://www.bcg.com/en-us/publications/2018/how-diverse-leadership-teams-boost-innovation>

EXHIBIT 9:

UNDERSERVED COMMUNITIES FACE LARGER CHALLENGES IN ACCESSING DIGITAL SKILLS TRAINING OPPORTUNITIES

Country	Example of underserved communities	Key fact/s
	Low-income individuals	31% of Australians in the lowest income quintile face significant challenges in accessing, purchasing, and using digital tools and technology, as compared to 17% of the national average
	Rural communities	Only 32% of people in rural areas of India had access to the Internet in 2020, as compared to 67% in urban areas
	Women	Only 16% of females have mobile Internet access, compared to 35% of males
	Rural communities	While nearly 60% of the population in Java (the region with Indonesia's largest cities) has access to the Internet, the share is only 11% in Sulawesi, Maluku, and Papua, 7% in Kalimantan, and 5% in Bali and Nusa Tenggara
	Women	Compared to 70% of men, only about 50% of women in Japan are employed, precluding them from receiving training support from employers. Among high-income countries, Japan has one of the lowest shares of women represented in tech-related employment, at 13% , compared to 25% in other developed countries
	People with disabilities	27% of people with disabilities do not have access to the Internet – more than triple the share of the national average
	Low-income individuals	Only 45% of households residing in 1- and 2-room government flats have Internet access, compared to 96% of households living in private condominiums and other apartments
	Senior citizens	The share of South Koreans aged above 55 who has access to the Internet is 30 percentage points lower than that of the general public, and the share with the ability to use computer and mobile devices is 46 percentage points lower

SOURCE: Australia Digital Inclusion Index (2021), Measuring Australia's Digital Divide; Borgen Magazine (2021), "How the Digital Divide Affects Poverty in India Amid COVID-19"; The Jakarta Post (2020), "Disconnected: Digital divide may jeopardize human rights"; Statista (2020), Female employment rate in Japan from 2011 to 2020; Women of Silicon Roundabout (2018), "Women in tech by country"; New Zealand Government (2019), Digital inclusion and wellbeing in New Zealand; CNA (2021), "Commentary: COVID-19 has revealed a new disadvantaged group among us – digital outcasts"; Jun (2021), A Study on Cause Analysis of Digital Divide among Older People in Korea; AlphaBeta analysis

**UNLOCKING FUTURE
WORKFORCE POTENTIAL –
RECOMMENDATIONS FOR
GOVERNMENTS, TRAINING PROVIDERS,
EMPLOYERS AND WORKERS**

There is an opportunity for governments, training providers, employers, and workers to address the barriers faced to digital skilling. The barriers faced by organizations and workers to digital skills training can be tackled through the following actions:

- **Promote courses for high-demand digital skills through official government platforms or portals.** A limited awareness of the available training options is the most common barrier faced in pursuing digital skilling, with 72 percent of employers and workers in the seven countries citing this. To address this barrier, governments can broaden the awareness of industry-led courses available by consolidating and promoting them on online platforms or portals, and work with training providers to develop one-stop training platforms on digital skills courses. Some international best practices of collaboration between government and industry on digital skills training can be found in Box 4.

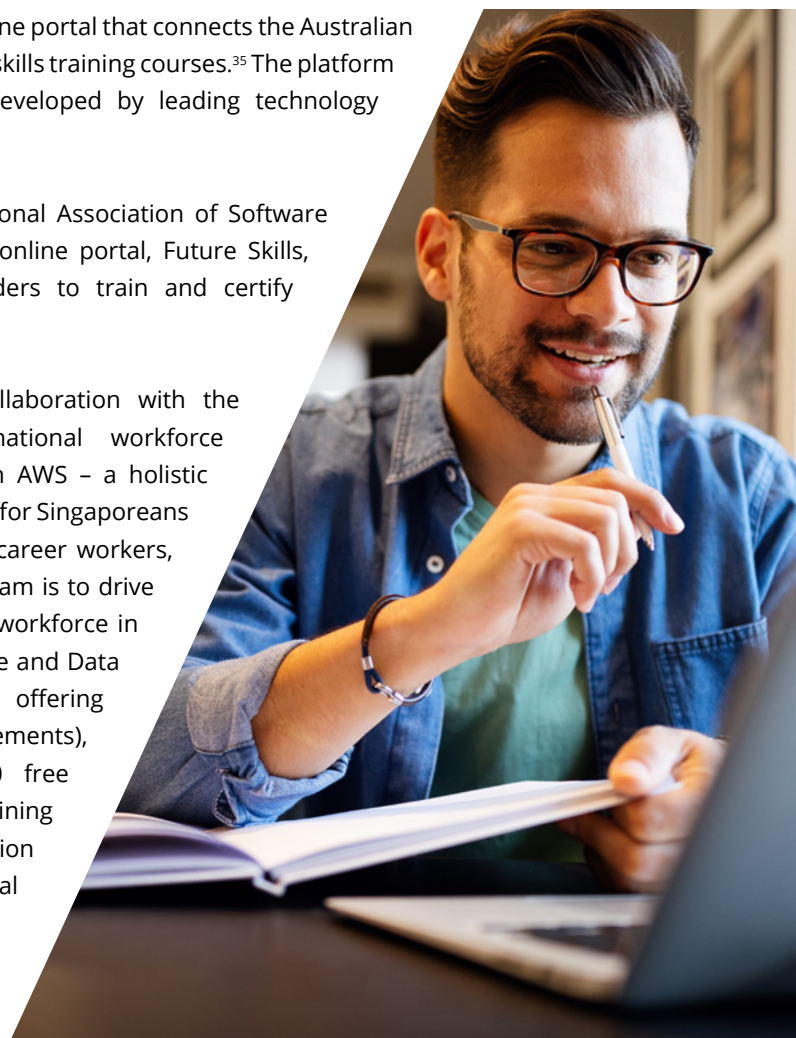
BOX 4:

GOVERNMENT AND INDUSTRY PARTNERSHIPS ON DIGITAL SKILLS TRAINING – INTERNATIONAL BEST PRACTICES FROM THE REGION

Skill Finder portal in Australia. Skill Finder is an online portal that connects the Australian workforce and small to medium businesses to digital skills training courses.³⁵ The platform contains over 1,000 digital micro-skills courses developed by leading technology companies from across the world.

Future Skills program in India. In India, the National Association of Software and Service Companies (NASSCOM) developed an online portal, Future Skills, that curates learning content from global providers to train and certify IT professionals in emerging technologies.³⁶

Cloud Ready SG with AWS (Singapore). In collaboration with the Singapore Government, AWS developed a national workforce development program called Cloud Ready SG with AWS – a holistic digital and cloud technology skilling program curated for Singaporeans across segments.³⁷ From new graduates and early career workers, to mid-career professionals, the intent of this program is to drive inclusive growth in training the current and future workforce in Singapore. This program includes AWS Infrastructure and Data Center Training Program (a 3–12-month program offering skills training, on-the-job traineeship, and job placements), free online training (with access to over 500 free on-demand online AWS courses), classroom training courses for the Information and Communication Technology (ICT) workforce, professional competencies for the financial industry, virtual job fairs, as well as six-month internship programs with AWS itself.



35. Skill Finder (2021), "About Skill Finder." Available at: <https://www.skillfinder.com.au/page/about>

36. NASSCOM (2021), *FutureSkills*. Available at: <https://futureskills.nasscom.in/about-futureskill.html>

37. Amazon Web Services (2021), "Building a future-ready and digitally skilled workforce in Singapore". Available at: <https://www.aboutamazon.sg/news/aws/building-a-future-ready-and-digitally-skilled-workforce-in-singapore>

- **Promote on-demand micro-courses and credentials.** The lack of time to pursue training is the second most commonly faced barrier, with 71 percent of workers in the seven countries citing this. To address this barrier, governments can work with industry to develop short-term micro-skills training courses, such as the micro-credential system and courses in New Zealand (Box 5). On the other hand, workers can take courses in modular, micro-skills that are available on-demand. Box 6 contains examples of such courses – free, on-demand cloud computing courses provided by AWS.

BOX 5:

PROVIDING LEARNERS WITH ACCESS TO MICRO-CREDENTIALS IN NEW ZEALAND

The New Zealand Qualifications Authority (NZQA) introduced a micro-credential system which certifies the achievement of a set of skills and knowledge at a smaller scale.³⁸ It also develops stand-alone education products intended to enable learners to access specific knowledge and skills in a cost-effective and time-efficient way. Within the NZQA website, individuals can access available training courses that are eligible to be certified as a micro-credential.



38. New Zealand Qualifications Authority (2018), "Recognising micro-credentials in New Zealand." Available at: <https://www.nzqa.govt.nz/about-us/consultations-and-reviews/recognising-micro-credentials/>



BOX 6: **EXAMPLES OF AWS'S TRAINING PROGRAMS**

With an aim to provide 29 million people globally with access to free cloud computing skills training by 2025, AWS offers a range of training programs for different types of workers.

FREE, ON-DEMAND CLOUD SKILLS TRAINING COURSES FOR INDIVIDUALS

AWS Training offers more than 500 free, online courses covering AWS services from foundational to advanced levels. These courses are accessible through the **AWS Skill Builder**, an online platform that allows individuals to easily access free on-demand courses. Many courses are offered in local languages, including Bahasa Indonesia, Chinese, Japanese, and Korean. **AWS Educate** also provides individual learners with free, self-paced training resources to build cloud skills on demand. Learners can complete any of AWS's 12 cloud career pathways that are related to in-demand roles such as cloud engineer, cybersecurity specialist, machine learning scientist, and data scientist.

CLOUD SKILLS TRAINING INITIATIVES FOR ORGANIZATIONS

AWS works with organizations to help upskill their workers so that they can innovate using AWS. **AWS Skills Guild** is a comprehensive skills enablement program that builds cloud fluency across an organization. It takes a programmatic approach that helps organizations accelerate cloud outcomes by creating excitement, increasing employee engagement, and nurturing a culture of learning.

CLOUD SKILLS TRAINING FOR STUDENTS

AWS Academy empowers higher education institutions to prepare students for careers in the cloud. The program provides higher education institutions with a ready-to-teach cloud computing curriculum that prepares students to pursue industry-recognized certifications and in-demand cloud jobs.

TARGETED CLOUD SKILLS TRAINING FOR UNEMPLOYED AND UNDEREMPLOYED INDIVIDUALS

AWS re/Start is a program targeted to help unemployed and underemployed individuals access career opportunities in the cloud through a free, full-time, classroom-based training and connecting them to potential employers. The program connects over 90% of graduates with job interview opportunities.



- **Develop digital skills frameworks to guide employers and workers on the types of digital skills needed by sector and occupation.** 66 percent of workers and employers feel that they lack awareness of the digital skills needed. To overcome this challenge, governments can develop digital skills frameworks that inform organizations on the technology they can adopt and guide workers on the digital skills they need, such as Singapore's Industry Transformation Maps (Box 7). Employers can also utilize frameworks and participate in workshops offered by training providers, such as the AWS Skills Guild program (Box 6).

BOX 7: **SINGAPORE'S INDUSTRY TRANSFORMATION MAPS**

Singapore's Industry Transformation Maps (ITMs) provide information on technology impacts, career pathways, the skills required for different occupations, and reskilling options for different industries.³⁹ It also provides a list of training programs for skills upgrading. This allows both employers and workers to identify emerging skills needs and access the training programs available.



39. Skills Future SG (2021), "Skills Framework". Available at: <https://www.ssg.gov.sg/wsq/skills-framework.html>

- **Provide financial support and leverage free training courses.** 65 percent of workers and employers feel that the costs of digital skills training courses are prohibitive. To tackle this barrier, governments can provide reskilling grants to organizations and training credits to workers, while employers can also leverage free or subsidized training courses provided by industry to upskill their workers.
- **Work with technology experts in developing high-quality training courses.** 64 percent of workers feel that digital skills training courses in their country are not high-quality. To overcome this challenge, training providers can collaborate with certified tech experts to ensure that their courses meet industry standards, while workers and employers can look to courses developed by certified tech experts such as those from educational institutions and tech companies.
- **Provide targeted support for underserved communities and unemployed individuals.** Underserved communities are not only receiving little targeted support from organizations but are also facing challenges in getting access to digital technologies and the Internet. To address this issue, governments should make Internet provision in rural and low-income communities a priority, and can incentivize organizations to provide support for them. At the same time, training providers should design programs targeted to underserved communities, such as women, at-risk youth, unemployed individuals, and low-skilled migrant workers. AWS, for instance, provides numerous targeted training programs for such communities. Box 8 demonstrates some of these impacts.
- **Demonstrate the cost-benefit analysis of training to employers.** Together with the training sector, governments can advocate for firms to invest in the employee training. A large variety of research has demonstrated the net-positive impact of training investments to organizations. For instance, a past report by the World Economic Forum (WEF) showed that the benefits of funding reskilling outweigh the costs.⁴⁰ While employers incur financial costs and missed productivity during their workers' reskilling period, they would be able to avoid severance and hiring costs, realize the future increase in productivity of their



workers, and increase job satisfaction among their workers, which is critical for organizational resilience. Other research also found that worker turnover can cost up to 30 percent of a worker's annual salary, while annual training expenditure takes up less than five percent.⁴¹ It is crucial that when making these investment decisions, employers take a holistic approach in assessing the costs and benefits of worker retraining. Exhibit 10 outlines the costs and benefits to employers pertaining to worker retraining.

There is a severe training shortfall in APJ. To bridge the estimated 86 million workers in the seven APJ countries who will need digital skills training to skilling opportunities, and to meet the rapidly rising demand for digital skills in the economy, there needs to be a fundamental shift in the mindsets and modus operandi of digital skills training. A habit of lifelong learning needs to be inculcated in workers, and a culture of workplace upskilling must be a norm in organizations. Unlocking more training will thus require a mindset shift from workers as well as the support of employers, industry, and governments.

40. World Economic Forum (2019), *Towards a Reskilling Revolution*. Available at: [WEF Towards a Reskilling Revolution.pdf \(weforum.org\)](https://www.weforum.org/publications/towards-a-reskilling-revolution)

41. Sources include: Training Mag (2020), *2020 Training Industry Report*. Available at: <https://pubs.royle.com/publication/?m=20617&i=678873&p=24&ver=html5>; HRM Asia (2019), "The true, crippling costs of employee turnover". Available at: <https://hrmasia.com/the-cost-of-employee-turnover/#:~:text=The%20US%20Department%20of%20Labour,an%20annual%20salary%20of%20%2433%2C000>.

BOX 8:

AWS'S DIGITAL SKILLS TRAINING PROGRAMS: EMPOWERING INDIVIDUALS AND ORGANIZATIONS THROUGH CLOUD SKILLS TRAINING

Helping a full-time parent re-enter the labor force. Joe is a Cloud Engineer at Itoc in Brisbane, Australia, who used the AWS re/Start program to get back into the employment market. Despite his previous experience in IT, his five-year break from work to be a full-time parent made it challenging for him to find a new job. Through AWS re/Start, he received training on the latest cloud computing technologies, which allowed him to secure a job within one week upon graduation.

"After being a full-time stay at home parent for the past five years, it was virtually impossible to find a job, despite my prior IT experience. After six months of unsuccessful job hunting, my friend recommended the AWS re/Start program, which gave me all of the tools and skills necessary to successfully land my current IT job."

"The program included hands-on problem-solving tests where we had to think outside of the box and try different methods to find the solution, which allowed me to immerse myself further into the world of cloud computing. One week after I graduated from AWS re/Start, I was offered two jobs, which was a great boost of confidence for me. I joined Itoc in August this year, and I just passed my 'AWS Certified Developer - Associate' exam; I am excited to continue upskilling through the numerous training and certifications offered by AWS."

- AWS re/Start graduate Joe Howe

Joining AWS Academy to equip students with in-demand cloud computing skills. The NorthCap University (NCU) in India participated in AWS Academy, an AWS ready-to-teach cloud computing curriculum, in alignment with its vision to include best-in-class industry-ready computing courses in its engineering and management programs.

"The North Cap University aims to provide a strong industry connect for students which not only helps them in getting employment and internships but create an environment where

students can develop their skills as per the latest industry trends. AWS Academy will be a catalyst for us in this approach and provide students with relevant technology skills to be part of the future workforce."

- Professor Kavita Khanna,
Head of Computer Science and Engineering Department, NCU

Leveraging AWS training to boost cloud operations. With its "data-first, then fashion" outlook, Zalora, an online fashion retailer in Asia, has been running all its systems on AWS since 2016. However, its tech team across Singapore, Malaysia, and Vietnam wanted to do more with the cloud. Zalora collaborated with AWS on a formal training opportunity for its engineers. Within the first six months of the training program, 120 Zalora employees logged 6,048 hours across 35 different courses.



"Many of our engineers working on networking and at our helpdesk attended multiple AWS trainings and view this as their ticket to upskill themselves for internal roles. I believe some employees may choose to stay with Zalora because of these training opportunities, even if they get an offer from another company. They see that we're genuinely invested in helping our employees grow."

"Moreover, many of Zalora's developers have enriched their site reliability engineering (SRE) skills through AWS Training and Certification. The SRE team has a niche, in-demand skill set that's in short supply. Previously, developers relied on SRE teams to set up and manage the infrastructure required for their projects. When developers can spin up and shut down AWS instances on their own, the wait time for SRE resources is eliminated. Since initiating the training program, Zalora performs development work 15-30 percent faster, which leads to an overall increase in time-to-market."

- Raymond Leong,
Director of Enterprise Technology, Zalora Group

EXHIBIT 10:

A HOLISTIC UNDERSTANDING OF THE COSTS AND BENEFITS TO WORKER RETRAINING COULD INCENTIVIZE MORE INVESTMENT BY EMPLOYERS

	COMPONENT	DESCRIPTION
 <p>Costs of worker retraining</p>	Reskilling expenditures	Reskilling costs covered by the company, including payments to course providers and salaries to in-house trainers
	Missed productivity during training	The company continues to pay wages to the employee during the training, but does not receive their full productivity
 <p>Benefits of worker retraining</p>	Avoided severance and hiring costs	Reskilling instead of hiring new talent allows employers to avoid such costs
	Productivity gains from reskilling	Skills learnt could be applied by employees to improve their productivity at work, which translates into overall productivity gains for firms
	Higher job satisfaction among workers, which boost organizational resilience	Studies have shown that worker experience correlates with organizational resilience. Workers appreciate it when their organizations invest in them, which translates to more loyalty, trust, and commitment to the purpose and mission of the organization

SOURCE: Literature review, AlphaBeta analysis

APPENDIX

SURVEY METHODOLOGY



Two surveys on digital skills – one for employers and one for workers – were conducted in each of the seven countries covered in this study: Australia, India, Indonesia, Japan, New Zealand, Singapore, and South Korea. Conducted online from 7 to 30 August 2021, these surveys asked respondents for their views on the following: the amount and frequency of digital skills training undertaken, the types of digital skills trained in, the business and career impacts of digital skills training, the barriers faced to undergoing digital skills training, and perspectives on the types of support required for digital skills training. Employers that were targeted for the survey included business managers, IT managers, and IT decision makers. Workers that were targeted included full-time workers who require some form of digital skills to do their jobs.

In the seven countries, a total of 7,193 workers and 2,166 employers were surveyed.⁴² For the employer survey, a minimum of 300 respondents per country was targeted to ensure statistically significant results at a 90 percent significance level and 5 percent margin of error. For the worker survey, a minimum of 1,000 respondents per country was set to ensure statistically significant results at a 95 percent significance level and 5 percent margin of error. We did not assign weights to the countries based on the population, and the results for this

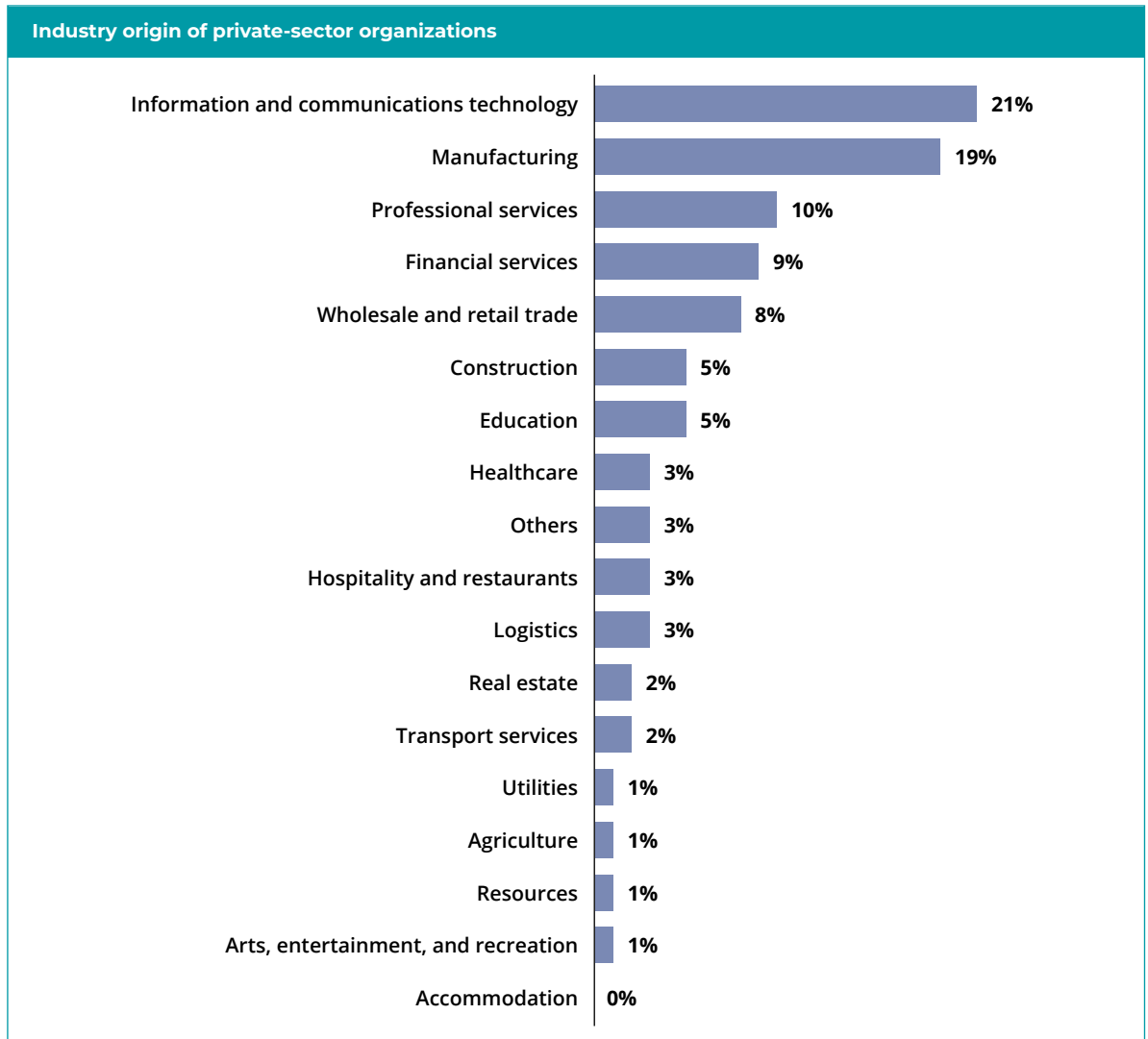
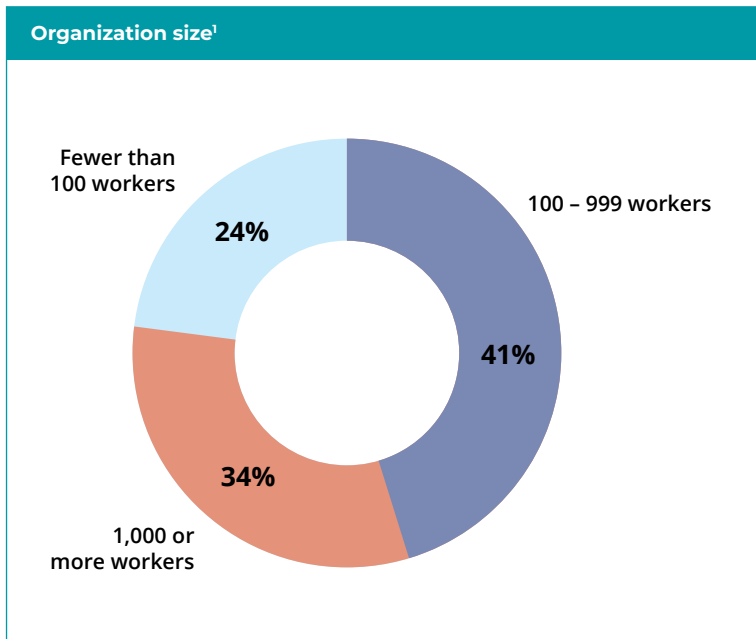
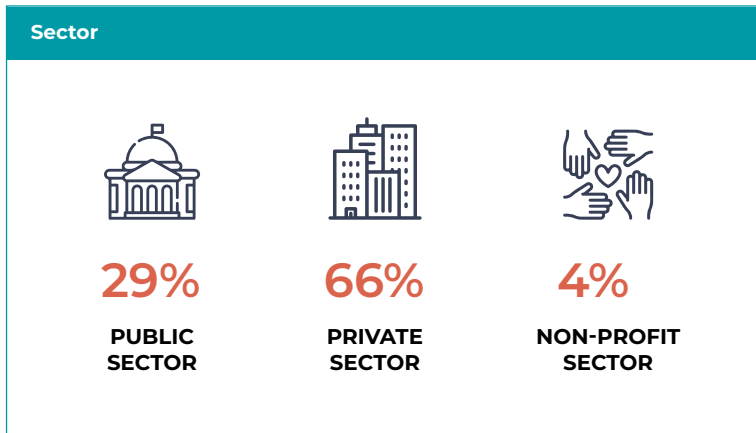
global study were analyzed based on the absolute total number of responses. This is because all countries have a relatively even split of responses among them – ranging from 300 (Indonesia and New Zealand) to 326 (Australia) for employers, and 1,012 (India) to 1,039 (New Zealand) for workers. This was assessed to be a more robust approach than weighting countries based on their populations given the dramatically larger sizes of a handful of countries among our sample (particularly India), which means that the global survey results would predominantly reflect the situation in those countries; and deriving a simple average of country responses, which would result in any outlier results from particular countries impacting the global result.

For the employer survey, employers from enterprises of different sizes and from different industries were included. The employer survey also had representation across public, private, and non-profit sectors. Exhibit A1 shows the full respondent breakdown across different sectors, organization size, and industry origin. For the worker survey, workers in both technology-related and non-technology related roles were included. The worker survey also had representation from workers across different industries and seniority levels. Exhibit A2 shows the full respondent breakdown across gender, seniority level and the technology focus of the job role.

42. Here are the specific numbers of workers surveyed in each country: Australia – 1023, India – 1012, Indonesia – 1035, Japan – 1032, New Zealand – 1039, Singapore – 1037 and South Korea – 1015. Here are the specific numbers of employers surveyed in each country: Australia – 326, India – 303, Indonesia – 300, Japan – 312, New Zealand – 300, Singapore – 314 and South Korea – 311.

EXHIBIT A1:

APJ EMPLOYER SURVEY – RESPONDENT PROFILE ACROSS 7 COUNTRIES



1. Percentages may not total to 100 due to rounding.

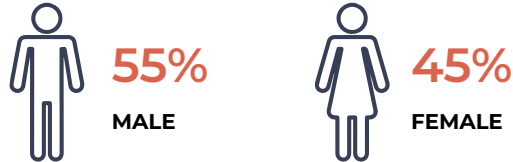
NOTE: The breakdown of the profile of employer respondents is based on the respondents in all 7 countries in the study.

SOURCE: AlphaBeta survey of 2,166 employers in 7 countries (Australia, India, Indonesia, Japan, New Zealand, Singapore, South Korea) in August 2021; AlphaBeta analysis

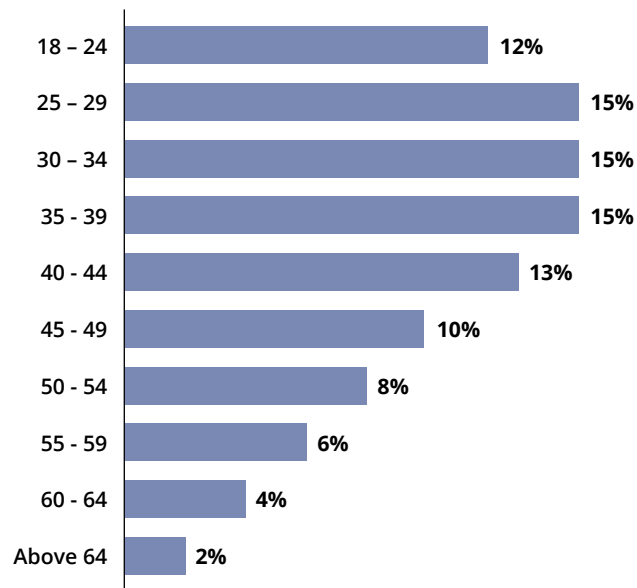
EXHIBIT A2:

APJ WORKER SURVEY – RESPONDENT PROFILE ACROSS 7 COUNTRIES

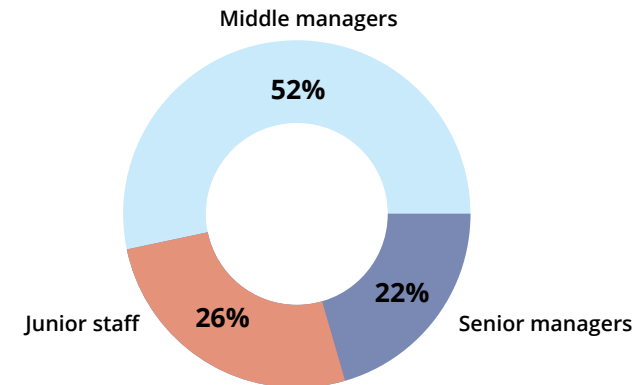
Gender



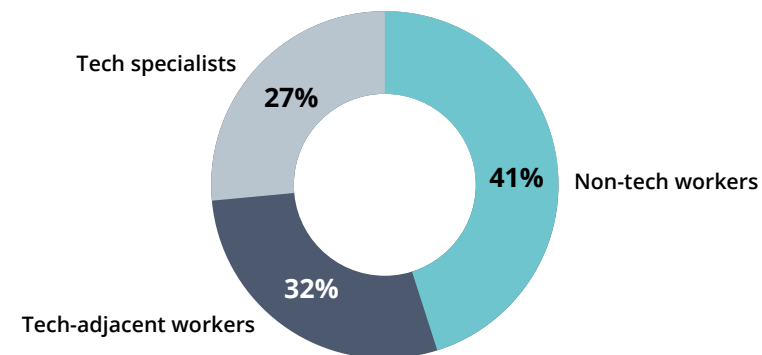
Age



Seniority level¹



Tech focus of job role²



1. Examples of senior managers are general manager and chief operating officer. Examples of middle manager are team lead and department head. Junior staff include entry-level staff.

2. Workers are classified into 3 groups based on the degree of tech focus in their job: tech specialists, tech-adjacent workers and other digitally skilled workers. Tech specialists are workers who develop new technologies or technological applications (e.g., software engineers), and/or use specialized tech knowledge to deliver your organization's objectives (e.g., data scientists). Tech-adjacent workers are workers who bridge technological products and services to people and organizations (e.g., tech product managers). These workers do not require a detailed understanding of technologies, but need to know how they work on a conceptual level. Non-tech workers are workers who do not require specialized tech knowledge and skills, but need some basic tech skills like knowing how to use word processing software and smartphones in order to do their job (e.g., administrative staff, café owners).

NOTE: The breakdown of the profile of employee respondents is based on the respondents in all 7 countries in the study.

SOURCE: AlphaBeta survey of 7,193 in 7 countries (Australia, India, Indonesia, Japan, New Zealand, Singapore, South Korea) in August 2021; AlphaBeta analysis

METHODOLOGY FOR ESTIMATING THE NUMBER OF WORKERS REQUIRING DIGITAL SKILLS TRAINING

Our estimate of the number of workers requiring digital skills training over the next year includes two types of workers:

1. **Digitally skilled workers:** these are workers who already possess digital skills today, but who are assumed to need training over the next year if they currently do not do any training at all, or if they do training less than once a year (e.g., once every two years);
2. **Non-digitally skilled workers:** these are workers who do not possess digital skills today, but who are assumed to need training over the next year as they progress into jobs requiring digital skills each year.

To estimate (1), we multiplied the share of surveyed workers who indicate that they currently undertake digital skills training less than once a year, or do not undergo any such training at all, by the total number of digitally skilled workers in each country.⁴³ We then summed up this number across all seven countries in the study.

To estimate (2), we forecasted the increase in the share of the workforce that is digitally skilled in each country.⁴⁴ This forecast was derived based on the historical rate of increase in this share over the past five years (i.e., 2015-2020 – the latest available data). We then multiplied the forecasted increase in this share by the total number of digitally skilled workers in each country.⁴⁵ The number for each country was then summed up across all seven countries in the study.

The numbers from (1) and (2) were then summed up to derive the total number of workers who require digital skills training over the next year.

43. The number of digitally skilled workers in each country was estimated by multiplying the total number of workers in each country by the share of the workforce with digital skills. This latter share is derived from the Global Innovation Index (GII). This Index contains an "ICT use" sub-index, which measures the share of the population that is digitally skilled. This is a composite index that weights three ICT indicators equally (i.e., 33 percent weight each): (1) Percentage of individuals using the Internet; (2) Fixed (wired)-broadband Internet subscriptions per 100 inhabitants; (3) Active mobile broadband subscriptions per 100 inhabitants. The GI Index is available at: <https://www.globalinnovationindex.org/>. The size of the workforce was obtained from the International Labor Organization's (ILO) database. The ILO database is available at: <https://ilostat.ilo.org/>

44. The forecasted increase in this share was derived from historical data of the share of the population that is digitally skilled from the GI Index. The GI Index is available at: <https://www.globalinnovationindex.org/>

45. The number of digitally skilled workers in each country was estimated by multiplying the total number of workers in each country by the share of the workforce with digital skills. This latter share is derived from the Global Innovation Index (GII). The GI Index is available at: <https://www.globalinnovationindex.org/>. The size of the workforce was obtained from the International Labor Organization's (ILO) database. The ILO database is available at: <https://ilostat.ilo.org/>





Amazon is committed to investing hundreds of millions of dollars to provide 29 million people around the world with access to free cloud computing skills training by 2025. The company is providing this free skills training through a range of AWS-designed programs, making the latest technical knowledge accessible to anyone who has ever considered a career in cloud computing. To learn more and to get started, visit: aboutamazon.com/29million.



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