Advancing Women's Empowerment

ICT SKILLS FOR GIRLS AND WOMEN IN SOUTHEAST ASIA

THE SASAKAWA PEACE FOUNDATION

Dalberg

Contents

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Acknowledgements

This is an independent knowledge briefing based on a rapid scan conducted under the guidance of the Sasakawa Peace Foundation by Dalberg Global Development Advisors from November 2016 to March 2017. The team comprised of Mari Kogiso, Lily Yu, Remi Masuda, Gaurav Gupta, Naoko Koyama, Jyothi Vynatheya Oberoi, Petra Sonderegger, Kanika Arora and Sudhira Reddy.

This knowledge briefing has been made possible by the assistance of a number of contributors and experts. Many stakeholders provided critical input during their interviews. We are grateful for their insights and their time.

We thank Tahan Menon and Surit Das for valuable editorial inputs. We especially thank our reviewers, Meg Jones, Chief, Economic Empowerment, UN Women; and Kunmin Kim, Task Manager, Asian Development Bank Institute, Japan.

Sasakawa Peace Foundation
Mari Kogiso, Director, International Project Planning and Development Department
Lily Yu, Project Coordinator, International Project Planning and Development Department
Remi Masuda, Program Assistant, International Project Planning and Development Department

Dalberg Global Development Advisors
Gaurav Gupta, Partner and Asia Regional Director
Naoko Koyama, Partner
Jyothi Vynatheya Oberoi, Senior Project Manager
Petra Sonderegger, Senior Fellow
Kanika Arora, Senior Consultant
Sudhira Reddy, Associate Consultant

Published in 2017 by The Sasakawa Peace Foundation and Dalberg Global Development Advisors.

Foreword

In the 21st Century, it is anticipated that many countries in Asia will experience rapid economic development and growth. In this time of change, it is critical that social inequalities are addressed and opportunities are made available for all to flourish and thrive. Yet in many aspects of labour, from job opportunities and wages to unpaid work, gender disparity continues to persist. At SPF, we believe empowered women are key agents in building more stable and resilient communities, reducing poverty and stimulating greater social and economic progress. Since 2016, the Sasakawa Peace Foundation has made Women's Empowerment, one of its priority themes, developing a body of research-informed projects and policy recommendations to advance women's economic opportunities, rights, security and well-being in Asia.

Economic growth and technological advances are creating dramatic changes in labour markets in Southeast Asia, with a move away from traditional agriculture towards services and industrial occupations. Our research indicates that up to 80% of future jobs will require at least basic and applied information communication technology (ICT) skills, and we anticipate a positive correlation between proficiency in ICT skills and job opportunities in the coming years. However, women in the region could be disadvantaged on many levels, ranging from digitisation-driven unemployment and shrinkage of industries traditionally dominated by women such as education and administration, disparities in access to the internet, technology and ICT skills training. Social attitudes and unconscious bias can also be barriers to women's recruitment in high growth, but traditionally male-dominated, STEM (science, technology, engineering, and mathematics) industries.

This report summarises analyses on how governments, foundations and the private sector can increase employment of women in Southeast Asia through the development of mechanisms to support women's ICT skills development. We propose solutions to address both technical and social barriers holding back women's participation in new growth industries. Opening paths to women's employment will be extremely important for sustained economic growth. As countries in Southeast Asia embrace change, we hope that this report will help readers to think about the importance of women's role in industries of the future and stimulate greater efforts to ensure no woman is left behind.

Nobuo Tanaka
Chairman,
The Sasakawa Peace Foundation

Mari Kogiso
Director, International Project Planning
and Development Department,
The Sasakawa Peace Foundation

Executive Summary

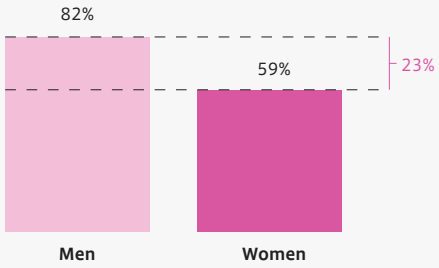
In Southeast Asia,[1] women are employed predominantly in sectors and jobs that require few or no skills in information and communications technologies (ICT). But, as the ongoing digital revolution transforms the region, many of their jobs are at risk of being automated. The manufacturing and services sectors are becoming digitised. As a result, traditional, low-skilled jobs are declining, and blue-collar jobs are becoming 'grey-collar.' Looking forward, it is expected that most jobs will require at least basic ICT skills, and women are likely to be left behind in the future workforce because there is little momentum to help them become digitally savvy.

Because technology is considered a male domain, girls and women are discouraged from attempting to access ICT training or employment. Those girls and women who do seek to acquire ICT skills must overcome time poverty, mobility constraints, and limited family investment. Successful graduates of training programmes who seek employment must then combat discriminatory hiring practices. The few women who reach the workplace find and face especially unattractive career prospects with lower wages and fewer promotions.

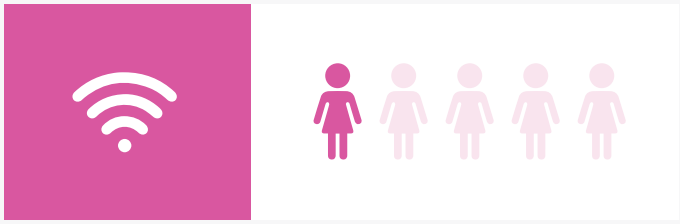
Three parties can contribute to supporting girls' and women's ICT skills: policymakers, philanthropies, and private sector businesses. Policymakers can explore new approaches to enable girls and women to access the Internet and ICT tools and training. They can also support gender equality policies in the workplace. Philanthropies can provide research and knowledge sharing to dismantle gender stereotypes around technology, improve ICT training for women, and leverage existing networks to link ICT trainers and employers to ease women's transition into the workforce. Private sector businesses can provide women basic and applied ICT skills through existing jobs and supply chains, create remote work or telecommuting options, highlight successful women working in ICT and, most importantly, partner with and recruit more women from ICT training programmes.

Concerted and coordinated action by all three parties can ensure that girls and women are equipped with skills to enter and remain in the future workforce, become economically empowered and help accelerate broader economic growth in Southeast Asia.

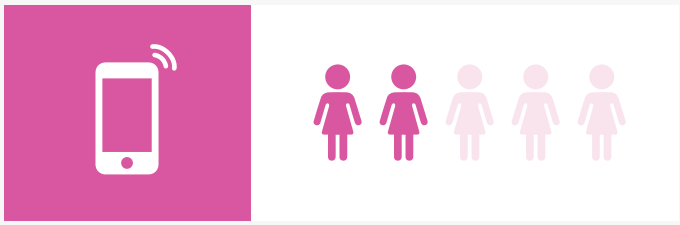
1. Southeast Asia includes Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand, Timor-Leste, and Vietnam.



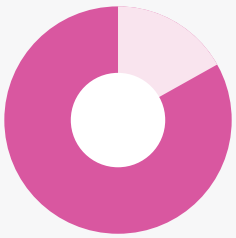
The gender gap in the Southeast Asian workforce: 23 percentage points



Only 1 out of 5 women in Indonesia access the Internet



Only 2 out of 5 women in Indonesia own a mobile phone



But up to 80% of future jobs need ICT skills, primarily basic and applied ICT skills

Context

Worldwide, and in Southeast Asia, jobs in the manufacturing and services sectors are digitising rapidly. Traditional low-skilled jobs are declining, and many traditional offline and blue-collar jobs are becoming 'grey-collar.'[2]

This is especially true of industries where women predominate in the workforce. In Cambodia, for example, in industries such as textiles, clothing, and footwear, women make up over 70% of the workforce, and automation may make the jobs of 88% of wage workers redundant. In five countries in Southeast Asia, over 75% of workers, around half of whom are women, in the wholesale and retail sectors may lose their jobs.[3]

The top three trends affecting the workforce in Southeast Asia demonstrate the increasing need for ICT skills:

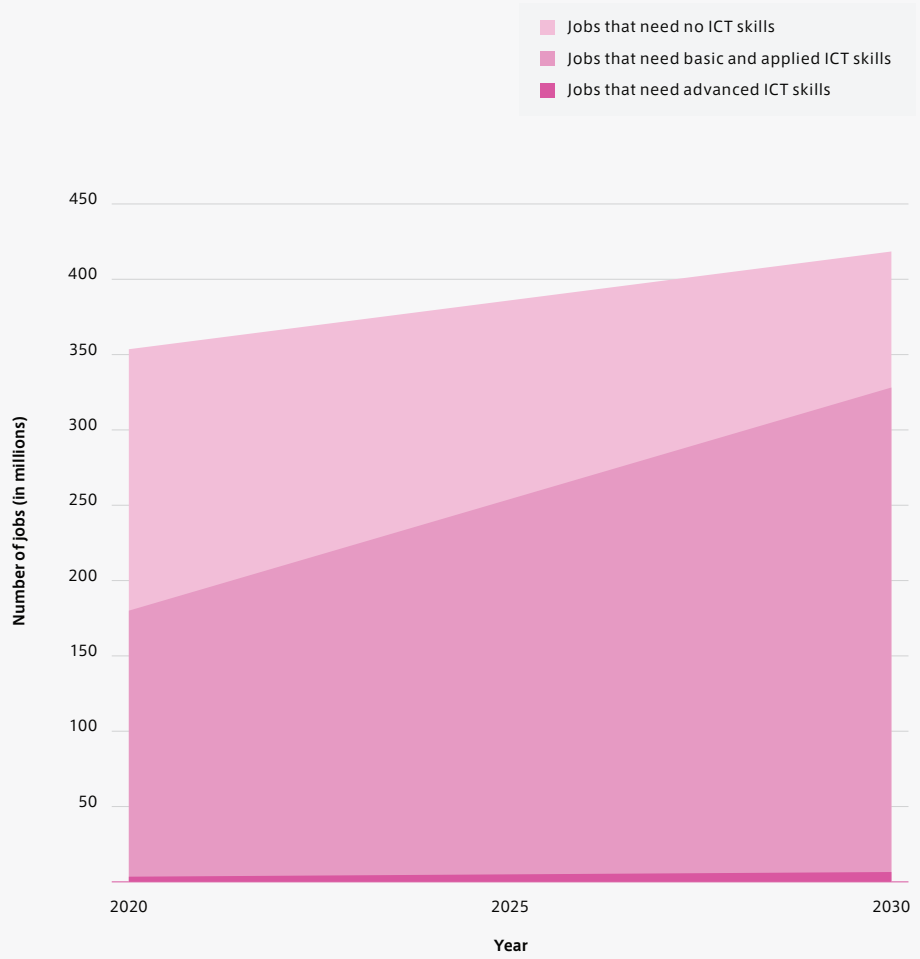
1. mobile Internet and cloud technology,
2. flexible work schedules, and
3. big data and processing power.[4]

Over the next decade, most countries in Southeast Asia will likely see the demand for basic digital literacy and applied ICT skills accelerate later, but faster, than OECD countries. By 2030, it is expected that up to 80% of jobs will require basic digital literacy and applied ICT skills (Figure 1).[5] Already, manufacturing firms have begun using robots to replace humans in low-skill manufacturing tasks like simple assembly.[6]

To ensure participation in the future Southeast Asian workforce, girls and women need to adopt ICT skills, especially basic and applied ICT skills, now.

2. Asian Development Bank, Skills for Competitiveness, Jobs, and Employability in Developing Asia-Pacific, 2013.
3. International Labour Organization, ASEAN in Transformation: How Technology is Changing Jobs and Enterprises, 2016.
4. World Economic Forum, The Future of Jobs, 2016.
5. Microsoft, Building the Workforce of Tomorrow Today, 2013. Note: Estimates for the number of jobs that require ICT skills (basic and advanced) are based on proportions from the United States since Southeast Asia is expected to follow the same trends with a time lag of 8–10 years.
6. International Labour Organization, ASEAN in Transformation: How Technology is Changing Jobs and Enterprises, 2016.

Figure 1: The increasing requirement for basic and applied ICT skills in Southeast Asian jobs[7]



7. (1) International Labour Organization, Employment Estimates and Projections, 2017 and 2020. (2) Microsoft, Building the Workforce of Tomorrow Today, 2013. (3) United States Census Bureau, Occupations in Information Technology, 2016. (4) World Economic Forum, The Future of Jobs, 2016.

   Notes: (i) Estimates for total job growth are based on a 10-year historical average. (ii) Estimates for the number of jobs that require ICT skills (basic and advanced) are based on proportions from the United States with a time lag of 8–10 years since Southeast Asia is expected to follow the same trends. (iii) Advanced ICT skills are classified as those needed for the 'computer, mathematics, and science' and 'architecture and engineering' job families (e.g., programming, database administration, computer software engineering).

Glossary

Information and communications technology (ICT) is an umbrella term. It refers to any product that stores, retrieves, manipulates, transmits, or receives information in a digital form (cellular phones, computer hardware and software, satellite systems) and to associated services and applications (video conferencing, distance learning).

Basic and applied ICT skills are skills needed to efficiently use elementary ICT functions to retrieve, assess, store, and produce information (such as typing and using e-mail, data entry, and accounting software). These skills are complementary and necessary to working across a variety of sectors, including transportation, logistics, and sales, but these sectors do not explicitly produce ICT products or services. These skills are applicable to both blue-collar and white-collar jobs.[8]

Advanced ICT skills are technical knowledge and abilities needed to accomplish complex functions, generally within the information technology (IT) sector, focused on creating ICT products and services. Typically, these skills require several years of training to acquire (such as programming, database information management, software development), and are often used in white-collar jobs.

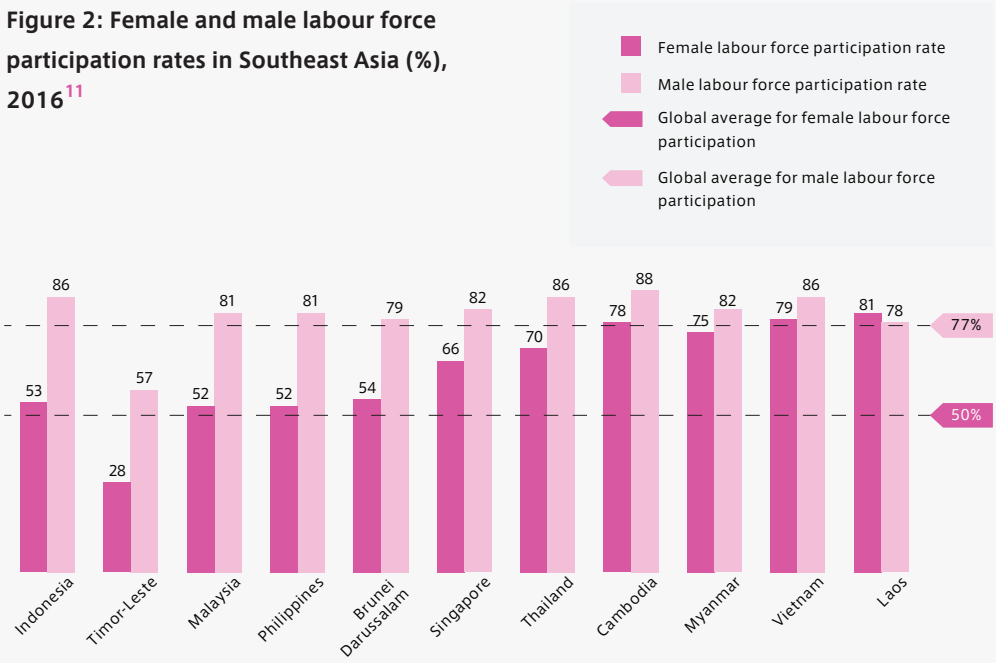
STEM is defined as science, technology, engineering, and mathematics skills, often applied in an interdisciplinary context (such as creating computer applications, advanced manufacturing, automobile engineering).

In this report, we discuss STEM skills because they represent an important complement to ICT skills; many trends evident in STEM skilling are reflected in ICT skilling and more statistical data is available on STEM skilling than on ICT skilling.

8. European Commission, Measuring Digital Skills Across the EU: EU-Wide Indicators of Digital Competence, 2014.

In Southeast Asia, the labour force participation rate is currently 23 percentage points lower for women than men.[9] The labour force participation rate of women in Southeast Asia (with the exception of Timor-Leste) is 2–31 percentage points higher than the global average, and the regional gender gap is slightly smaller than the global average of 27 percentage points. Nevertheless, the gender gap is significant. In countries that employ more women in agriculture and informal services (such as Vietnam and Laos), female labour force participation rates tend to be higher and closer to gender parity. Conversely, in Indonesia, where many women opt out of informal employment, the current gender gap is as high as 33 percentage points (Figure 2).[10]

Figure 2: Female and male labour force participation rates in Southeast Asia (%), 2016[11]



In Southeast Asia, women tend to be employed in less attractive jobs and receive lower wages. Women receive 20–40% lower wages than men for equal work. The wage differential between women and men is the lowest in Singapore. It is highest in Vietnam, in part because women have lower access to training opportunities and greater family responsibilities than men do.[12,13] Across Asia, women represent 33% of the total workforce, but account for 46% of wage employment and 43% of informal employment.[14]

9. Asian Development Bank, Women in the Workforce: An Unmet Potential in Asia and the Pacific, 2015.
10. Asian Development Bank, Female Labour Force Participation in Asia: Indonesia Country Study, 2016.
11. World Economic Forum, Global Gender Gap Report, 2016. For Myanmar and global averages, World Bank 2014 data is used.
12. World Economic Forum, Global Gender Gap, 2016. Myanmar and Timor-Leste excluded.
13. International Labour Organization, Despite High Labour Force Participation Rate for Women, Gender Pay Gap on the Rise, 2013.
14. Asian Development Bank, Women in the Workforce, An Unmet Potential in Asia and the Pacific, 2015.

Most sectors will require basic and applied ICT skills while a small minority of jobs will require advanced ICT skills (Figure 3). In particular, the top fields where employment is growing – transportation, logistics, and sales – will require greater use of digital skills. For example, handheld devices and smartphones are already becoming increasingly important for organising and tracking logistics and transportation services.

Figure 3: Employment and ICT outlook in ASEAN countries by main job family[15]

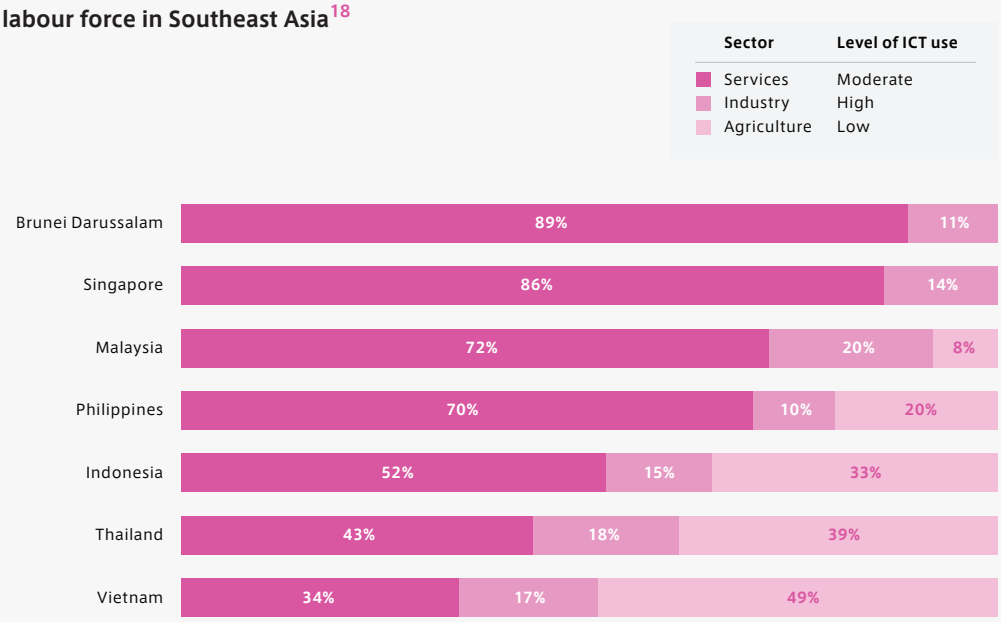
		Current Workforce (Thousands)	Examples of Increasing Digitisation
Growing Employment	Transportation and logistics	12,525	Self-driving cars, mobile ticketing, online booking and tracking
	Sales and Related	11,575	E-commerce, digital payments
	Management	9,113	Digital customer relationship management
	Business, legal and financial	4,945	Automated credit fulfilment for loans
Declining Employment	Manufacturing and production	9,342	3-D printing, augmented reality mechanisms, robotics
	Computer, mathematics and science	3,604	Artificial intelligence, advanced machine learning
	Education and training	2,700	Massive online open courses, mobile application based learning, in-classroom ICT use
	Architecture and engineering	2,195	Computer-aided design, intelligent home systems
Uncertain Future of Employment	Farming, fishing and forestry	20,120	Sensing and monitoring, online markets and market information
	Office and administrative	10,317	Artificial intelligence assistants
	Installation and maintenance	5,372	Service through mobile applications, smart systems integration
	Arts, design, entertainment, sports and media	2,712	Digital books, growth of online media, e-sports

15. World Economic Forum, Future of Jobs, 2016. Note: These projections are based on demand over the next decade. Financial services are likely to require more advanced ICT skills, but this is likely outweighed by the need for basic ICT skills in both business and legal jobs.

The use of digitised supply chains as well as online marketing and tracking of consumer behaviour is expected to increase. Conversely, the share of job families such as computers, mathematics, science, and engineering – which require specialised, advanced ICT skills – is small and may decline in Southeast Asia in the coming years.[16]

Primarily, women are employed in the service sector, in jobs that currently require minimal ICT skills (Figure 4).[17] Women are predominantly employed in in the agriculture sector or in informal jobs that typically do not require strong ICT skills. Currently, therefore, there is limited momentum for women to adopt ICT skills. The Singaporean economy, driven by services and industry sectors that use ICT more, serves as an example of where other, more agriculturally intensive countries in Southeast Asia that use ICT less, are headed.

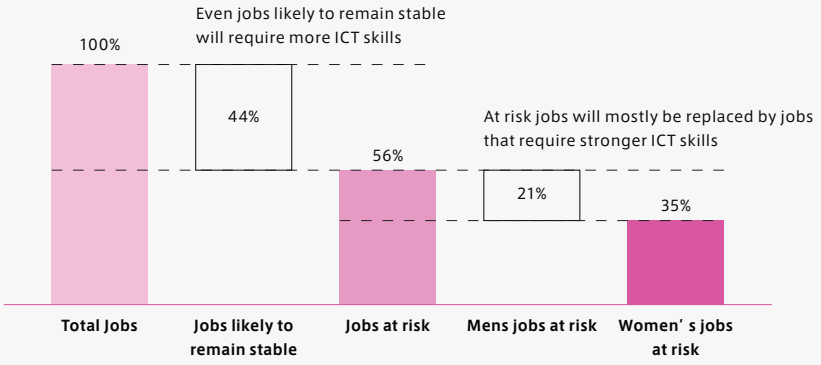
Figure 4: Sector division of the current female labour force in Southeast Asia[18]



As the Southeast Asian workforce digitises, women are at greater risk than men of being left behind (Figure 5). Across five countries assessed, women are employed in lower-skilled jobs than men and, so, are at higher risk than men of losing their jobs to automation. This gendered risk is lowest in Indonesia, where women are only 20% more likely than men to be in an occupation at risk (although they are less likely to be working in the first place). In Cambodia and Thailand, women's jobs are 50–60% more likely to be at risk of automation than men's jobs. The differential is the highest in the Philippines and

16. World Economic Forum, The Future of Jobs, 2016.
17. World Economic Forum, Global Gender Gap, 2016. Myanmar and Timor-Leste excluded.
18. World Bank, Percentage of Female in Services, Industry and Agriculture, 2016.

Figure 5: Jobs estimated at risk due to automation across Southeast Asia (%)[19]



Vietnam, where women are over twice as likely as men to be at risk of losing their job.[20] Most newly created jobs will require ICT (or other technical) skills; this risk exacerbates the range of gender biases and other barriers girls and women face in attaining ICT skills, accessing ICT devices that foster skill adoption, and gaining employment.

Digitisation of jobs could enable more women to participate in the workforce – if they have the required ICT skills. There is an important opportunity to include more women in the workforce through mechanisms like flexible and remote work. A recent study identified flexible work as the second most important trend affecting the labour force in Southeast Asia.[21] However, to realise these opportunities, girls and women need to overcome existing barriers and acquire ICT skills from a young age.

This report assesses the need to equip girls and women with ICT skills, particularly basic and applied ICT skills, to better participate and compete in the future workforce of Southeast Asia. For the purposes of this report, we address both ICT and STEM skills training. We focus on ICT skills because they will be required for the bulk of future jobs, and we address science, technology, engineering and mathematics (STEM) skills when there are trends that likely reflect across both STEM and ICT skills training and employment. This report highlights the need for ICT skills in the future workforce and the barriers girls and women face in adopting ICT skills. Given that there is currently relatively little emphasis on the importance of basic and applied ICT skills, there is a strong need to motivate and coordinate key players around this need in the region. This report outlines the roles that policymakers, philanthropies, and private sector businesses can play to better support girls and women in acquiring these skills.

19. (1) World Bank, World Development Indicators, 2017. (2) International Labour Organization, ASEAN in Transformation: The Future of Jobs at Risk, 2016. Note: Even in stable jobs, the extent of ICT use is expected to increase.
20. International Labour Organization, ASEAN in Transformation: How Technology is Changing Jobs and Enterprises, 2016.
21. World Economic Forum, The Future of Jobs, 2016.

Equipping girls and women with ICT skills to participate in the future workforce can economically empower over 20 million women and accelerate economic growth by over USD 2 trillion.[22]

On a national and regional level, greater participation of women in the workforce leads to stronger and more sustainable growth of gross domestic product (GDP). For example, if Indonesia increases its female participation in the workforce by about 20% (to be on par with Thailand), it could add 20 million semi-skilled workers and boost GDP by up to USD 1.8 trillion by 2030.[23,24] It is widely known that equipping women to enter and remain in the workforce improves their earning power and, thus, empowers them economically. Research also demonstrates a strong link between an increase in the number of women in paying jobs and a reduction in their proportion of unpaid work.[25] As women's incomes and their control over spending increase, there is high potential for inter-generational benefits across society, because women tend to spend more on children's health and education, which fosters societal gains and a more productive future workforce.[26]

Methodology: Rapid scan

A rapid scan of 165 documents, covering existing research literature, programme documentation, and monitoring and evaluation (M&E) reports related to ICT and increasing women's labour force participation, was conducted from November 2016 to March 2017. In addition, field visits were conducted in Malaysia, Indonesia, and Singapore, and 24 interviews were conducted with experts on gender, work, and ICT in Southeast Asia. In total, around 100 programmes were analysed and 19 detailed case studies were developed. This report presents the results of the scan relevant to improving ICT skills for girls and women.

22. McKinsey and Company, The Archipelago Economy: Unleashing Indonesia's Potential, 2012.
23. Organisation for Economic Co-operation and Development (OECD), Gender Equality in Education, Employment and Entrepreneurship: Final Report to the MCM, 2012.
24. McKinsey and Company, The Archipelago Economy: Unleashing Indonesia's Potential, 2012.
25. (1) United Nations, Leave No One Behind, 2016. (2) World Economic Forum, Women's Economic Empowerment is the Smart Thing to Do. What's Stopping Us? 2017.
26. World Bank, World Development Report 2012: Gender Equality and Development, 2012.

Barriers Girls and Women Face

Girls and women tend not to pursue ICT skills and employment because of barriers to (i) developing an interest in ICT, (ii) acquiring ICT skills, and (iii) entering the digital workforce (Figure 6).
The challenges girls face in developing an interest in ICT stem from gender biases that stereotype technology as a male domain. For girls and women, barriers to acquiring ICT skills include limited time to pursue ICT skill adoption, restricted mobility, a lack of physical and online safety, limited willingness

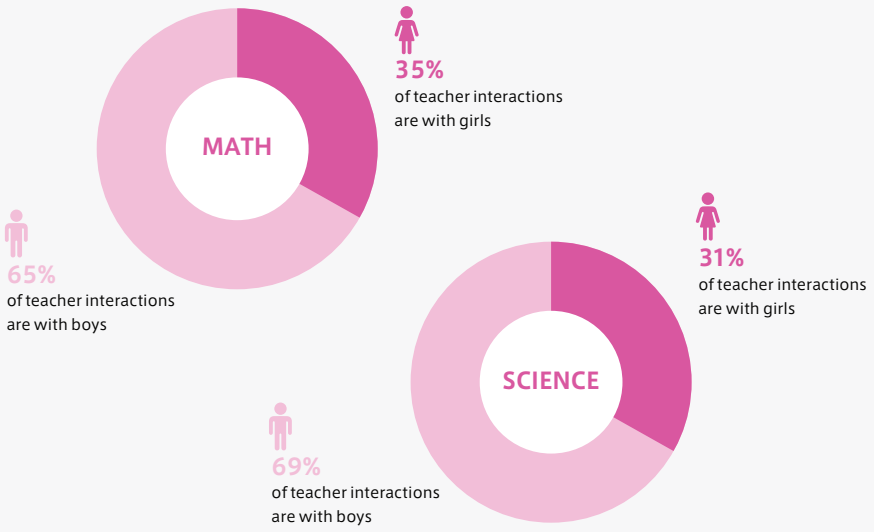
Figure 6: Barriers faced by girls and women that affect ICT and STEM skill adoption and employment

of families to invest in ICT training for girls compared to boys, and a lack of gender-sensitive training content and delivery. Gender discrimination in hiring and promotion practices at the workplace is a barrier to entering the workforce and renders many existing ICT jobs unattractive to women. We discuss these factors in detail.

Gender biases that reinforce technology as a male domain lead to lower support from parents and teachers. Across Indonesia, Malaysia, and Singapore, girls who pursued STEM education or jobs overwhelmingly rated parents as their greatest influence. In Indonesia, 90% of girls named parents as the most influential reason, followed by 70% in Malaysia and 59% in Singapore.[27] Data from Cambodia suggest a high correlation between parental encouragement and girls' perceived importance of mathematics and science fields. In essence, if parents do not emphasise the importance of technical subjects to girls, they will likely not view these subjects as important or appropriate, and they will not pursue technology-related career paths.

Similarly, across the East Asia-Pacific region, many teachers still reinforce gender norms in the classroom by discriminating against girls.[28] Classroom engagement is critical to learning ICT and STEM, and girls struggle when teachers neglect them. There is an emerging focus on teacher training in gender sensitivity in both using and teaching ICT in the classroom. However, data suggest that despite equal representation of girls and boys in the classroom, teachers still tend to interact with boys far more than with girls when teaching technical subjects. In Vietnam, for example, teachers interact with boys nearly twice as much as with girls in mathematics and science classes (Figure 7).

Figure 7: Teachers' interactions with female students and male students in Vietnam[29]



27. MasterCard, Girls in Tech, 2016.
28. United Nations Girls' Education Initiative, Girls, Disabilities and School Education in the East Asia Pacific Region, 2014.
29. UNESCO, Girls and Women in Science, Technology, Engineering and Mathematics in Asia, 2015.

Gender biases that reinforce technology as a male domain lead to lower support from parents and teachers

In the face of gender biases and low support, girls lose interest and develop low self-esteem in ICT and STEM subjects from a young age. Across Cambodia, Indonesia, Malaysia, and Vietnam, girls tend to least enjoy STEM subjects and perceive their performance to be lower in these subjects (regardless of actual performance) than in other school subjects.[30] In Singapore, lack of interest is the top reason girls give for not pursuing technical subjects in school.[31] Interviews highlight that when ICT and STEM are perceived as boys' domains, girls are less likely to engage; when they do engage, they are more likely to act as consumers of technology instead of creators. Therefore, from a young age, boys develop a deeper understanding of, and connection to, technology than girls.

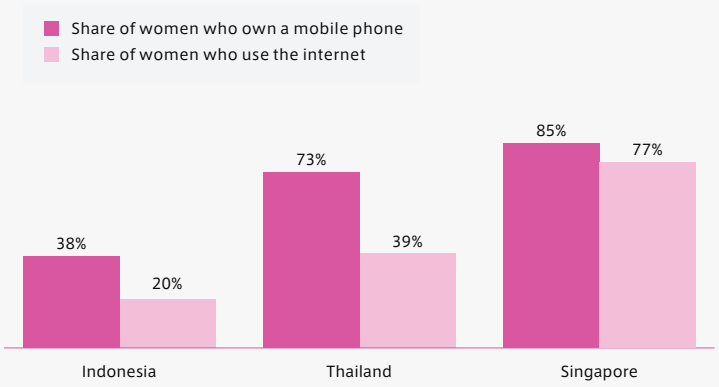
Gender biases that view technology as a male domain contribute to fewer female role models. Currently, there are few women in technology-related fields. Therefore, girls lack role models who can drive their interest and aspirations around technology.[32]

Lower access to technology inhibits girls' interest in pursuing ICT and limits independent exploration and development of online skills. Across Indonesia, Malaysia, and Singapore, women's access to the Internet is on average 4% lower than men's access to the Internet; mobile phone ownership is 4–14% lower for women than men.[33] In some countries, women have high mobile phone ownership, but access to the Internet is still lower (Figure 8). Across Indonesia, Thailand, and Singapore, women's access to the Internet is 8–34 percentage points lower than their mobile ownership. In Indonesia, approximately 50% fewer women access the Internet than own a mobile phone.[34] Lower access to more complex ICT limits exposure and practice of relevant skills, and hinders women in understanding the potential of ICT. Women report limited awareness of the benefits of using the Internet.[35]

Girls interested in ICT face barriers in acquiring ICT skills, including limited time, mobility, and family investment. Girls and women are responsible for over 70% of domestic and care work, and have less time than men for ICT training and employment.[36] It is estimated that men spend one-and-a-half hours per day on family care but girls and women spend over twice that time.[37] Mobility is limited for girls and women. Public spaces and transportation systems are not women-friendly. In a recent survey of 1,417 men and women in Bangkok conducted by the Bangkok Post, one-third of women reported being sexually harassed in a city public bus or public hospital.[38] Girls and women are at risk of harassment online too. That may inhibit them from seeking ICT skills or engaging fully with technology.[40] Traditional gender biases allow men control over the mobility of girls and women. Some girls and women need permission from their father, husband, or another male household

30. UNESCO, Girls and Women in Science, Technology, Engineering and Mathematics in Asia, 2015.
31. MasterCard, Girls in Tech, 2016.
32. UNESCO, Girls and Women in Science, Technology, Engineering and Mathematics in Asia, 2015.
33. (1) World Economic Forum, Global Gender Gap Report, 2016. (2) GSMA, Bridging the Gender Gap: Mobile Access and Usage in Low and Middle-Income Countries, 2015. (3) Malaysian Communications and Multimedia Commission, Hand Phone Users Survey 2014, 2014.
34. GSMA, Bridging the Gender Gap: Mobile Access and Usage in Low and Middle-Income Countries, 2015.
35. Dalberg Global Development Advisors and Intel, Women and the Web, 2012.
36. Asian Development Bank, Women in the Workforce An Unmet Potential in Asia and The Pacific, 2015.
37. Organisation for Economic Co-operation and Development, Unpaid Care Work: The Missing Link in the Analysis of Gender Gaps in Labour Outcomes, 2014.
38. Bangkok Post, Third of Women Groped on Buses, 2017.

Figure 8: Mobile phone ownership and Internet usage for women[39]



member to leave home.[41] Our interviews highlighted that families prefer to invest in boys' education over girls', including in ICT training. The barriers of time poverty, constrained mobility, and limited family investment affect girls and women of all ages in pursuing ICT training. Even after they have entered the workforce, women continue to face these barriers if they seek to acquire additional ICT skills for career advancement.

Gender-insensitive content and delivery hinders adoption of ICT skills by girls and women. In Vietnam, for example, textbooks perpetuate negative gender stereotypes about women in technology by portraying only boys and men as using technology.[42] Our interviews confirm that even if gender sensitive content is used, teachers – even female teachers – may propagate negative gender stereotypes while teaching ICT skills to girls and women.

The gender gap in the technology industry makes ICT-related careers unattractive to women. Women view ICT jobs as unattractive primarily because they (i) receive lower wages and (ii) gain fewer promotions than men. In premier technology companies, there are up to nine men for every woman in a technology role.[43,44] The gender wage gap is large. Women receive 64–81% of the wages men receive for the same work.[45] Once in the workforce, women are promoted less often than men. In Indonesia, Malaysia, and Singapore, women occupy only 10–20% of middle-to-senior-level management positions and only 5–8% of CEO-level positions.[46]

39. (1) World Economic Forum, Global Gender Gap Report, 2016. (2) GSMA, Bridging the Gender Gap: Mobile Access and Usage in Low and Middle-Income Countries, 2015.
40. Dalberg Global Development Advisors and Intel, Women and the Web, 2012.
41. UNESCO, Girls and Women in Science, Technology, Engineering and Mathematics in Asia, 2015.
42. UNESCO, Girls and Women in Science, Technology, Engineering and Mathematics in Asia, 2015.
43. McKinsey and Company, Women Matter: An Asian Perspective, 2012.
44. Statista, The State of Women in Tech, 2016. Note: This is global data taken from seven technology companies: Apple, eBay, Facebook, Google, LinkedIn, Microsoft, and Twitter.
45. World Economic Forum, Global Gender Gap, 2016. Myanmar and Timor-Leste excluded.
46. McKinsey and Company, Women Matter: An Asian Perspective, 2012.

Women face outright gender discrimination in hiring practices. In their job search, they have weaker networks to leverage. The stereotype that technology is a male domain works against women during the job search. In the technology industry, research shows that both men and women can be up to twice as likely to hire a man than a woman for a mathematics-based job. Women tend to have weaker networks than men, in part because women tend to see networking as inauthentic and too transactional. This decreases the number of jobs that women identify, apply to, and are selected for throughout their careers.

This basket of conditions predisposes girls and women to opt out of ICT-related employment and perpetuates their low representation in ICT. Women looking to enter the space face an unfavourable environment, where representation is low and remuneration is unequal. They are, therefore, likely to be dissuaded from entering at all and are discouraged from learning ICT skills, even for jobs outside the ICT sector.

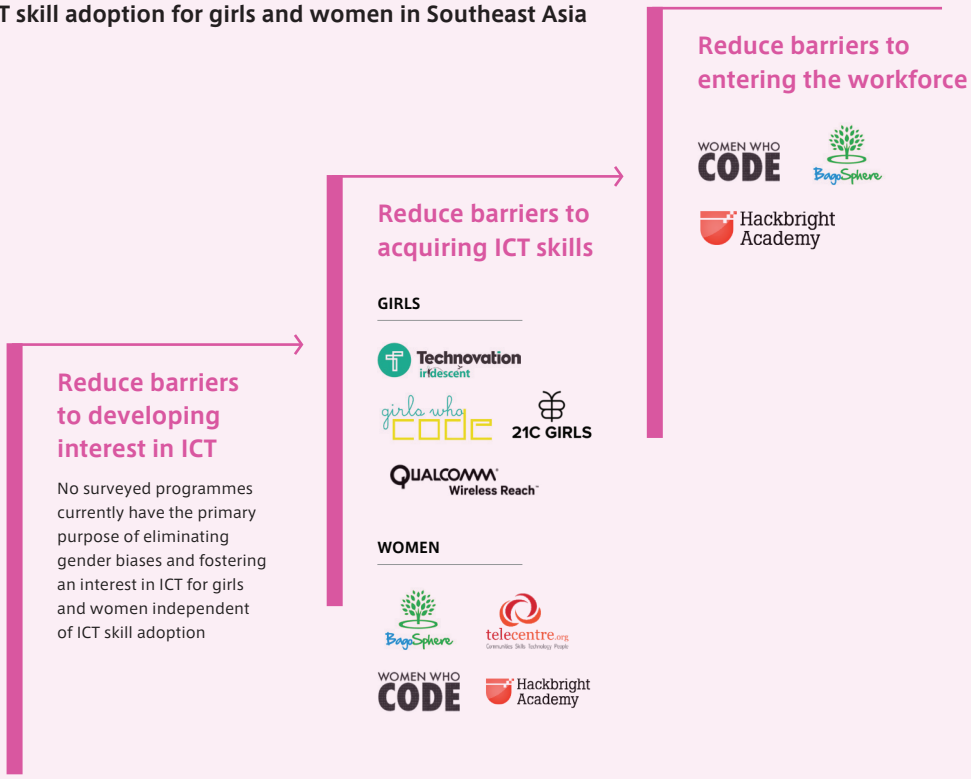
Women face systemic challenges. Therefore, comprehensive strategies are needed to support their interest in and adoption of ICT skills as well as to transition these skills to employment. If strategies to help girls and women overcome existing barriers are successful, their adoption of ICT skills will fulfil its potential to catalyse female economic empowerment.

Learnings from the Field

Several programmes in Southeast Asia work to mitigate the immediate barriers to ICT skill adoption for girls and women, but we have yet to see a major, large-scale regional or national programme. The surveyed programmes active solely within Southeast Asia are all small and only reach between 200–1000 girls or women. Some larger global programmes have a presence in Southeast Asia; however, their local presence is also comparatively small.

Few programmes aim solely to foster girls' and women's interest in ICT, independently from helping them acquire ICT skills. We assessed over 100 programmes in the space in Southeast Asia. There is limited monitoring and evaluation data; so, it is difficult to assess the overall impact of each programme. But we have ascertained the purpose and characteristics of select programmes (Figure 9). In our scan, we found that most programmes adjust training content and create activities to make technology more appealing to girls and women. However, programmes do not primarily focus on the intentional change of gender biases that stereotype technology as a male domain, partly because it is much more difficult to address this issue and gauge the results of such programmes.[47]

Figure 9: The purpose of select programmes that foster ICT skill adoption for girls and women in Southeast Asia



47. Note: Programmes that do address socio-cultural norms often do so on an ad-hoc basis and focus on a specific issue relevant to their programme implementation.

Several programmes aim to reduce the barriers for girls and women to adopt ICT skills, but only a few aim to reduce the barriers against entry into the workforce. Many programmes focus on addressing the more immediate barriers girls and women face in adopting ICT skills. Broadly speaking, these programmes offer skills training and access to ICT tools and connectivity. The Telecentre Foundation's Digital Literacy for Women programme and the WE Learn initiative are examples. The Telecentre Foundation provides access to ICT tools and training at scale via existing telecentres, and the WE Learn initiative provides female students 3G-enabled phones to enhance classroom learning. Bagosphere partners with call centres to provide trainees employment and is one of the few programmes that formalises direct links from training to employment.

Many programmes provide short-term specialised and advanced skills training, but there is greater need for longer-term basic and applied ICT skills training. 21C Girls, for example, focuses on providing coding courses to Singaporean girls. Technovation teaches girls mobile application development. Most programmes offer training that is under six months long in duration. These programmes have reported success in furthering girls' interest and skills in STEM and advanced ICT topics. For example, Technovation reported that 56% of its alumnae enrol in further computer science courses. But they do not address the vast majority of girls and women, who may not want to enter the STEM field but require basic ICT skills to pursue other career paths. The few programmes that do provide basic and applied skills training, such as the Telecentre Foundation's Digital Literacy for Women, often do so for a similarly limited duration. These time limits mean that the initial impact of training may dissipate, particularly if girls and women have limited access to ICT tools, connectivity, and subsequent training to maintain their skills.

Programmes could benefit from more gender-sensitive training content and delivery as well as improved access to ICT tools and Internet connectivity. These are three important barriers to implementation. Programmes for girls and women often include both overt and subtle biases in content that favour men over women (graphics that portray only men in technology jobs, for example). While gender-sensitive content is necessary, there also needs to be gendered delivery of training content. Interviews suggested that even female teachers reinforce internalised gender biases that constrain girls. Training teachers in gendered delivery of content is required to mitigate this. In addition, programmes have difficulty accessing funding to provide comprehensive ICT infrastructure in the form of both tools and connectivity.

CASE 1 The Telecentre Foundation's Digital Literacy Initiative

Description[a]

The Telecentre Foundation developed basic digital skills for over 1 million women globally through a "train the trainer" model from 2011-14

Geography

Global, including the Philippines

Key Learnings

Considerations for success

- **In-person training for basic digital literacy:** in-person training led to quicker learning of basic functionalities (e.g. typing)
- **"Train the trainers model":** the programmes effectively scaled across multiple geographies with lower costs by leveraging a network effect
- **Government partnerships:** programme funding and women's employment was secured through government collaboration

Lessons for implementation

- **Limited opportunities for employment:** the foundation only provided access to jobs in NGOs and the government; there appear to be limited opportunities for employment in the private sector

Project Activities

The main programme activity is to provide:

- Training courses on basic digital literacy (e.g. Internet use, e-mail use, social media use, computer use) in telecentres, based on a curriculum provided by the International Telecommunications Union (ITU)

Results

Reach (2011-2014)

- 1 million women trained in digital skills globally across 79+ countries on 5 continents[b]
- 100+ telecentres run by women[c]
- Taught 10,000 women digital skills in the Philippines[d]
- Partnered with 153+ organisations in order to scale effectively[e]

Reach (2011-2012)

- 220,000 women trained in digital skills globally across 65 countries in 5 continents[f]
- Partnered with 100+ organisations in order to scale effectively[g]

Key Partners[h]

The Telecentre Foundation has partnerships with foundations and technology companies, such as:

- **ITU:** provided curriculum repository and programme advice
- **Government of the Philippines:** provided implementation and bureaucratic support
- **Cherie Blair Foundation:** provided mentors for the programme
- **United Nations Women:** knowledge partner for training material

Hands-on, in-person training ensured successful skill adoption for Filipino women, and strong collaboration with the government ensured programme and financial sustainability

Source: (a, h) Telecentre Foundation, Telecentre Women - Digital Literacy Campaign, 2016. (b, c, e) Telecentre Foundation, TCF Inspires Change Through ICT with over 1M Women Trained Worldwide,2016. (d) Telecentre Foundation, Philippines to Launch Digital Literacy Campaign for Women, 2017. (f) ITU, Telecentre Women: Empowerment through Technology, 2012. (g) Telecentre Foundation, Philippine Telecentre Wins CHF 15,000 Worth of ICT Equipment in Telecentre Women-Digital Literacy Campaign Contest, 2017.

CASE 2 WE Learn[a]

Description

Qualcomm® Wireless Reach™ ran a pilot programme until 2014 that provided 3G enabled phones to 650 students, including girls, in a primary school in Singapore to acquire 21st century competencies and knowledge

Geography

Singapore

Key Learnings

Considerations for success

- **Partnership with technology providers:** efficient technology support expeditiously addressed technology-related problems
- **Support from government:** the vision and drive of Singapore's Ministry of Education led to increased buy-in from key stakeholders (e.g. principal, teachers)
- **Strong curriculum and pedagogy:** administrators, teachers and experts collaborated to tailor curriculum suitable to deliver via technology

Lessons for implementation

- **Required longer time frame for adoption:** longer timeframes for adoption were needed because mobile technology for classroom learning is still novel

Project Activities

The programme pilot for 3rd and 4th grade students ended in 2014:

- Supported self-directed and collaborative learning with 24/7 access to educational content, web-based resources and a broad range of learning tools.
- Used advance mobile technologies to enable teachers to become mentors who provide personalized guidance and gave students the means to take responsibility for their own learning.
- Provided professional development experiences for Nan Chiau teachers in the WE Learn pedagogy

Results

Reach (2016)

- Provided 650 students in 3rd and 4th grade and their teachers 3G enabled smartphones and mobile connectivity

Impact on learning outcomes

Results from an independent study of the programme concluded:

- Students reported better scores on English classes
- Students reported better scores on science classes, especially on open-ended questions
- Students showed greater ability to collaborate and ask questions

Key Partners

Qualcomm's WE Learn programme has 7+ partnerships, including

- **Nan Chiau Primary School:** government designated Future School
- **Nokia:** provided discounted Nokia Lumia 710 smartphones for students and teachers
- **Microsoft**: provided Windows Server infrastructure software and the Windows Phone operating system
- **National Institute of Education Learning Sciences Lab:** assisted teachers with professional and curriculum development
- **M1:** enabled mobile learning over 3G wireless network

Strong collaboration with technology service providers and the Ministry of Education ensured successful programme outcomes in a short timeframe

Source: (a) Qualcomm Wireless Reach, WE Learn: Building the 21st Century Classroom with 3G Smartphones in Singapore, 2015.

CASE 3 BagoSphere[a]

Description

BagoSphere provides vocational telecommunication skills training to increase women's employment, reaching just under 200 students till date

Geography

Philippines

Key Learnings

Considerations for success

- **Partnerships with microfinance institutions to fund skilling:** Bagosphere worked with a top microfinance institution to offer microloans for students to fund training
- **Employers pay commission for hires:** call centres pay a fixed fee per student hired, which helps fund the programme

Lessons for implementation

- **Difficulty in transitioning women to employment:** limited ability for potential employees to travel to the workplace location
- **Data collection for monitoring and evaluation is challenging:** data collection for women's employment outcomes at scale was complex and resource intensive

Project Activities

The programme provides:

- **Call centre training:** women are trained in call centre competencies like basic IT and financial literacy
- **Financial support for women:** women are provided with a transportation allowance, free stationery and course materials
- **Direct link to call centre employment:** after training completion, women gain employment in established IT-BPO call centres and companies

Results

Reach

- 95% graduation rate, with 189 out of 199 enrolled students completing the training course

Employment outcomes

- 85% of graduates were employed within 2 months of graduation
- 71% of graduates still employed after 6 months
- USD 290 average monthly salary of graduates
  - USD 2,520 estimated increase in yearly income per BagoSphere graduate

Key Partners

BagoSphere has two key partnerships:

- **Panasiatic Solutions:** one of the largest employers located near BagoSphere headquarters
- **Negros Woman for Tomorrow Foundation:** a microfinance provider for women

Key conditions for programme success were partnerships with microfinance institutions to fund skilling and financial incentive arrangements with recruiters

Source: (a) Centre for Education Innovations, BagoSphere, 2014.

CASE 4 21C Girls

Description[a]

Provides free coding classes and computational thinking courses to 1,000 girls in Singapore

Geography

Singapore

Key Learnings

Considerations for success

- **Affordability:** coding classes offered free of charge to girls likely incentivised participation
- **Connect learnings to the real world:** students benefited from having real-world applications (e.g. a cryptography class allows students learn to send coded messages that adults cannot read)
- **Access to role models:** highlighting successful Singaporean female technology leaders allowed girls to feel that technology careers are attainable

Lessons for implementation

- **Mentorship was ad-hoc and informal:** unstructured group introductions created short-lived relationships between participants

Project Activities

The organization provides:

- **Coding in the Community:** a multi-year, multi-level computer science and computational thinking course for 3,000 underprivileged Singaporean youth
- **Fintech Camp:** a 1 week long intensive course for 12-18 year old girls
- **"Define" Conference:** Asia's first conference for K-12 computer science teachers
- **Tech Star Junior:** 20-lesson introduction to coding course on computational thinking, with real world application links

Results

Reach for girls

- Taught coding to 1,000 Singaporean girls[b]
- Delivered coding courses to 3,000 Singaporean youth[c]
- 250+ girls taught coding through Crescent Girls School[d]
- 20+ students are learning robotics[e]

Networking and knowledge sharing

- 35+ people attended the first computer science educators' conference in Singapore[f]

Key Partners[g]

21C Girls has 15+ partnerships with businesses and foundations, including:

- **Google:** partner for hosting training events
- **VISA:** provided funding
- **Salesforce:** hosted informational sessions to allow girls to explore technology roles within the firm
- **Singapore Indian Development Association:** co-hosted community training for girls
- **Codomo:** co-facilitated the Fintech Camp
- **The Keys Academy:** partner for training events

Exposure to real world ICT applications and connections to female role models stimulated interest in coding among girls

Source: (a, c) 21C Girls, Programs, 2017. (b) LinkedIn, 21C Girls Description, 2017. (d) 21C Girls, Tech Star, 2017. (e) 21C Girls, Google SG50 Camp, 2015. (f) 21C Girls, Define Conference Speakers and Attendees, 2016. (g) 21C Girls, Partners, 2017.

Figure 10: Implementation learnings from around the world [48]

	Hackbright Academy[a]	Girls Who Code[b]	Women Who Code[c]
Overview	Hackbright Academy's provides coding courses and mentorship exclusively to female students	Girls Who Code teaches computing and programming skills to girls	Women Who Code (WWCode) provides a combination of advanced skills trainings and online coding courses
Location	United States	United States	Global (20+ countries)
Reach	400+ female students (2012-16)	40,000 (2012-16)	80,000 women (2011-16)
Education / Employment Outcomes	78% received full-time salaried positions, with salaries that ranged from USD 50,000 – 160,000	90% of summer immersion participants were planning to major or minor in computer science or a closely-related field	80% of all WWCode participants relayed that participating in WWCode has advanced their careers
Learning from abroad	Part-time and flexible courses allowed women who have additional work or domestic obligations to participate	Corporate pledges to employ women increased the employment of women in technology fields	Encouraging local leadership fostered local events and helped grow local networks

See Cases 6, 7 and 8 for more details.

The Southeast Asian region can leverage global learnings to build upon current programmes and overcome the barriers that girls and women face to increasing women's participation in the workforce. The rapid scan revealed that more established programmes exist outside of Southeast Asia; and learnings from around the world can be applied to the region to accelerate its progression of skilling girls and women in ICT. For example, the Hackbright Academy in the United States leveraged part-time and flexible courses for women to balance training with domestic work, which led to higher rates of women's participation and employment. Women Who Code was able to successfully scale coding programmes for women across the globe by empowering local leaders to launch and sustain chapters (Figure 10). In Southeast Asia, the nature of ICT training and employment for girls and women is nascent and disparate, and such tactics are not widespread. Therefore, these examples can help accelerate ICT training in the region.

48. (a) Hackbright Academy, Outcomes Report, 2016. (b) Girls Who Code, Annual Report 2015, 2016. (c) Women Who Code, About Us, 2017.

Moving forward, cross-cutting solutions that address multiple barriers are critical for programme success. Simply addressing a single barrier that girls or women face may be more feasible, but it is far less likely to have the desired effect of fostering greater interest and adoption of ICT skills among girls and women. Instead, combining strategies and programmes to mitigate several barriers at once is more likely to have an impact (Figure 11).

Figure 11: Cross-cutting solutions are likely to be more successful in supporting girls' and women's interest in and adoption of ICT skills [49]

In the United States, Harvey Mudd college provides an example of using a cross-cutting approach to encourage women's participation in computer science education by doing the following:

- Changing the context of the introductory computer science course to be more fun and relevant by changing the code from Java to Python and providing real-world problems to solve with code (while leaving the level of rigour the same)
- Providing more tailored education by separating out first-year students by skill level
- Breaking the stereotype of STEM as a male domain by taking a large number of female students to the Grace Hopper Celebration of Women in Computing conference that brings together several thousand women in various stages of technology careers
- Marketing a clear message on the importance of women in computer science that directly targeted the reasons women chose not to pursue computer science (e.g. "computer science can offer higher paying careers with a more flexible lifestyle" directly addressed women's concern that their image of computer scientists and their lifestyles was not appealing)

As a result of this approach, the female computer science majors increased four-fold from 10% to 40%.

For anyone developing or executing a programme in this space in Southeast Asia, there are four design principles to leverage (Figure 12). The key learnings from the rapid scan and case studies can be summarised as design principles. These address root causes that hinder ICT skill adoption for girls and women, encourage experimentation to enable girls and women to adopt ICT skills and transition to employment, and apply to a wide range of initiatives across the ICT skills and employment ecosystem.

As programmes expand, the challenge will be to shift the focus from providing advanced ICT skills to imparting basic and applied ICT skills over a sustained period. Only if girls and women can adopt basic and applied ICT skills can they realise their chance to be included in the future workforce and become economically empowered at scale.

49. University of South Carolina-Columbia, Transforming the Culture of the STEM Disciplines: A Multiple Case Study of Successful Strategies for Inclusive Excellence, 2014.

Figure 12: Design principles for providing ICT skills to girls and women[50]

Design Principle	Description	Supporting Evidence
Highlight female role models to increase the confidence of girls and women	• Connecting women with role models in technology-related jobs to share experiences breaks gender stereotypes and allows women to better envision future careers in ICT and STEM fields	• Profiling successful women in STEM fields as role models resonates with girls aged 17-19 years old and is an effective means of encouraging them to consider STEM careers[a] Research found that girls and women perform better when they know successful female role models[b]
Leverage content that portrays ICT as a female domain	• Using customised, gender responsive content that appeals to girls and women improves ICT and STEM learning outcomes for them. Examples include involving more girls in diagrams in math and computer science classes	• The content of teaching and learning materials, particularly textbooks, perpetuates traditional gender roles and discourages girls from pursuing STEM fields (e.g. in Indonesia, a Grade 7 textbook includes a graphic of only men learning science)[c]
Reinforce gender sensitive delivery to increase female participation and skill adoption	• Providing professional development to teachers on gender sensitive strategies to involve and cater to girls and women ensures greater participation and effectiveness of gender sensitive content. Examples include teachers explicitly interacting with and calling on girls during ICT and STEM classes or scheduling evening classes for working women	• Math and science teachers interact with boys twice as much as with girls in some Southeast Asian classrooms, resulting in lower participation, learning outcomes and interest from girls in these classes[d]
Level the playing field for women around access to ICT	• Girls and women face difficulties in accessing the tools and connectivity needed to benefit from ICT-oriented programmes (e.g. computers, mobile phones, the Internet) • Affordability of devices and network/data connections is a major deterrent for women	• Women face a gender gap of up to 5 percentage points in access to the Internet and mobile phone ownership[e, f] • Interviews suggest that even when women own ICT devices, men and children may use them more than women themselves[g]

50. (a) MasterCard, Girls in Tech, 2016. (b) University of Colorado-Boulder, Why Women Aren't Where They Are Needed in the Workforce: Putting the Pieces Together, 2017. (c) UNESCO, Girls and Women in Science, Technology, Engineering and Mathematics in Asia, 2015. (d) UNESCO, Girls and Women in Science, Technology, Engineering and Mathematics in Asia, 2015. (e) World Economic Forum, Global Gender Gap Report, 2016. (f, g) GSMA, Bridging the Gender Gap: Mobile Access and Usage in Low and Middle-Income Countries, 2015.

CASE 5 Technovation

Description[a]

Taught digital literacy, mobile application development and how to create and pitch business ideas to 7,000 girls across 80 countries (including Cambodia) in 2016 alone

Project Activities

The programme provides girls aged 10-18 with in-person and online trainings that teach them to:

- Identify a problem in the community
- Create a mobile application solution to address the problem
- Communicate these ideas and translate them into a fully launched business using ICT

Key Learnings

Considerations for success

- **Women mentors:** women mentors ensured girls felt comfortable during teaching sessions
- **Local champions at country level:** working with local champions in countries supported programme scale-up
- **Partnerships were key:** leveraging multiple partnerships is critical to scale

Lessons for implementation

- **Content is delivered only in select languages:** there is a need to develop online content in more local languages to scale up the initiative

Geography

Global, including Cambodia

Results

Reach (2016)[b]

- 7,000+ girls registered for the programme, out of which 54% (4,000) completed the programme
- Girls across 87 countries and 4 territories registered for the programme
- Girls across 44 countries completed the programme
- Girls created 847 applications through the programme

Reach (2010-2016)[c]

- 10,000 alumnae completed the programme across 80+ countries and created 2,000 applications

Higher STEM education[d]

- 26% of college age alumnae intend to major in computer science after Technovation (compared to only 0.4% of college freshmen)
- 58% of alumnae enroll in further computer science courses

Key Partners[e]

Technovation has several partnerships, including with:

- **UN Women:** provided seed funding for expansion of programmes
- **White House:** partner in organising high-visibility events
- **Google:** provided funding worth USD 435,000

Identifying and working with local champions helped the programme scale up across countries, and girls felt more comfortable to voice their ideas in the presence of women mentors

Source: (a, c, d, e) Technovation, Girls For a Change, 2016. (b) Technovation, Technovation by the Numbers, 2016.

CASE 6

The Hackbright Academy

Description[a,b]

Hackbright Academy provides coding courses and mentorship exclusively to female students, reaching an average of 180 students every year

Geography

United States

Key Learnings

Considerations for success

- **Partnerships with recruiters:** formalised pathways for graduates significantly increased employment rates for women
- **Flexibility:** part-time courses allowed women who have additional work / domestic obligations to participate
- **Combination of skilling and mentorship:** pairing students with mentors, in addition to skills training, ensured greater adoption and inspiration for women

Lessons for implementation

- **Limited functionality of course content:** taught codes that were more complicated than necessary

Project Activities

Students pay between USD 3,000 – 17,000 (8 weeks – 12 weeks) to access:

- **Software engineering fellowships:** women can learn the fundamentals of computer science and modern web development to become software engineers
- **Part-time night courses:** women can flexibly follow basic programming and coding courses on the job
- **1:1 mentorship:** each student has individualised mentors with experience in the technology industry to provide additional coaching

Results[c]

Reach

- 99.5% completion rate for students (183 out of 184 students completed the programme) from February 2014 to September 2016

Employment

- Out of 111 graduates who provided job data, most transitioned into technology roles (e.g. software engineer, software developer, front-end engineer)
  - 78% (87) accepted full-time salaried positions
  - 11% (12) accepted paid internships or apprenticeships
  - 11% (12) accepted paid contract work
- Graduates received jobs less than 6 months from the course graduation date
- The salary for graduates ranged from USD 50,000-160,000

Key Partners

The Hackbright Academy partners with several recruiters to improve women's access to technology jobs:

- **Facebook**
- **Eventbrite**
- **Amazon**
- **Yelp**
- **Uber**

Partnerships with recruiters, flexible options to undertake part-time courses and 1:1 mentorship contributed to programme success

Source: (a) Hackbright Academy, Hackbright Prep-New!, 2017. (b) Hackbright Academy, Software Engineering Fellowship, 2017. (c) Hackbright Academy, Outcomes Report, 2016.

CASE 7 Girls Who Code

Description[a]

Teaches computing and programming skills to aproximately 2,000 girls in the US every year to increase the number of women in computer science

Geography

United States

Key Learnings

Considerations for success

- **Affordability:** free coding classes likely induced greater participation among girls
- **Tangible output:** coding for a specific output (e.g. an application) increased girls' confidence and comfort in using technology
- **Partnerships with 100+ private sector organisations:** collaboration supported the funding and continuity of programmatic activities[6]
- **Pledges for employment:** corporate pledges increased employment of women in technology fields

Lessons for implementation

- **Lack of post-programme support:** no mechanisms for training support after the summer immersion programme

Project Activities

The programme had a cost of approximately USD 7 million from 2012-15 and provides:

- A free 7-week summer immersion coding programme for 10th- 11th grade girls
- After school clubs for 6th-12th grade girls

Results

Reach

- Taught 40,000 girls how to code from 2012-16 (10,000 in clubs and 2,000 in the summer immersion programme in 2015)[b]

Willingness to pursue computer science

- 65% of club participants considered a major or minor in computer science after completing the programme[3]
- 90% of summer immersion participants were planning to major or minor in computer science or a closely-related field[4]
- 100+ alumnae from the programme majored in computer science at top-ranked United States universities (e.g. Harvard, Stanford, Massachusetts Institute of Technology)[5]

Employment

- 57 top technology companies pledged to hire Girls Who Code alumnae and offer internship opportunities

Key Partners

Girls Who Code has 100+ partnerships with businesses and foundations:

- **Accenture:** summer immersion programmes and coding clubs supporter
- **AppNexus:** major corporate donor and summer immersion programmes partner
- **AT&T:** alumnae networking partner, major corporate donor and summer immersion supporter
- **Kate Spade & Company:** major corporate donor and summer immersion programme partner

Encouraging girls to produce tangible outputs at the end of training workshops was a key success driver for developing confidence among girls

Source: (a, b, c, d, f, g) Girls Who Code, Annual Report 2015, 2016. (e) Girls Who Code, About Us, 2017.

CASE 8 Women Who Code

Description[a]

Women Who Code (WWCode) has reached over 80,000 women globally by providing a combination of advanced skills trainings and online coding courses

Geography

Global, including Malaysia, Singapore and Philippines

Key Learnings

Considerations for success

- **Partnerships for commercial sustainability:** companies must pay USD 100-1,500 for job posts / partnership benefits
- **Links to formal employment:** an online job board tailors jobs for women, provides direct outreach on jobs and features technology companies / coding jobs via social media
- **Encouraging local leadership fostered scale:** allowing local women to lead local events helped grow networks

Lessons for implementation

- **Short courses, with limited post programme support:** workshops (e.g. in Malaysia) are very short (typically 1-2 days), which makes it difficult to follow up on progress made

Project Activities

The programme operates in over 40 cities and provides:

- **Skilling workshops:** in-person trainings on coding and contemporary technology, often at technology companies
- **Online coding resources:** recommended tutorials, blogs and videos to help women learn to code, learn a new language or polish existing skills online
- **Connect to job opportunities:** works closely with organisations to link women to job opportunities

Results

Reach

- Connected 80,000 women globally[b]
- Organised 4,000 free technical events through 40 cities[c]
- Awarded over $1 million in educational scholarships[d]
- An average of 4 events happen per day around the world[e]
- 1,000 free / low cost workshops, hackathons, and developer conferences from leading experts in technology each year[f]

Career advancement

- 80% of all WWCode participants relayed that participating in WWCode has advanced their careers[g]
- Members have volunteered over 50,000 hours in the form of speaking, mentoring and teaching on technical and career topics[h]

Key Partners

Women Who Code is financially sponsored by 18+ corporations, including:

- **Box**
- **eBay**
- **Google**
- **CapitalOne**
- **Groupon**
- **Target**

Partnering with local champions to lead programmes ensured scale-up across and within countries; however, short training courses with no effective follow-up support make it difficult to monitor progress

Source: (a, b, c, d) Women Who Code, About Us, 2017. (e, f, g) Women Who Code, Women Who Code Fact Sheet, 2016. (h) Women Who Code, For Companies, 2017.

The integration of ICT in classrooms that is both sustained in duration and provides transferable skills fosters longer-term comfort and adaptability with technology

The Path Forward

To equip girls and women with basic and applied ICT skills for the future workforce, there needs to be coordinated action across policymakers, philanthropies, and private sector businesses. The primary role for each actor is different based on strengths that we have identified through our rapid scan (Figure 13). Ideally, each will be involved in shaping and delivering programmes that address the spectrum of barriers that girls and women face. Leveraging the strengths of each actor can ensure cross-cutting support to girls and women to adopt ICT skills.

Figure 13: Key roles of policymakers, philanthropies, and private sector businesses to foster ICT skill adoption for girls and women

Type of role
- Primary
- Supporting

	Reduce barriers to developing interest in ICT	Reduce barriers to acquiring ICT skills	Reduce barriers to entering the workforce
Policymakers	Explore a rights-based approach to enable **access** to ICT tools and connectivity for women	Review school **curricula** to ensure gender sensitivity and sustained integration of ICT Mandate ICT education in existing government **skills programmes**, with an emphasis on girls and women	Support policy to improve workplace **gender equality** and fair hiring practices Engage the private sector to assess national **skill needs**
Philanthropies	Generate thought leadership on the impact and strategies of mitigating and reversing negative **gender biases** that prevent women from pursuing ICT skills and work	**Research** and disseminate findings on increasing women's adoption of ICT skills	Build networks between organisations to link women in ICT training to **workforce entry**
Private sector businesses	Highlight successful female **role models** who use ICT	Train existing **employees** and women in **supply chains** on ICT skills, particularly basic and applied ICT skills	Partner with ICT training programmes to **hire** more women Provide options to **work virtually**

Policymakers

Policymakers can help girls and women develop an interest in ICT by enabling their access to tools and connectivity, possibly by exploring a rights-based approach. The use of technology is growing in every sector. Basic awareness of technology is becoming a necessity to participate in the economy, and access to technology not just a luxury, but a basic human right. The government needs to ease the current situation of differential access by providing girls and women the tools and connectivity they need. Finland, for example, has made broadband access a legal right for all citizens.[51] Exploring a rights-based approach can allow policymakers in Southeast Asia to determine how to best provide women the ICT products and services they need to work.

Policymakers can (i) review school curricula to ensure gender sensitivity and adequate ICT integration, with a focus on basic and applied ICT skills and (ii) mandate basic and applied ICT education in existing government skills programmes targeted at women. Currently, there is a great need for content that encourages the active participation and interaction of girls with technology. Policymakers can call for continual curriculum review to ensure that the content promotes women in ICT. The content should also ensure that both in-person and virtual training for basic and applied ICT skills is integrated into school curricula in classes 1–12, and should focus on integrating activities that encourage girls' active, creative use of ICT. The integration of ICT that is both sustained in duration and provides transferrable skills fosters longer-term comfort and adaptability with technology. For example, ensuring that a certain portion of coursework is integrated with digital platforms throughout a student's school career is likely to be more helpful than taking one short course on how to use ICT. Similarly, the government can ensure that basic and applied ICT education is provided in existing government skilling programmes focused on girls or women (e.g. integrating ICT content into Indonesian vocational programmes for women).

Policymakers can also develop policies that support gender equality in the workforce and engage the private sector to understand skill needs. For example, policies that reinforce equal wages for women and men, and hiring practices that eliminate gender markers and biases, can enable women to enter the workforce. Policymakers can also call for a systematic and regular national review of skills needed in an economy. As an example, the National Skill Development Corporation of the Government of India assesses national and state-level skill needs to guide policy decisions.

51. The Guardian, Finland Makes Broadband Access a Legal Right, 2009.

Philanthropies

Due to the breadth and depth of existing networks, philanthropies are uniquely positioned to bridge the gap between ICT training and employment to ease women's entry into the workforce. They can connect women with both on-the-ground programmes and small and large businesses across local, national, and regional economies for ease of employment. They can leverage existing partnerships to build informal women's networks to increase the likelihood of women identifying a vacancy and being hired for a job. As an example, Bagosphere is a programme in the Philippines that directly transitions women from ICT training to employment at a local call centre; as a result, 85% of the programme's graduates were employed within two months.[52]

Philanthropies can help girls and women develop interest in ICT by generating thought leadership on changing existing gender biases. For example, supporting research on how to mitigate and reverse gender biases that inhibit women from acquiring ICT skills would be particularly useful to change the overall enabling environment to increase the willingness, interest, and ability of girls and women to adopt ICT skills. Philanthropies are well suited to researching compelling, difficult topics, such as quantifying the hidden costs of gender biases to technology firms. This can catalyse other actors to understand the need and methods to change underlying gender biases.

Philanthropies can support long-term research on understanding the key drivers and solutions for girls' and women's adoption of ICT skills. For example, research and leading practices on how to foster the active use of technology for girls could guide the actions of on-the-ground programmes and allow girls and women to overcome some barriers to acquiring ICT skills. Similarly, philanthropies can leverage their ability to invest in multi-year assessments of innovative, on-the-ground programmes to distil key findings on how other programme delivery agents can strengthen the link between ICT skill adoption and economic empowerment.

Private sector businesses

Private sector businesses, as the largest driver of employment in Southeast Asia, have an important role in partnering with ICT training programmes to recruit more women into the workforce. By fostering partnerships between businesses and ICT training programmes and focusing on gendered recruitment practices, businesses can attract and hire more women. There are examples of focused efforts to hire women from ICT training programmes (e.g. pledges to hire women, flexible timings for interviews), but these are predominantly focused on advanced ICT trainings. There is a strong need to translate these practices for women who acquire basic and applied ICT skills.

52. Centre for Education Innovations, BagoSphere, 2014.

Private sector businesses can catalyse flexible working arrangements by providing options to work virtually. Allowing employees to work from home allows women to balance domestic responsibilities and circumvent mobility constraints and, possibly, encourages men to engage more in the household as well. For example, Accenture offers both flexible working time and teleworking options to its workforce.[53] Another interesting example is the Mom Project, which provides a digital marketplace to connect companies looking for talented workers with women who need flexible jobs.[54]

Businesses can train female employees and women in their supply chains in basic and applied ICT skills.[55] Private sector businesses can play a major role in ICT skills dissemination by using existing structures as a conduit to train women in basic and applied ICT skills. For example, Coca-Cola's 5by20 campaign aims to enable the economic empowerment of five million women entrepreneurs in its value chain, in part by providing women skills training.[56] Businesses can make it a strategic priority to identify women involved in their company and in their supply chains, provide initial in-person ICT skills training, and then transition to providing virtual training content that can help them become more effective and productive. For virtual training, companies can increase access to skills training by both digitising current training programmes and including ICT content in courses for women who have had limited access to formal schooling or for women who are re-entering the workforce after an extended period of time (e.g., after maternity leave).

To interest younger girls and women in acquiring ICT skills, the private sector can highlight and affirm successful women who work with ICT. Businesses can highlight female role models who use ICT in the popular media and through branding to encourage women to enter the workforce. As an example, Google launched a global programme called WomenTechmakers to provide women in technology more visibility and resources.[57] Companies can also match female role models within their companies with female trainees to coach them through the job application process. Businesses can support women's networks and mentoring, both in person and virtually, to increase their knowledge of both firm-specific and broader industry trends.

The roles presented above illustrate that policymakers should focus on exploring new approaches to ICT access for women, reviewing school curricula to ensure gender-sensitive content and ICT integration, and mandate ICT education in existing government skills programmes targeted at girls and women. Philanthropies are ideally positioned to leverage existing networks and to bridge the gap between ICT trainers and employers for women. Private sector businesses have an important role in many areas, particularly in partnering with ICT training providers to recruit women and in providing training to women in existing jobs and supply chains and creating options for flexible and remote work. Ensuring the cooperation and alignment of all three parties can amplify the efforts of each to ensure girls and women are equipped with ICT skills.

53. Accenture, Flexible Work Arrangements, 2017.
54. Fast Company, These Companies are Helping Women Find Work-Life Balance, 2016.
55. ASEAN, SME Developments in ASEAN, 2015.
56. Coca-Cola, 5by20: What We're Doing, 2017.
57. WomenTechmakers, 2017.

Conclusion

This report aims to close the information gap around how ICT skills training, particularly basic and applied ICT skills training, for girls and women can increase economic empowerment and growth. It highlights that women's workforce participation could contribute considerably to economic development in Southeast Asia, yet there remains a significant, 23-percentage-point gender gap.[58] Over the next decade, up to 80% of jobs will demand ICT skills. But women will continue to face barriers to pursuing ICT training, such as strong perceptions of gender roles, large domestic burdens, limited mobility, and constrained access to ICT.[59] Therefore, it is expected, women will continue to be at a disadvantage in terms of workforce participation. To mitigate these trends, skilling efforts in the region targeted toward girls and women should focus on providing basic and applied ICT skills. These should sustain engagement with girls and women across the lifecycle of training, employment, and career progression.

Significant additional work remains to be done to increase women's economic empowerment. This report prioritised the Southeast Asia region and the use of ICT to address women's workforce participation, but there are additional strategies to increase women's workforce participation globally, like a focus on entrepreneurship. As economies become more digitised and interconnected, there is also a greater need to examine the ability to load-balance supply and demand of the women's workforce not only at the country level but also at the regional and global levels. Finally, while labour force participation is used as a proxy for economic empowerment, women can also achieve income and economic empowerment outside of traditional employment (e.g. financial services, property, and other productive assets).

Policymakers, philanthropies, and private sector businesses need to act now to incorporate girls and women across the ICT education and employment ecosystem for the future economic empowerment of women and the economic well-being of Southeast Asian economies. The current economic outlook is weak for Southeast Asia. Given the changing world of work and digital technology, ensuring that girls and women have relevant ICT skills can secure the success of local and country economies and decrease the gender divide in the workforce. Policymakers can explore new approaches to enabling greater access to ICT tools and connectivity for girls and women. Philanthropies can leverage existing networks to increase gender-sensitive training and link ICT trainers and employers to ease women's transition into the workforce. Private sector businesses can provide basic and applied ICT skills to women through existing jobs and supply chains, create options to work virtually, highlight successful women working in ICT and, most importantly, partner with and recruit more women from ICT training programmes. All three parties can contribute significantly alone and in concert to ensure that girls and women are equipped with skills for the future workforce. This will increase the economic empowerment of women and accelerate broader economic growth in Southeast Asia.

58. Asian Development Bank, Women in the Workforce: An Unmet Potential in Asia and the Pacific, 2015.
59. International Telecommunication Union, Contribution to the 2015 United Nations Economic and Social Council (ECOSOC) Integration Segment, 2015.

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THE SASAKAWA PEACE FOUNDATION

The Sasakawa Peace Foundation Bldg.
1-15-16 Toranomon, Minato-ku, Tokyo 105-8524, Japan
TEL 03-5157-5430 EMAIL spfpr@spf.or.jp

www.spf.org
The Sasakawa Peace Foundation SPF_PR