

A woman with blonde hair, wearing a white lab coat and a blue lanyard, is leaning over a desk in a laboratory or office setting. She is looking intently at a small, white and black robot with a camera lens on its head. The robot is connected to various wires and components. In the background, there are computer monitors displaying data and graphs. The overall scene is brightly lit with a blueish tint.

SHOWCASING WOMEN INNOVATION LEADERS IN AUSTRALIA AND SOUTHEAST ASIA

A REGIONAL DIALOGUE

This report supports the ASEAN Women in Innovation Leadership Dialogue – an initiative of the Australian Government.

“Catalysing discussion on the imperative for women leadership across the region.”

CONTENTS

A REGIONAL SNAPSHOT OF WOMEN IN INNOVATION LEADERSHIP	2
INTRODUCTION	5
KEY FACTS	6
TECHNOLOGICAL TRENDS ARE RAPIDLY RESHAPING THE GLOBAL ECONOMY	7
Digital disruption and technological uptake in the region is driving demand for an innovation-skilled workforce	7
Entrepreneurship unlocks the full potential of the Fourth Industrial Revolution	8
INCREASING WOMEN IN INNOVATION UNLOCKS GROWTH	9
Gender diversity has positive economic outcomes	9
STEM skilled women are key to realising innovation potential	9
We need more women leaders in business and entrepreneurship	10
IMPROVING LEADERSHIP PATHWAYS FOR WOMEN DRIVES INNOVATION AND CREATES JOBS	11
Australia and the Southeast Asia region must pave the way for more women in innovation leadership	11
ENSURING WOMEN LEADERS THRIVE	12
Countries in the Southeast Asia region have implemented measures to increase women in innovation leadership	12
NEXT STEPS: OPPORTUNITIES FOR REGIONAL COLLABORATION	13
REFERENCES	14







A REGIONAL SNAPSHOT OF WOMEN IN INNOVATION LEADERSHIP





MYANMAR  **53.4** MILLION

 19%  47%  41%



THAILAND  **69** MILLION

 58%  30%  59%  65%


CAMBODIA  **16** MILLION

 12%  17%  74%  57%

MALAYSIA  **31.6** MILLION

 45%  39%  49%  26%

INDONESIA  **264** MILLION

 38%  37%  50%  22%

 POPULATION  GROSS FEMALE TERTIARY ENROLLMENT RATIO  FEMALE SHARE OF GRADUATES FROM STEM
 FEMALE EMPLOYMENT TO POPULATION RATIO  FIRMS WITH A FEMALE TOP MANAGER

Note: The gross female tertiary enrollment ratio is the ratio of total female enrollment in tertiary education to the population of the age group that officially corresponds to tertiary education.

For additional data definitions see: The World Bank Group, *The Little Data Book on Gender: 2019*, <<https://openknowledge.worldbank.org/bitstream/handle/10986/31689/LDB-Gender-2019.pdf?sequence=2&isAllowed=y>>.

 **6.9** MILLION


LAOS

 16%  25%  76%  45%

 **96** MILLION

VIETNAM

 31%  37%  71%  22%




 **105** MILLION

PHILIPPINES

 40%  36%  45%  30%

 **429,000**

BRUNEI

 40%  52%  52%

 **6** MILLION

SINGAPORE

 91%  34%  58%

 **25** MILLION

AUSTRALIA

 134%  32%  56%



INTRODUCTION

The Fourth Industrial Revolution is upon us. New technologies, such as robotics, artificial intelligence (AI) and automation, are transforming the way we live and work. Industry 4.0 technologies combined with the rapid rise of the digital economy are driving demand for a skilled innovation workforce.

This will have a profound impact on Australia and the Southeast Asia region.¹ In order to compete in a dynamic and increasingly integrated global economy, countries will need to promote entrepreneurship and drive an innovation mindset by investing in upskilling their workers for the jobs of the future.

With a labour force of over 340 million people, the human capital of Australia and the Southeast Asia region holds enormous potential.² Women are a critical part of this story. But women have historically been underrepresented in innovation-driven professions. Increasing representation of women in innovation leadership will be key to realising the potential of the entire workforce of Australia and the Southeast Asia region.

Governments, international organisations, and corporations in Australia and the Southeast Asia region are aware of the untapped potential within their women workforces and are seeking ways to address this. Science, technology, education and mathematics (STEM)³ are crucial enablers for innovation. Strategies that increase the number of women with STEM skills help grow the number of women in innovation leadership positions in startups, entrepreneurship, venture capital, technology firms and knowledge intensive companies.⁴ Ensuring a sustainable pathway for women to become innovation leaders is vital.

Although the economies and workforces of Australia and the Southeast Asia region are hugely diverse, the underrepresentation of women in entrepreneurship, STEM and innovation leadership is a common challenge. Australia and Southeast Asian countries need to work together to ensure that opportunities that empower women to find pathways into leadership roles are made transparent. This will enable the region to collectively take advantage of one of its most underutilised resources. Australia has made good progress in responding to initiatives that empower women in STEM, entrepreneurship and leadership, and is well placed to work with and learn from the region in implementing solutions that provide international career pathways for women leaders in innovation.

Emerging bodies of work on this challenge across the region will provide a baseline to understand how to increase the number of women in innovation leadership. Taking a region-wide approach to understanding best practice policies will be critical to overcoming the barriers to women's participation in entrepreneurship and innovation.

We need to start to unpack the connections between STEM as an enabler for technological advances, as a driver of entrepreneurship in the technology sector, and of regional growth. This report examines some of these core issues but is only a starting point. Further research on existing initiatives which have been successful will be important in supporting a regional conversation on the actions we need to take, and key areas for collaboration. This collaboration will be the key to unlocking the growth potential of the Fourth Industrial Revolution across Australia and the Southeast Asia region.



KEY FACTS



Technological trends will drive demand for new skills

By 2028, rapid automation will require up to **6.6 million workers** in the six largest economies of the ASEAN region (Indonesia, Malaysia, Philippines, Singapore, Thailand and Vietnam) to **transition to new occupations and learn new skills**.⁵



Skills for innovation are critical for the future of work

The demand for the skills required for innovation is increasing. Future jobs will **demand skills for innovation 70% more** than jobs of the past.

From 2015 to 2017 demand for skills increased by:

-  **212%** for digital literacy
-  **158%** for critical thinking
-  **65%** for creativity⁶



However, there are deep skills-challenges across Australia and the Southeast Asia region

41% of workers in Singapore, Philippines, Vietnam, Malaysia, Thailand and Indonesia will face **'acute skills mismatch with vacant positions'** in information technology.⁷



In Australia, there is a **shortage of 3 million people with digital literacy skills**.⁸

Women are under-represented in the global and regional workforce

Across Australia and the Southeast Asia region, gender imbalances in formal workforce participation persist.

ASEAN countries	Australia
 59% women employed	60% women employed
 78% men employed	71% men employed ⁹



Female workforce participation unlocks innovation

Gender diverse work teams are associated with **higher collective intelligence**, are more likely to experiment, be creative, share knowledge and encourage innovative change.¹⁰



Supporting women will also unlock regional economic growth

Increasing participation of women in high-productivity sectors could add **\$6 trillion to the collective annual GDP of the Asia Pacific**,¹¹ or a 12% increase in business-as-usual GDP.¹²

Women are under-represented in business leadership positions



In ASEAN member countries in 2018, **28%** of the total proportion of **senior roles were held by women**.¹³



In ASX 200 companies in Australia, **women comprise less than a third (29.5%) of board positions**,¹⁴ a quarter (25%) of executive leadership teams, and just 6% of CEO roles.¹⁵



Increasing the visibility of female leaders will drive change:

Australian research highlights that a lack of women role models is a significant **hurdle for gender equality**, especially in fields where women are underrepresented.¹⁶

TECHNOLOGICAL TRENDS ARE RAPIDLY RESHAPING THE GLOBAL ECONOMY

Technology and innovation are having a profound impact on the structure of the global workforce. The Fourth Industrial Revolution has seen the emergence of technologies like robotics, 3D printing, big data, artificial intelligence, blockchain, 5G and the Internet of Things. These technologies are displacing traditional occupations, requiring new ideas, driving new ways of working, and increasing the need for entrepreneurship and innovation.¹⁷

DIGITAL DISRUPTION AND TECHNOLOGICAL UPTAKE IN THE REGION IS DRIVING DEMAND FOR AN INNOVATION-SKILLED WORKFORCE

Across the region, governments must respond to the impact of technology by ensuring their workforces can meet the skill demands of the future. Digital and STEM skills, including computational thinking, high-level maths and 'Big Data' analysis, will play a key role¹⁸ as drivers and tools for innovation and entrepreneurship.

The digital revolution is generating huge growth in the internet economy, which will require a digitally-capable and innovative workforce. In 2019, Southeast Asia's internet economy reached \$134 billion, with high growth expectations throughout the region expected in the future¹⁹ increasing the demand for digitally capable and innovation-skilled workers.

By 2030, it is expected that up to 375 million workers (or 14 per cent of the global workforce) will need to transition to new occupations and learn new skills in the event of rapid automation.²⁰ This will be critical to filling the 50 million new jobs that are expected to be created in the global technology sector in this period.²¹ These jobs are likely to be for computer scientists, engineers, IT administrators and technology consultants.²²





ENTREPRENEURSHIP UNLOCKS THE FULL POTENTIAL OF THE FOURTH INDUSTRIAL REVOLUTION

Entrepreneurship and innovation in technology have the potential to increase productivity and unlock economic growth in Australia and the Southeast Asia region. The Fourth Industrial Revolution is seeing the emergence of technologies that are changing the way we live and work. Amid this transformation, business leaders understand that integrating digital capabilities into their organisations will be crucial to unlock future growth.²³

Entrepreneurship and the rise and growth of tech-based startups are driving new innovations in the region. Between 2016 and 2019, more than \$50 billion in capital flowed into Southeast Asia's internet economy.²⁴ This included investment in nearly 3,000 startups, including major e-Commerce and ride-sharing tech unicorns. As at November 2019, Southeast Asia was home to eight unicorns, and Australia was home to three.²⁵

Industry 4.0 technologies, such as 3D printing, have the potential to both disrupt and generate productivity improvements in traditional Southeast Asian industries, including manufacturing.²⁶ Regional collaboration will be the key to ensuring the benefits of these technologies are realised. New technologies such as fifth-generation mobile networks (5G) are unlocking the potential of autonomous vehicles and virtual reality.²⁷ Entrepreneurs that develop new products and services will be critical to innovation in technology, finding new applications for existing technologies and developing technologies not yet imagined.²⁸

Women are a vital part of this story. Increasing women's participation and representation in innovation-skilled entrepreneurship will be critical to future-proofing regional economies.

INCREASING WOMEN IN INNOVATION UNLOCKS GROWTH

Increasing women's participation in innovation is key to realising the potential of the Fourth Industrial Revolution in Australia and the Southeast Asian region, by unlocking our 340 million strong labour force to drive economic prosperity.

GENDER DIVERSITY HAS POSITIVE ECONOMIC OUTCOMES

Increasing the number of women in the workplace and promoting diversity increases market resilience, output and productivity.²⁹ Increasing the participation and paid hours of women in high-productivity sectors will add \$4.5 trillion, or a 12 per cent increase, to the collective GDP of the Asia Pacific by 2025.³⁰

Supporting the development of women in innovation leadership and ensuring there are clear pathways for women to enter highly-skilled roles will drive regional competitiveness and foster innovation. Creating a diverse workforce will ensure the region is in a strong position to take advantage of the opportunities presented by an increasingly technological future.

STEM SKILLED WOMEN ARE KEY TO REALISING INNOVATION POTENTIAL

To be at the cutting edge of entrepreneurship and innovation, countries will need to make the most of their human capital.

Around the world, low levels of women in the STEM skilled workforce has meant that countries are failing to realise their full innovation potential. For example, women comprise just 17 per cent of the STEM-qualified population in Australia,³¹ and only 17 per cent of STEM students in Southeast Asia region countries.³²

Labour force data in Australia shows that jobs in STEM occupations are growing faster than jobs in non-STEM occupations.³³ Digital and STEM skills are critical for innovation, especially in technology advancement. The difference in STEM occupation growth rates is expected to become more pronounced by 2023, with STEM jobs growing at 11 per cent, and non-STEM jobs growing at 6 per cent.³⁴

Accessing the full potential of the region's human capital will be key to ensuring that we have a workforce and future leaders with the skills required to drive an innovation-based economy.





WE NEED MORE WOMEN LEADERS IN BUSINESS AND ENTREPRENEURSHIP

The Southeast Asia region has diverse rates of women entrepreneurship. Women are well represented in entrepreneurship in the Philippines (69 per cent) and Thailand (64 per cent), while they are under-represented in countries such as Malaysia (25 per cent) and Myanmar (35 per cent).³⁵

However, women entrepreneurs in the Southeast Asia region are concentrated in lower value activities. For example, across six countries in Southeast Asia, women entrepreneurs were overrepresented in retail trade, hotels and restaurants but underrepresented in the information and communication sector.³⁶ This means there are fewer women leading innovation-driven businesses that hold the potential to realise higher revenues and contribute to higher economic growth.³⁷

Indonesia has a strong pool of women entrepreneurs. Women own over half of small enterprises and about a third of medium-sized enterprises.³⁸ But women-owned enterprises are more likely to be necessity-based businesses, started due to a lack of opportunities in the regular labour market.³⁹ This is in contrast to more innovation-driven businesses that recognise a gap in the market and create a new product or service or enter to improve an existing product or service.⁴⁰

Young people across the Southeast Asia region are keen to work in innovation-driven settings, and highly value entrepreneurial skillsets. A third of young people surveyed in six Southeast Asian countries aspire to work in an entrepreneurial setting, and consider creativity, innovation and the ability to use technology among the most important skills for the future.⁴¹ Ensuring that these skills are fostered among young people, particularly young women, will need to remain a regional priority. Engaging more women in high productivity and innovation-driven entrepreneurship is critical to the region's success in the Fourth Industrial Revolution.

IMPROVING LEADERSHIP PATHWAYS FOR WOMEN DRIVES INNOVATION AND CREATES JOBS

Increasing women in innovation leadership (including in business, entrepreneurship, tech and STEM disciplines) has positive flow-on effects for women looking to enter, remain in and climb the ranks of the innovation workforce. For example, 80 per cent of women in fields such as engineering and physics said that a lack of female role models was ‘a significant hurdle for gender equity in their field’.⁴² Ensuring women leaders are visible has the potential to empower the next generation of women in innovation.

AUSTRALIA AND THE SOUTHEAST ASIA REGION MUST PAVE THE WAY FOR MORE WOMEN IN INNOVATION LEADERSHIP

Australia and the Southeast Asia region face a common challenge of underrepresentation of women in innovation leadership. Part of the challenge is that the representation of women in innovation and STEM — STEM is a critical contributor to innovation in technology — declines at each milestone leading to leadership positions. In entrepreneurship, the challenge is creating pathways and upskilling women entrepreneurs to ensure they are operating in high-growth sectors and participating in innovation-driven business in the technology sector. Increasing and upskilling women with STEM skills is vital to building a pathway for greater numbers of women into leadership positions in the new economy.

Currently, low numbers of women are choosing to undertake STEM-related education at the tertiary level. In Indonesia, young women outperformed men in science subjects in secondary education.⁴³ But at the tertiary level, women only made up 37 per cent of STEM graduates.⁴⁴ There is a further drop off for Indonesian women entering the workforce. In academic research, for example, only 31 per cent of STEM researchers were female compared to 69 per cent of males.⁴⁵

The picture is similar in Australia. Boys outnumbered girls 3-to-1 in secondary education physics subjects and 2-to-1 in advanced mathematics.⁴⁶ Of the total engineering labour force in Australia, only 12 per cent are women.⁴⁷ At the senior level of Australian STEM-related careers, women represented only 15 per cent.⁴⁸

Women face key challenges in their pathways to leadership including stereotypes, discrimination from peers, parents, teachers and within workplaces, societal expectations and workplace culture and structures.⁴⁹

Addressing the barriers to representation of women in innovation leadership positions and building a strong pathway for women into STEM will be critical to unlocking economic opportunities in the Southeast Asia region.



ENSURING WOMEN LEADERS THRIVE

Increasing the representation of women in innovation leadership is a common challenge across Australia and the Southeast Asia region. The women who are already leading and inspiring others in innovation should be celebrated, but more needs to be done. Governments, corporations, and non-government organisations are seeking new ways to address this challenge, with many taking steps to build the number of women leaders. This section showcases some of these key existing initiatives in the Southeast Asia region.

COUNTRIES IN THE SOUTHEAST ASIA REGION HAVE IMPLEMENTED MEASURES TO INCREASE WOMEN IN INNOVATION LEADERSHIP

Governments, international organisations, and corporations in Australia and the Southeast Asia region have been proactively seeking to build their pipeline of future women innovation leaders. Recognising the key role that STEM education and experience plays in driving innovation, particularly in the technology sector, many initiatives in the region have focused on improving pathways through STEM, from education, to work and to leadership. Given the common nature of this challenge, identifying examples of best practice and leveraging insights from existing initiatives will help lay the foundation for successful regional collaboration to increase the representation of women in innovation leadership.

Governments are looking at ways to support and encourage women's participation in innovation leadership across all industries

The Australian government has been a regional leader in its efforts to support women in innovation leadership. Recent initiatives have focused on highlighting pathways and success stories to pave the way for more women leadership.⁵⁰ In October 2018, the Australian government appointed an inaugural Women in STEM Ambassador to advocate for greater gender equality, provide advice on issues affecting women in STEM and to increase the visibility of women in STEM education and careers.⁵¹

Through a 'Women in STEM and Entrepreneurship' grant from the Australian Government, the Academy of Science has created 'STEM Women,' an online directory of women in Australia working in STEM with links to opportunities such as committees, boards, awards and conferences for aspiring leaders.⁵² The STEM Women initiative also seeks to increase the visibility of women in STEM fields and promote pathways to leadership for women in innovation.

Malaysia has created residential science schools to deliver high-quality STEM education, including six schools exclusively for girls. Malaysia is also keen to share its key learnings with other countries across the region and is developing a resource pack for gender-responsive STEM education.⁵³ Regional collaboration will continue to be crucial to draw lessons and develop an understanding of best practice from the important work that is already occurring across Australia and the Southeast Asia region.

International organisations are supporting cross-sector collaboration to increase the representation of women in leadership

International organisations are well placed to implement collaborative initiatives across Australia and the Southeast Asia region to increase the number of women innovation leaders. Since 2017, the International Labour Organization with the support of JPMorgan has been working with governments, industry and education providers in Indonesia, the Philippines and Thailand to increase women in STEM roles and leadership positions.⁵⁴ The *Women in STEM Workforce Readiness and Development Programme* (the Programme) aims to increase opportunities for women in high-growth industries in each country. The Programme seeks to increase the entry, retention, and advancement of women workers into these industries in STEM-related roles.⁵⁵ The Programme focuses on upskilling women on the pathway to leadership by providing training in high-end technical skills and leadership and managerial training.

Corporations are also getting involved in the push to increase women's representation in an innovation-skilled workforce

Large corporations are also playing an increasingly important role in the Southeast Asia region. For example, Microsoft has also joined forces with the ASEAN Foundation and Malaysian Ministry of Education to develop a Future Ready ASEAN platform that provides online digital training for young people throughout the region.⁵⁶ This is critical for a youth population that believes they need to upskill for the Fourth Industrial Revolution.⁵⁷

In Singapore, Arup has partnered with the Singapore Committee for UN Women to develop the Girls2Pioneers program, encouraging young women to pursue careers in STEM.⁵⁸ The initiative hosts events, conducts field trips to construction sites and provides two-week long internship programs for girls interested in STEM. Since the initiative started in 2014, it has impacted over 500 female students in Singapore.⁵⁹



NEXT STEPS: OPPORTUNITIES FOR REGIONAL COLLABORATION

Developing the human capital required to unlock the economic opportunities of the Fourth Industrial Revolution is a challenge across Australia and the Southeast Asia region. Increasing women in innovation leadership is a common goal, and Australia can both contribute to, and learn from successes across the region. Collaboration in this area has the potential to drive productivity, economic growth, efficiency, and cross-regional innovation, as well as deepen our partnerships in the Southeast Asia region.⁶⁰

This paper highlights the need to increase women's representation and participation in innovation leadership. Governments across the region are aware of the need to address this challenge, and have implemented a number of initiatives to develop the pathway for women in innovation leadership.

To effectively leverage the lessons from key partners in the Southeast Asia region, Australia should seek to develop a more comprehensive understanding of regional initiatives to increase women's participation in innovation leadership. A clear understanding of regional best practice will both inform Australia's own approach to developing a pathway for female innovation leaders, and highlight potential areas for future collaboration.

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