



**Asia-Pacific  
Economic Cooperation**

**Advancing** Free Trade  
for Asia-Pacific **Prosperity**

# **Advancing Inclusion through Enhancing Women and Girls' Digital Literacy and Skills in the Context of Industry 4.0**

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**APEC Policy Partnership on Women and the Economy**

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## EXECUTIVE SUMMARY

The ***APEC Action Agenda on Advancing Economic, Financial and Social Inclusion*** endorsed by APEC Leaders has been one of the key deliverables of APEC Viet Nam 2017. The Document identified the priority areas of work to achieve a more inclusive APEC community by 2030, which includes, inter alia, promoting the internet and digital economy, capitalizing on the opportunities, overcoming challenges presented by the 4<sup>th</sup> Industrial Revolution, and enhancing the social empowerment of women, including by enabling access to digital platforms. APEC Leaders also called on APEC fora to collectively propose in 2018 two initiatives for each of the economic, financial and social inclusion areas. To carry on the instructions of APEC Leaders in 2017 and also to work in line with APEC 2018 theme "***Harnessing Inclusive Opportunities, Embracing the Digital Future***"

The Project had been implemented from June 2018 to April 2019. The project includes: (i) a 3-month background research; (ii) an outcome paper of the research (as attached in the Annex of this Report), and (iii) a 2-day Workshop on 11-12 April 2019. Based on the research and discussion, there are some key findings as follow:

The Fourth Industrial Revolution has been radically disrupting almost every business sector and creating huge challenges and opportunities for women and girls

- ***The top challenge to women and girls' digital inclusion is still the inherent gender biases, socio-cultural stereotypes and norms.*** According to multiple researchs, that differences in performance in scientific and ICT-related fields do not stem from innate differences in aptitudes, but rather from students' attitudes and confidence in their own capabilities. Girls are less confident in their math, science and IT abilities, often due to or fueled by societal and family biases. As a result, women and girls are always the disadvantaged minority in STEM Education and hi-tech jobs. LinkedIn estimated that, globally, women account for 52% of non-tech jobs, but only 20% of tech jobs. In APEC region, based on the available data, women still represent the minority among STEM fields and staff working on research and development. For instance, female graduates in science programs represented less than 50 percent of the graduates in all 12 economies with available data between 2013 and 2015. The percentage of female graduates from Engineering, Manufacturing and Construction was as low as 15 percent in some APEC economies.
- ***The economic inequality is another key reason behind the gender digital divide.*** Globally, women earn 23 percent less than men. 700 million fewer women than men are in paid work. As the majority of the global poor people, many women therefore live in areas with poor digital infrastructure, and they are less likely to be able to afford the digital devices, the

broadband subscription and the education needed to get connected to the internet. Alongside with poverty, Illiteracy also further hinders women's and girls' ability to access online services. About 83% of women worldwide are literate, compared to 90% of men (UNESCO, 2017), women comprise a majority of the 175 million young people globally who are still illiterate. Illiterate women only appear to be using online platform services, such as Skype and YouTube, that are more familiar to them or are easier to access and use.

- ***Without digital literacy, digital access does not empower women and girls.*** Researchs show that the dramatic spread of mobile phones is not enough to get women online, or to achieve empowerment of women through technology. Without a major escalation of gender-sensitive policy efforts and investments, most of the benefits of technology change will be captured by men, further deepening the gender divide. For both mobile phone and internet use, even when women do have access to the internet, many of them do not have enough skills or capacities required to use it to improve their lives and those of their families and communities.

On the flip side, The Fourth Industrial Revolution also bears huge potentials for women and girls:

- ***Digital Services are creating leap frogging opportunities for women and girls*** and levelling the playing field thanks to their characteristics of flexibility, convergence, immediacy. Online or video-based upskilling and tutorials may especially help women make better use of digital tools and extract more value from them. The new digital landscape will also provide female entrepreneurs with the flexibility to start businesses with a relatively small amount of investment, and to sell their products and services across the globe.
- ***New job opportunities thanks to new technologies:*** The Industrial Revolution also provides multiple opportunities for new jobs and make some “traditional jobs” become more valuable. Skills that women bring to the table, once called “traditional soft skills”, are now recognised as increasingly profitable and important: the ability to understand what is going on based on someone's body language; emotional intelligence; the ability to build consensus; to mentor people, etc...
- ***Reduced housework and more opportunities for flexible work from home:*** As many housework is further automated, it may relieve part of the dual burden of a woman being both a caregiver and a breadwinner. At the same time, changes in the nature of work – such as an increase in opportunities for remote working – make it easier for women to better balance work and family, career and children.
- ***The emerging social network services provide the extra means to empower women and girls.*** Women is the majority and more active force on social network services in general. On Facebook, 52% users are women vs 48% men, Pinterest (85% women, 15% men); Twitter (62% women, 38% men); Instagram (58% women; 42%men). While men use social network to

gather the information that they need to build influence, Women use social network services truly for social networking. Women are more vocal, expressive and willing to share on social networks. Therefore, social media, with their instant and viral nature, turn into a powerful means for women to rally and speak out for any injustice against them.

Considering the opportunities challenges, insights shared by APEC members and international experts, there are **5 key recommendations** from the project:

- **Further develop a comprehensive set of relevant sex-aggregated data for evidence-based policy formulation, progress monitoring and assessment.** This could be done by improving the data collected for the PPWE Dashboard and further commitments of all APEC members to voluntarily report their data to PPWE and PSU for updating the report<sup>1</sup>.
- **Continue to expand digital and internet access for women and girls.** This objective require a combination of measures, including (i) continual poverty reduction as digital affordability is a key reason for gender digital gap; (ii) expansion of digital infrastructure (i.e. by satellite) to unserved and underserved communities, especially rural and remote areas, (iii) establishment of free or low-cost public access points that are safe and women-friendly, (i.e. by reviving and expanding the model of APEC Digital Opportunity Centers); (iii) Make Internet-capable devices more affordable for women. Foster low-cost Internet service packages for low-income people, especially for women.
- **Tackle all forms of gender stereotype, biases, discrimination, violence that prevent women and girl's participation in STEM and hitech sector** by increasing media awareness and sensitization, promoting the integration of a gender awareness perspective into government strategies, policies, and budgets. Promote internet safety for women and girl by tackling all forms of violence against women through social media tools; Promote hashtag activism that bring women's issues to the forefront of political agendas.
- **Take measures to encourage women and girls' participation in STEM education,** by setting up APEC wide time-bound target to enhance the number of women and girls in STEM education and hi-tech jobs; create fund/grant schemes and prizes to assist and encourage women and girls in STEM and share to APEC database of scholarship (education.apec.org); set up APEC Award to recognize female role models in hi-tech, with a view to inspire more young women.
- **Provide more capacity building project to help women entrepreneurs** harness fintech, apps, mobile and digital platforms for their business, as this will help women entrepreneurs take advantage

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<sup>1</sup> APEC gender data related to skills, capacity building and health and innovation and technology are still scarce and mostly extract from other third-party reports. APEC members can work with PSU and experts to consider building a list of relevant gender data based on the Guidance List of UN's Minimum Set of Gender Indicator: <https://genderstats.un.org/files/Minimum%20Set%20indicators%202018.11.1%20web.pdf>

of the level-playing field provided by digital services.

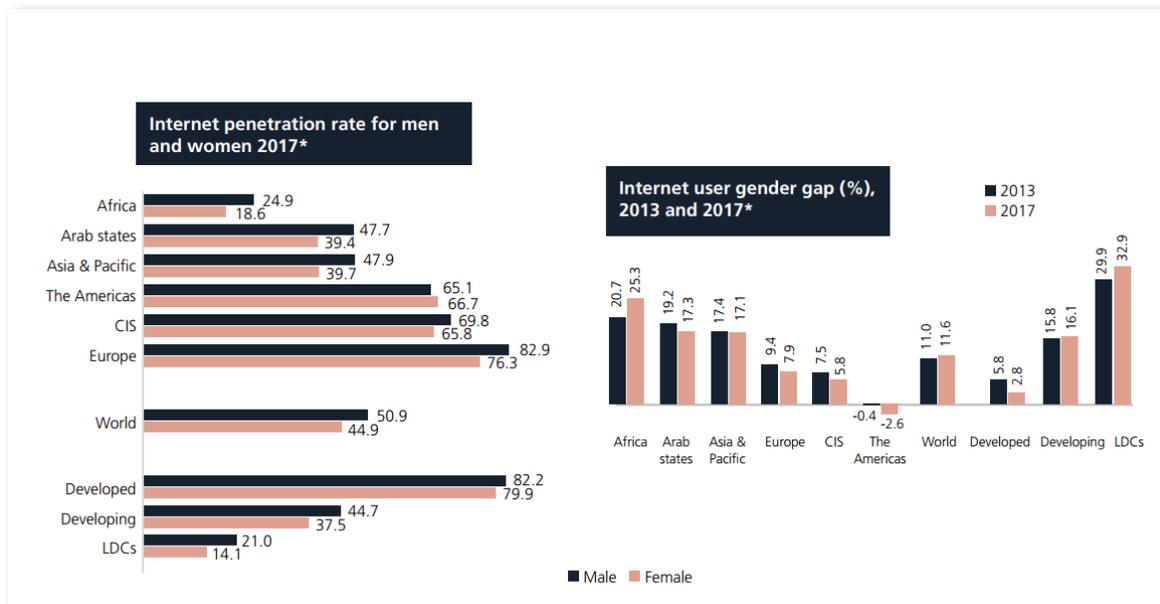
This report also contain a Summary of key points noted from the Workshop which captures all the main points raised by speakers and discussants during the two-day Workshop, as presented at Chapter II

The participants of the project agreed to submit to PPWE consideration a List of Recommendations, plus a list of 10 specific action items for PPWE members to consider voluntarily implementing in their annual workplans, as presented at Chapter IV.

## I. KEY STATISTICS COLLECTED IN THE PROJECT

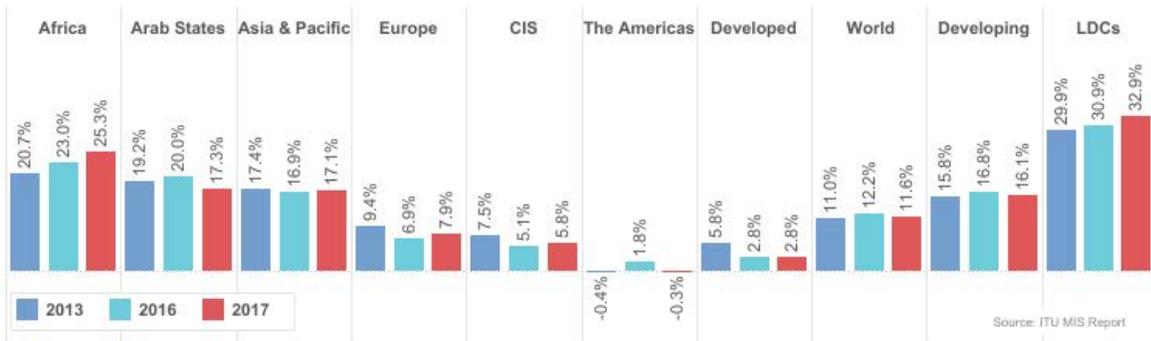


Source: GSMA (2018), *The Mobile Gender Gap Report*, [https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2018/04/GSMA\\_The\\_Mobile\\_Gender\\_Gap\\_Report\\_2018\\_32pp\\_WEBv7.pdf](https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2018/04/GSMA_The_Mobile_Gender_Gap_Report_2018_32pp_WEBv7.pdf)



Source: ITU(2017), *“ICT Facts and Figures 2017,”* <http://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2017.pdf> .

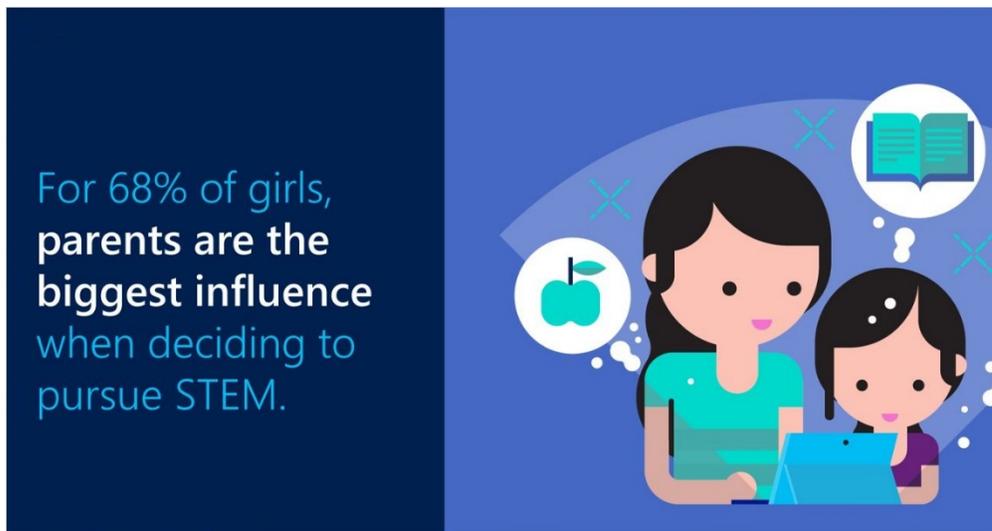
## Internet User Gender Gap (%), 2013, 2016 & 2017



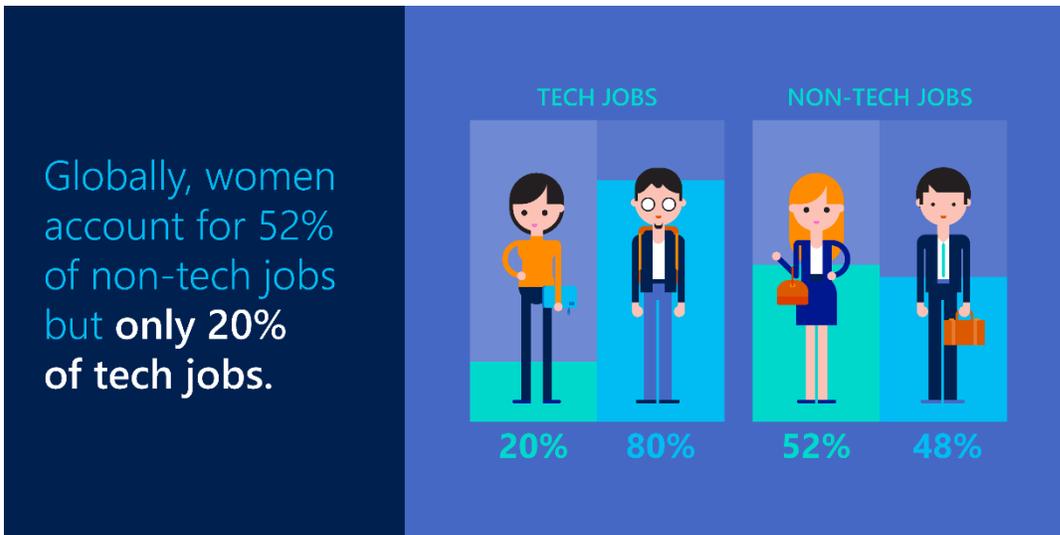
<p>In low- and middle-income countries,  <b>184 million</b> fewer women                      own mobile phones than men.  <small>Source: GSMAI and World Bank data</small></p>	<p>There are an estimated  <b>250 million</b> fewer women                      online globally than men.  <small>Source: ITU MIS Report</small></p>
<p>Of the 193 ITU Member States,  <b>25</b>                      (22 in 2016)                      have <b>female ICT Ministers</b>.  <small>Source: ITU data</small></p>	<p>Out of 164 independent regulators,  <b>16</b>                      (12 in 2016)                      are <b>headed by women</b>.  <small>Source: ITU data</small></p>
<p>Only <b>6%</b> of  <b>app developers</b> are female  <small>Source: InMobi's State of Mobile App Developers 2016 report</small></p>	<p>There are only  <b>21</b> Female CEOs                      amongst Fortune 500 companies  <small>Source: TBC</small></p>
<p><b>8.7%*</b> of ITU Sector Members                      have <b>female CEOs</b></p>	<p><b>6.2%*</b> of ITU Sector Members                      have <b>female CTOs/CIOs</b></p>

\*Provisional data. 80% of Sector Members surveyed to date.

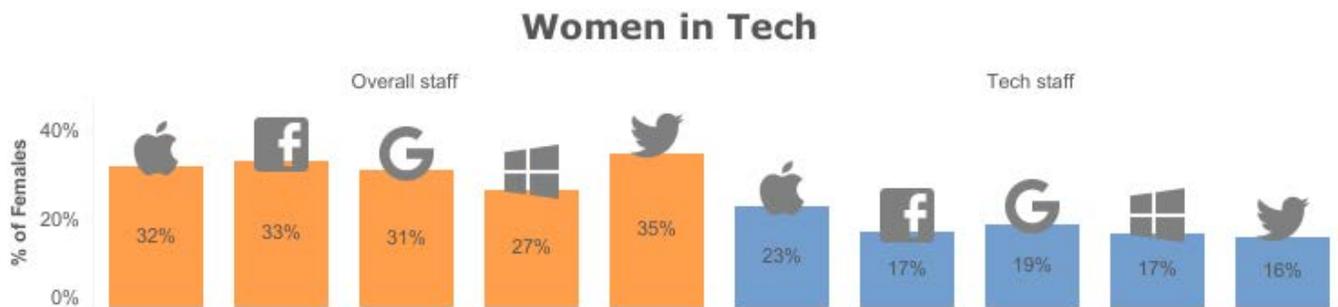
Source: ITU (2019) , <https://www.itu.int/en/ITU-D/Statistics/Pages/default.aspx>



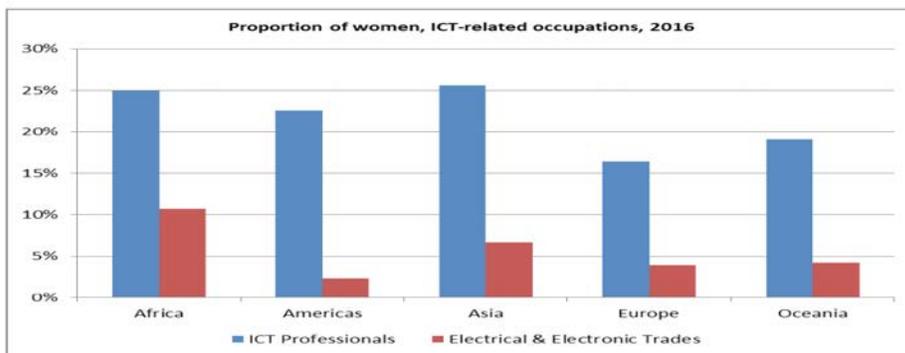
Source: Microsoft (2017), <https://news.microsoft.com/apac/2017/03/08/are-women-at-risk-in-the-4th-industrial-revolution/>



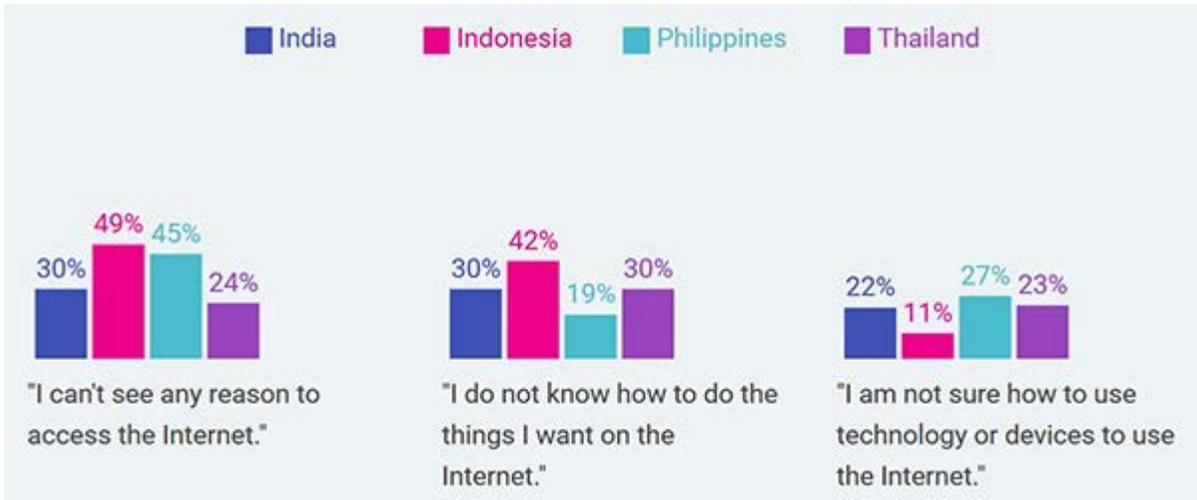
Source: LinkedIn (2016), 2016 LinkedIn Workforce Diversity Report <https://careers.linkedin.com/diversity-and-inclusion>



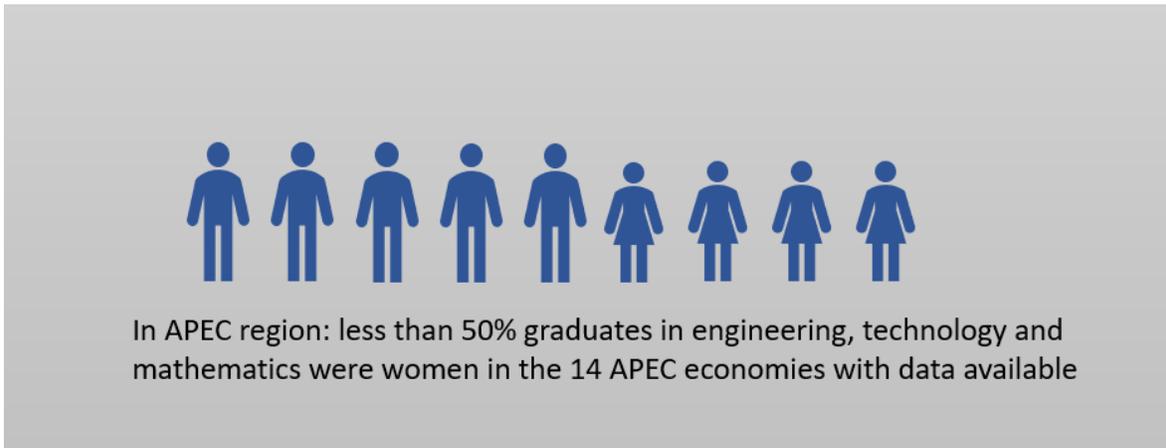
Source: BBC (2018), <http://bbc.com/news/technology-37605943>



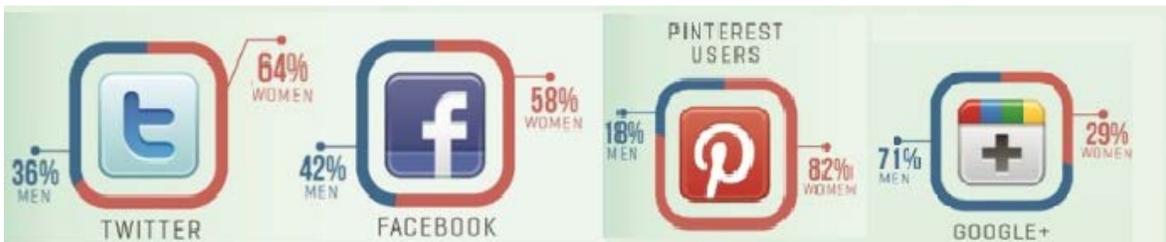
Source: EQUALS (2018), *Taking stock: Data and evidence on gender equality in digital access, skills and leadership*, <https://www.equals.org>



Source: WEBFOUNDATION (2015)  
[http://webfoundation.org/docs/2015/10/womens-rights-online\\_Report.pdf](http://webfoundation.org/docs/2015/10/womens-rights-online_Report.pdf)



Source: APEC PSU (2017), *The APEC Women and The Economy Dashboard 2017*, <https://www.apec.org/Publications/2017/09/The-APEC-Women-and-The-Economy-Dashboard-2017>



Source: HUFFPOST (2012), <https://www.huffpost.com/entry/women-facebook->

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## II. SUMMARY OF MAJOR IDEAS ARISING FROM THE WORKSHOP

The two-day Workshop on 11-12 April 2019 was divided into a **Multi-Stakeholder Dialogue and three Plenary Sessions**

***The Multi-Stakeholder Dialogue on Women and Girls' Digital Literacy and Skills in The Context of Industry 4.0*** was chaired by Dr. Ha Thi Minh Duc, Deputy Director-General of the Department of International Cooperation, Ministry of Labour, Invalids and Social Affairs of Viet Nam.

**Russia** presented on the challenges of stereotypes on the way to digital economy in Russia. Her key recommendations include the involvement of government in creating conditions for the full and equal participation of women in all spheres of society; promoting STEM Education for girls; and leveraging on social media to change social opinion.

**Chinese Taipei** presented on the gender imbalance in business leader positions and emphasized on the two important factors (two wings) to promote women's entrepreneurs, especially in tech fields, which are venture capital and STEM Education.

**Microsoft** briefed on the enormous impact of the 4<sup>th</sup> Industrial Revolution (IR 4.0) on every aspect of the economy and how it would affect the future of work. Key recommendation is a combined solution including skills, economic opportunity, education, inclusion, and policy making.

In the general discussion, the participants agreed that the increasing gender digital divide is an outstanding problem which needed comprehensive solutions and multi-stakeholder approach. The discussion had provided substantive inputs on background of the issue and food for thought for the following sessions.

***The Opening Session*** began by the Speech of Mdm. Trinh Thi Minh Thanh, Permanent Vice Chair of a Quang Ninh People's Council, which welcomed delegates and introduced Quang Ninh Province's achievements on promoting digital inclusion for local women and girls. UNWOMEN Representative elaborated on the opportunities and challenges that the 4<sup>th</sup> Industrial Revolution presented to women and girls. H.E. Mr. Bui Thanh Son, first Deputy Minister of Foreign Affairs of Viet Nam gave a keynote speech in which he tasked the Workshop to focused on finding comprehensive solutions, changes of awareness, multistakeholder approach, capacity training for developing economies, and future vision for APEC on the issue.

***Session I on Industrial Revolution 4.0: Opportunities and Risks for Women and Girls*** was chaired by Ms. Edwina Mistry from New Zealand and the speakers are from UNDP, UNESCO, OECD, with panelists from Chile, China, Viet Nam.

**UNDP** presented a comprehensive analysis of the impacts of IR4 on the economic inclusion of women. Key recommendations are (i) promoting inclusive IR4.0 (which include creating new growth drivers that help create new job streams, capacity building, and social protection system); (ii) addressing unequal participation in scientific and technological careers, and; (iii) Supporting women to generate start-

ups, especially using IR4.0 technology to solve social and environmental issues.

**UNESCO** presented the findings in the 2017 Report on Girls' and Women's education in STEM which highlights the gender imbalance in STEM and ICT fields and many underlying causes. UNESCO emphasized the importance of early education, reskilling & upskilling and lifelong learning, especially embracing women's and girls' visions of the future of STEM.

**OECD's** presentation analyzed the challenges of Industry 4.0 posed to women and girls, especially women start-ups. The key recommendations are policies in education and training as well as general policy regulating social welfare and labor market; tackling unobserved factors (preferences, bias, gender norms); promoting gender-related statistics for policy actions.

**Chile** introduced a best practice of talent match-making by the example of Wall Breaker, a company that helped train underrepresented talent from universities, certify them and promote them to hi-tech companies for employment.

**China** presented on the challenges of the digital transformation to senior women and the policy to help aging women adapt to digital technology in the new context.

**Viet Nam** shared on recent improvement of government policies on HRD and policies to support digital literacy for women.

***Session II on Scaling Up APEC Efforts: Holistic Approach and Action to Advance Women and Girls' Digital Inclusion*** was chaired by Ms. Andrea Guendelman from Chile and speakers from China, New Zealand, Japan, with panelist from UNDP, UNESCO, Chinese Taipei

**China** presented the best practice of how Shanghai city support women in the Digital Age. Key measures are: Policy Support; Education Priority; Role Models; Connect & Lead with Online Services

**Russia** shared best practice of an educational IT-project "Girls Solve" by Global Rus Trade which offers free training course for young girls grade 8-11. The project helps girls build up digital skill, gain confidence widen their career choice since early education.

**New Zealand** shared best practice of the ShadowTech Program by CreatOps Company, which provides girls in school years 9 -11 with an opportunity to experience what working in the tech sector is like, encouraging them onto education pathways that lead into tech sector roles. In 2014 started with 42 girls participating. In 2018- 650 girls, 100 organizations and 300 industry mentors participated. Over 75% of students said they would be interested or really interested in pursuing a career in tech after attending ShadowTech 2018

**Japan's** presentation offered a panoramic view of the impacts of the 4<sup>th</sup> Industrial Revolution on the economy, causing deep changes in the demand side, supply side and the workforce. Therefore, Japan's policies to cope with the issue focus on three main areas: education, training, and job creation.

**Chinese Taipei** shared best practices of Programs supporting Women, including Phoenix Micro Startup Program: In 2007, Ministry of Labor rolled out a "Phoenix

Micro Startup Program” to help women by providing business startup courses, consultation services and loans. “Women Entrepreneurship Flying-geese Program”, organized by the Ministry of Economic Affairs organized providing individualized and integrated services for women entrepreneurs during different stages by focusing on their needs, including capital matchmaking and business opportunity developments.

The speakers and panelists then moved on to in-depth discussion on how to tackle social stereotypes, government policies and subsidiary to support women and girls in IT; how UN Organizations and other NGOs can help women entrepreneurs and what are the collaboration mechanisms between them.

***Session III on Scaling Up APEC Efforts: Holistic Approach and Action to Advance Women and Girls’ Digital Inclusion*** was chaired by Ms. Nguyen Minh Hang Deputy APEC SOM of Viet Nam and speakers from Chile and UNWOMEN.

**Chile** presented on the new vision for empowering women in the digital age. Chile recommended that, in order to incubate women tech entrepreneurs, it is necessary to have a systemic and gradual approach from digital literacy to digital enthusiast, digital career and women tech entrepreneurs.

**UNWOMEN** presented on “twin-track approach” to the Sustainable Development Goal of Gender Equality: (i) The stand-alone SDG 5; and (ii) Through the mainstreaming of gender equality across the 2030 Agenda and the SDGs. Key recommendations are: Extending networks and digital access; Promoting access to and affordability and use of connected digital devices; Boosting availability and promotion of e-banking and mobile money to women; Increase online safety; Addressing stereotypes, target existing gender biases in the digital era.

The Workshop then moved on to parallel group discussion on the List of Recommendations presented, which covered 6 major recommendations: *(i) Taking holistic approach and bold actions to improve digital access for women and girls; (ii) Promoting digital literacy, reskilling, upskilling and lifelong learning; (iii) Addressing employment and improving social protection; (iv) Ensuring internet safety and security; (v) Leveraging on digital technologies to Support Women Entrepreneurs; (vi) Promoting synergies among regional and international organizations on gender and digital inclusion.* the Workshop agreed to continue to refine and endorse the List by 22 April 2019.

The Workshop was closed by Ms. Nguyen Minh Hang Deputy APEC SOM of Viet Nam.

### III. LIST OF BEST PRACTICES UNDERTAKEN BY APEC MEMBERS

APEC Economies have implemented many proactive initiatives and policies to promote more participation of women and girls in STEM education and hi-tech jobs.

This table below is a non-exhaustive capture of major policies and initiatives recently carried out by APEC members to support women and girls in the digital economy, based on information collected from APEC members and also from the presentations at the Workshop.

<p><b>AUSTRALIA</b></p>	<ul style="list-style-type: none"> <li>The Australian Government is invested AUD 13 million over five years from 2016/17 to initiatives focused on women’s participation in STEM. The National Innovation and Science Agenda has been contributing to ongoing efforts across the Australian Government to encourage more girls and women to study STEM and pursue STEM-based and entrepreneurial careers.</li> </ul> <p>APEC Projects:</p> <ul style="list-style-type: none"> <li>APEC Women in STEM Initiative: Workshop, GIST Boot Camp and Roundtable</li> </ul>
<p><b>BRUNEI DARUSSALAM</b></p>	<ul style="list-style-type: none"> <li>Ebunda provides access to e-learning opportunities to raise awareness on issues important to women such as health, the environment, business and finance, careers, education, and affirmative action. eBunda is a CSR initiative of the technology company, <u>BAG Networks</u>. Its name is derived from “ibunda,” the Malay word that means mother. The portal targets women who have taken a break from their careers to have children and need support to continue learning. eBunda has worked with Microsoft and Ikhlas to develop e-learning tools for the website. The Microsoft Digital Literacy Program provides basic, standard, and advanced information on IT and provides a “digital literacy” certification. In partnership with Ikhlas, a small, medium, and micro enterprise (SMMEs) accounting company, eBunda sponsors women’s SMME’s online subscriptions to accounting software so they can accurately record their finances. Further, eBunda’s “active aging” initiative provides older woman with ICT skills. The <i>eBunda Café</i> is a radio show broadcast with the University of Brunei Darussalam’s radio</li> </ul>

	<p>station. The show cover topics important to women; one such broadcast was called “Women in Business: The Reality of Online Businesses.” eBunda plans to launch an ICT classroom in collaboration with the Brunei Darussalam Women’s Business Council. It also plans to develop a manual of instructions on text messages, web browsing, and other areas to bridge the digital divide with the older generation.</p>
<b>CANADA</b>	<ul style="list-style-type: none"> <li>• “30 by 30” campaign to increase the percentage of newly licensed engineers who are women to 30 percent by the year 2030.</li> <li>• Social media campaign "Choose Science," encouraging young women to enter STEM.</li> <li>• “Actua’s National Girls” Program to inspire young women to fulfill their role as leaders in STEM and encourages female engagement in STEM fields</li> <li>• “hEr VOLUTION” project targeting young women from underserved communities to come to in order to advance in 21st Century Skills.</li> </ul>
<b>CHILE</b>	<ul style="list-style-type: none"> <li>• “Gender Equality Admissions” Program by Faculty of Mathematical and Physical Sciences at the University of Chile. Under this program, 40 extra women are selected into the most competitive engineering and science program in the economy.</li> <li>• “STEM Academies in Chile” project, funded by Pan American Development Foundation (PADF), implemented by nonprofit Fundación Ciencia Joven.</li> <li>• “Be Visible Network” (bevisible.soy) is one of the most successful networks of underrepresented professionals in Chile. The Project find potential candidates who have background on digital programming and train them to upgrade their skill to meet the hiring criteria of companies</li> </ul>
<b>PEOPLE'S REPUBLIC OF CHINA</b>	<ul style="list-style-type: none"> <li>• The “WeTech Online Mentoring Program”, sponsored by Qualcomm, WeTech is a customized virtual mentoring program that links young women in China with tech leaders across the world. In its pilot phase, WeTech</li> </ul>

	<p>targeted university women in China as mentees, linking volunteer mentors from Qualcomm offices around the world with the university women, and providing support, career advice and guidance as students' transition from university into the workforce.</p> <ul style="list-style-type: none"> <li>• Shanghai City's Best practices in support women in the Digital Age. Key measures are: Policy Support; Education Priority; Role Models; Connect &amp; Lead with Online Services</li> </ul> <p>APEC Projects:</p> <ul style="list-style-type: none"> <li>• APEC Women Connect Capacity Building Program - 2018 Global Value Chain-Cross Border e-Trade (GVC-CBET) Workshop</li> </ul>
<b>HONG KONG, CHINA</b>	<ul style="list-style-type: none"> <li>• "Women Who Code": A nonprofit network dedicated to inspiring women to excel in technology careers, Women Who Code creates a connected community of women in technology. Hong Kong,China's network of Women Who Code links the economy to one of the largest communities of women engineers in the world</li> <li>• "Women in tech": Hong Kong,China's first non-profit community dedicated to achieving gender parity and help women advance by connecting them with other professional females working in all sectors of technology.</li> <li>• "She loves Tech": A Regional community to promote gender equality in entrepreneurship through sourcing and advocating impactful technology innovation led by females/benefited female well-being</li> </ul>
<b>INDONESIA</b>	<ul style="list-style-type: none"> <li>• Development of Cottage Industry Model in 21districts. The program help strengthening women's access to 4 areas: Finance, Trainings, Market, and Information. Incorporating ICT trainings for 10 thousand micro-scale businesswo men .</li> </ul>
<b>JAPAN</b>	<ul style="list-style-type: none"> <li>• New Technologies for Women's Empowerment (telework, home electric appliances, ICT access)</li> <li>• Increase Women in STEM fields (STEM Girls Ambassadors)</li> </ul>

	<ul style="list-style-type: none"> <li>• Recurrent Education (After Childcare leave; Career shift to IT and digital field; Career up to Leadership position)</li> <li>• The Japanese government will make programming class compulsory at primary school (from 2020).</li> <li>• “Future Classroom-Learning Innovation.” focus on utilization of ICT in primary and secondary education rather than learning IT literacy. The Program is led by Ministry of Economics, Trade and Investment (METI), in collaboration with private sector, which demonstrate new learning programs that utilize ICT and EdTech. The Program is for teaching STEAM to children and students. It optimizes education in schools, customizing each students’ needs.</li> <li>• METI are going to demonstrate “AI school” in collaboration with IT companies and universities. Participants will consist of university students and IT workers. They mutually teach programming, machine learning methods and other IT skills.</li> <li>• "Program for Certification of IT-Skills Training Courses to Meet the Era of the 4th Industrial Revolution": The program is to certify practical educational training courses targeting workers in the fields, mainly IT and data, under the name of the Minister of Economy, Trade and Industry. Eligible fields are: (i) AI, IoT, data science and cloud computing, including those combined with new development methods; (ii) Advanced security and networking; and (iii) IT utilization.</li> <li>• The City of Yokohama and one of the major telecom operators of Japan named “Softbank Corp.” are demonstrating a new working style “short-time telework” which utilizes ICT for a local housing complex in Yokohama. This project aims at “job-creation” for women who have children and leave the labor market for several years.</li> </ul>
<b>REPUBLIC OF KOREA</b>	<ul style="list-style-type: none"> <li>• IT Women Net (ITWomenNet)</li> <li>• Women Enterprise Supporting Center (WESC)</li> </ul>

	<ul style="list-style-type: none"> <li>• Gyeonggi Women’s Development Center (GWDC)</li> <li>• Information Network Village (INVIL)</li> <li>• Smart App Creative Center</li> </ul> <p>APEC Projects:</p> <ul style="list-style-type: none"> <li>• Initiative for APEC Women’s Participation in the Digital Economy</li> </ul>
<b>MALAYSIA</b>	<ul style="list-style-type: none"> <li>• Project “Strengthening STEM Curricular for Girls in Africa and Asia and the Pacific-Phase I,” funded by Malaysia Funds-in-Trust and led by the IBE, the Ministry of Education of Malaysia is supporting the development of STEM education in Cambodia, Indonesia, Kenya and Nigeria, in order to mainstream gender sensitive STEM education in the educational policies, the curriculum, pedagogy and teacher education.</li> <li>• ‘Code for Malaysia’ campaign</li> <li>• “Hour of Code’ campaign, held from Oct 30 to Nov 13, 2017 saw the participation of 80,037 students aged seven to 17 from 745 schools nationwide. Malaysia is also the economy with the highest number of Hour of Code sessions hosted outside of the United States and surpassed its target of 40,000 students.</li> <li>• “TechFemme” Program in coordination with Microsoft in 2015</li> </ul>
<b>MEXICO</b>	<ul style="list-style-type: none"> <li>• “Mil Niñas, Mil Futuros” (1,000 girls, 1000 futures) program, by The U.S.-Mexico Foundation (USMF)</li> <li>• “Codigo X”. In April 2016, Mexico's federal government launched the mentoring program entitled Codigo X, which aims to connect civil society, academy, government and industry to prepare girls and women for careers in ICT</li> </ul>
<b>NEW ZEALAND</b>	<ul style="list-style-type: none"> <li>• In 2018, Association for Women in the Sciences AWIS introduced a financial award to support women studying STEM subjects. Managed by the New Horizons for Women Trust, the \$9,000 award will support up to three women annually enrolled in a tertiary STEM qualification. The award is particularly</li> </ul>

	<p>aimed at women whose social identify is under-represented in their field of study. The initial funds for the award were raised through screenings of the 2017 movie <i>Hidden Figures</i>, which centered around female mathematicians involved in the NASA space programme.</p> <ul style="list-style-type: none"> <li>• The next step of the Gender Pay Action Plan was launched in 2018 by Minister for Women Julie Anne Genter, with seven public service agencies committing to flexible work pilots. Seven government agencies have signed up to pilot 'flexible-work-by-default' approaches in the first in a staged roll-out across the whole public service by the end of 2020.</li> <li>• The Ministry for Women has led research with Netsafe in 2017 on digital harm for girls and boys.</li> <li>• "ShadowTech" Program by CreatOps Company provides girls in school years 9 -11 with an opportunity to experience what working in the tech sector is like, encouraging them onto education pathways that lead into tech sector roles. In 2014 started with 42 girls participating. In 2018- 650 girls, 100 organizations and 300 industry mentors participated. Over 75% of students said they would be interested or really interested in pursuing a career in tech after attending ShadowTech 2018</li> </ul>
<p><b>PAPUA NEW GUINEA</b></p>	<ul style="list-style-type: none"> <li>• "Girls in ICT Tertiary Scholarship": The Papua New Guinea National Information &amp; Communications Technology Authority (NICTA) first launched the NICTA Girls in ICT Scholarship programme in 2013. Through this programme NICTA will support the education of girls in PNG, in an ICT related field of study. NICTA is pleased to announce that commencing in 2018; four scholarships are awarded to four successful applicants. The scholarship will cover tuition, boarding and lodging, textbook and stationary, fortnightly stipend and travel expenses.</li> </ul>
<p><b>PERU</b></p>	<ul style="list-style-type: none"> <li>• In November 2015, the Peruvian Congress approved the Telework Law to support</li> </ul>

	<p>flexibility in the workforce. The law allows full-time or part-time employees to work remotely. Women were able to start their businesses because they could work from home, and by using social media platforms like Facebook as a sales and marketing tool they generated income from home without a significant investment in business infrastructure.</p> <ul style="list-style-type: none"> <li>• To increase access to the Internet and raise digital literacy in rural areas, development projects, corporate social responsibility programs, and for-profit businesses train or provide incentives for women entrepreneurs in rural communities to use ICT to connect with suppliers and access new market opportunities. The Center for Information and Education for the Prevention of Drug Abuse (CEDRO) has established 37 tele centers and enrolled more than 20,000 small-hold farmers and producers in capacity-building activities.</li> <li>• The telecommunication company Telefonica del Peru in 2011 launched a rural connectivity and development program called Connect to Grow (Conectarse para Crecer). The program organizes annual business plan competitions for rural organizations that want to use ICT to improve and create business opportunities for their community. Women have won almost one-third of the \$5,000 to \$10,000 prizes. In addition to a cash prize, winners also receive training on ICT tools.</li> <li>• The Mini Academy of Science and Technology) was awarded the 2017 UNESCO Prize for Girls’ and Women’s Education for its “Mobile MaCTec Bus Labs/Mini Academy of Science and Technology” project. MaCTec is a non-profit organization empowering young Peruvian girls from urban and rural areas through quality science education and helping to reduce the gender gap in science, technology, engineering and mathematics (STEM) fields. It was founded in 2012 by four Peruvians (one scientist and three graduate students) and reaches girls from 8 to 11 years old.</li> </ul>
<b>THE PHILIPPINES</b>	<ul style="list-style-type: none"> <li>• “Women ICT Frontier Initiative” (WIFI), a flagship program of the UN APCICT which</li> </ul>

	<p>aims to promote women’s entrepreneurship through ICT capacity development</p> <p>APEC Projects:</p> <ul style="list-style-type: none"> <li>• APEC MSME Marketplace. The online portal which facilitates business matching for MSMEs and other stakeholders currently showcases 34 government and 158 private marketplaces. With 10, 054 visitors as of last month— 58.2% of which are women</li> </ul>
<p><b>RUSSIA</b></p>	<ul style="list-style-type: none"> <li>• “Project 5-100”, a government-run program to maximize the competitive position of a group of leading Russian universities in the global research and education market, stated that: “Russian universities, are dedicated to combating women’s underrepresentation in science and research, and giving female scientists the appreciation they deserve”.</li> <li>• Thanks to the good education policy inherited from the Soviet era, For Russian girls, technology training starts at an early age. Science has been proclaimed to be a domestic priority and technical education are open to everyone, regardless of gender. As a result, young Russian girls view STEM more positively and this has resulted in a more lasting interest. A report from UNESCO recently found that, in Russia, 41 percent of people in scientific research are women. The number of women inventors in Russia number more than three times that of other western economies.</li> <li>• The National Strategy for Women for the period 2017 to 2022 was adopted. It implies the creation of conditions for the full and equal participation of women in all spheres of society. And this is set as a priority direction of the state policy of Russia.</li> <li>• “GirlSolve”: A project that offers free classes on website building for girls. The project has taught young girls to build more than 40 websites.</li> </ul> <p>APEC Projects:</p> <ul style="list-style-type: none"> <li>• APEC Business Efficiency and Success Target (BEST) Award</li> </ul>

	<ul style="list-style-type: none"> <li>• APEC Women Amidst 4th Industrial Revolution</li> </ul>
<b>SINGAPORE</b>	<ul style="list-style-type: none"> <li>• “SkillsFuture” is a domestic movement to provide citizens with opportunities and resources to develop the skills they need as Singapore continues into the next phase of its development as an advanced economy. In 2016, around 134,000 women took part in SkillsFuture, and efforts are under way to increase participation through multiple media campaigns.</li> <li>• “Girls2Pioneers”: Along with MasterCard and Standard Chartered, Singapore Committee for UN Women launched the Women in STEM campaign “Girls2Pioneers”. Girls2Pioneers provides day camps for girls between the ages of 10 to 15 comprising of fun challenges that cultivate skills in technology, design and construction, research, strategic planning, improvisation and engineering. These day camps are followed by field trips and mentoring sessions, which allow for first-hand interactions with corporate partners and mentors in each field.</li> </ul>
<b>CHINESE TAIPEI</b>	<ul style="list-style-type: none"> <li>• Talent education programs: e.g. Science Lecture at a Girls’ High School</li> <li>• Female Talent Development Program</li> <li>• Digital Application Promotion Project in Remote Areas</li> <li>• FB#SheMeansBusiness Programme</li> <li>• Ministry of Economic Affairs has established a one-stop startup service platform that integrates online and offline services to help to create a friendly environment for young entrepreneurs and start-ups</li> <li>• Phoenix Micro Startup Program: In 2007, Ministry of Labor rolled out a “Phoenix Micro Startup Program” to help women by providing business startup courses, consultation services and loans. In order to assist female entrepreneurs to solve the problem of obtaining capital, the “Phoenix micro start-up loan” is set at the maximum limit of NT\$1</li> </ul>

	<p>million. Moreover, no guarantor or collateral is needed, and the government provides 95% guarantee coverage, as well as two years of interest subsidies, thereby alleviating the capital and interest burden of women entrepreneurs.</p> <ul style="list-style-type: none"> <li>• “Women Entrepreneurship Flying-geese Program”, organized by the Ministry of Economic Affairs organized providing individualized and integrated services for women entrepreneurs during different stages by focusing on their needs, including capital matchmaking and business opportunity developments. Furthermore, they are referred to various government loans (Youth Entrepreneurship and Start-up Loan and Small Business Owner Loan).</li> <li>• The Ministry of Economic Affairs has planned related information education courses within the curriculum outline of senior high schools, including Internet literacy and ethics, information safety, and protection in order to improve the digital awareness of students. In addition, “Career planning” course, related activities, individual/group counseling are implemented to encourage female students to study science and engineering courses. The ratio between male and female students studying in “science and technology” faculty in the institutions of higher education is roughly 2 to 1, the number is increasing at a rate of 0.3%~0.4% every year.</li> </ul> <p>APEC projects:</p> <ul style="list-style-type: none"> <li>• ADOC : APEC Digital Opportunity Centers</li> <li>• APEC Skills Development Capacity Building Institute</li> <li>• Gender Inclusion in Smart Agriculture 2018</li> <li>• Women and the Economy Sub-Fund (Chinese Taipei, Australia, US, and Japan)</li> <li>• APEC GIFTS A+ Initiative: Seminar on Gender Inclusion in Smart Agriculture</li> <li>• APEC Gendered Innovation for Technology and Science (GIFTS): Promoting Women in STEM for Sustainable Growth</li> </ul>
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	<ul style="list-style-type: none"> <li>• APEC Workshop: Unlocking Potential, Creating Style – APEC GIFTS (Gendered Innovation for Technology and Science) for Women in the Creative Industry</li> <li>• Innovation for Women and Economic Development - Facilitating Women's Livelihood Development and Resilience with ICTs</li> </ul>
<b>THAILAND</b>	<ul style="list-style-type: none"> <li>• A 2015 study by UNESCO revealed that Thailand was ahead of most economies in terms of women working in STEM (science, technology, engineering and mathematics) fields.</li> <li>• Thailand is among the economies with the highest opportunity for women in the workforce, according to the MasterCard Index of Women Entrepreneurs. The survey ranks 20 economies with the highest scores for female entrepreneurship. Thailand is among the top 10 and is the only upper-middle-income economy to make it to the list.</li> <li>• Ministry of Education pilots a policy toolkit under UNESCO's global STEM and Advancement</li> </ul>
<b>THE UNITED STATES</b>	<ul style="list-style-type: none"> <li>• The Untold History of Women in Science and Technology: Created by the White House Office of Science and Technology Policy, this online repository features stories about women trailblazers in STEM. The resource sets an example of "writing women scientists into history" so that educators and employers can be more mindful of including women as examples of leaders in the sector.</li> </ul> <p>APEC Projects:</p> <ul style="list-style-type: none"> <li>• Implementation of the APEC Dashboard: Increasing STEM Education</li> <li>• Empowering Women as Managers of the Renewable Energy Sector</li> <li>• Evaluating Business Environments to Foster Access to Trade and Growth of Women's SMEs in Southeast Asian APEC Developing Economies</li> <li>• APEC Workshops on Best Practices in Micro-Finance and Micro-Credit</li> </ul>

	<ul style="list-style-type: none"> <li>• Gap Analysis Toward Development of a Women’s Entrepreneurship in APEC (WE-APEC) Network</li> <li>• Next Steps for Women's Entrepreneurship in APEC (WE-APEC), Phase 2</li> <li>• APEC Women in STEM Framework: Workshop on Building a Pipeline for Girls and Women and Coding the Way to Success</li> </ul>
<p><b>VIET NAM</b></p>	<ul style="list-style-type: none"> <li>• “The Enabling Boat” Project bring digital skill training to women and girls of the fishery communities in 2017</li> <li>• “YouthSpark Digital Inclusion” project, aiming to close the digital gap, inspire passion and develop knowledge and skills in computer science, computational thinking and ICT for students in rural areas.</li> <li>• STEM SPEAK 2018: The United Nations Educational, Scientific and Cultural Organization (UNESCO) and Microsoft in cooperation with the Centre for Education and Development (CED) gathered thirty-eight Vietnamese youth from across the economy to develop an inclusive Science, Technology, Engineering and Mathematics (STEM) vision</li> <li>• #GIFT (Girls in Future Technology) Project: Microsoft Viet Nam support girls (13-16 years old) to approach ICT and STEM.</li> </ul> <p>APEC Projects:</p> <ul style="list-style-type: none"> <li>• APEC Workshop on Advancing Inclusion through Enhancing Women and Girls' Digital Literacy and Skills in the Context of Industry 4.0.</li> </ul>

## **IV. LIST OF RECOMMENDATIONS TO PPWE**

The participants of the project agreed to submit to PPWE consideration a List of Recommendations, plus a list of 10 specific action items for PPWE members to consider voluntarily implement in their annual workplans, as follows:

### **IV.1. List of Recommendations to PPWE**

#### ***I. Taking holistic approach and bold actions to improve digital access for women and girls***

- 1. Promote the integration of a gender awareness perspective into government's strategies, policies and budgets to address gender gap in the education system and labor market.*
- 2. Mainstream the policies of digital inclusion for women and girls into government's strategies for gender equality and those for sustainable, inclusive and innovative development.*
- 3. Make Internet-capable devices more affordable and foster low-cost internet service packages for low-income people, especially for women and girls.*
- 4. Expand digital infrastructure (i.e. by satellite) to unserved and underserved communities, especially rural and remote areas, and free or low-cost public access points that are safe and women-friendly.*

#### ***II. Promoting digital literacy, reskilling, upskilling and lifelong learning***

- 5. Encourage online learning by providing adapted content and services for women and girls. Digital literacy should take into consideration local needs and constraints by providing appropriate learning opportunities for disadvantaged women and girls.*
- 6. Implement concrete measures and policies to promote lifelong learning that enables women and girls to acquire skills, reskill and upskill, especially in foundational skills, ICT and advanced numeracy skills to respond to the shifting demand of the labor market and move up to higher wage, high growth field, such as STEAM (Science, Technology, Engineering, Art, Mathematic). Governments, workers and employers, as well as educational institutions, have complementary responsibilities in building an effective and appropriately financed lifelong learning ecosystem.*
- 7. Promote boot-camps that foster programming skills for young girls.*

8. *Strengthen ecosystem for women and girls regarding STEAM education. Promote scholarships, funds, grants to encourage and support the participation of women and girls in STEAM Education.*
9. *Promote women's networks and associations in high tech sectors to connect women, facilitate mentoring for young girls and graduates, and help them make the transition to the labor market.*
10. *Advocate female role models to inspire young women to study, start and run a business, and lead in high-technology sectors.*
11. *Encourage more concrete initiatives to implement APEC Action Agenda on Advancing Economic, Financial and Social Inclusion and APEC Framework on Human Resource Development in the Digital Age.*

### **III. Addressing Employment and Improving Social Protection**

12. *Promote research on anticipation of future skills needs to provide policy advice to cope with widening skills mismatch.*
13. *Strengthen public-private partnership for appropriate actions to facilitate women and girls' participation in the digital economy. Promote researches and statistics data that identify the relation between women digital inclusion and economic growth in APEC region.*
14. *Step up efforts to help women grow in their careers. This includes policies such as improving access to quality employment, improving childcare provision, offering paid leave for fathers and more generally addressing gender discrimination.*
15. *Promote flexible working arrangements and online talent platforms for women; Also ensure that digitally enabled jobs are also quality jobs, with proper pay and social protection.*

### **IV. Ensuring internet safety and security**

16. *Implement measures that identify, prevent, and counter the sexual and gender-based abuse, harassment and the threat of violence against women and girls in digital contexts. Increase awareness of cyber violence threats and intimidation and encourage measures to condemn such instances of cyber violence when they occur.*
17. *Promote internet safety for women and girl by tackling all forms of violence against women through social media tools; Promote hashtag activism that bring women's issues to the forefront of political agendas.*

### **V. Leveraging on digital technologies to Support Women Entrepreneurs**

18. *Foster conducive environment for women to start and run business. Promote women owned MSMEs and women entrepreneurship in the digital economy.*
19. *Promote capacity training and encourage women entrepreneurs to learn and use apps, mobile and digital platforms for their business (B2B, B2C).*
20. *Promote the application of innovative, smart business models that meet the diverse needs of women.*
21. *Design policies to support women entrepreneurs' access to finance. Promote mobile financial services which help reduce remittance costs, facilitate digital*

*finance and thus increase the volume of transactions and loans to individuals and businesses. Facilitate start-ups financing.*

**22.** *Facilitate and simplify business procedures by digitalizing business registration and license fee payments.*

#### **VI. Promoting synergies among regional and international organizations on gender and digital inclusion**

**23.** *Establish network of exchanges, sharing experiences and best practices among policy makers, researchers, entrepreneurs, women union, and localities in APEC region.*

**24.** *Strengthen coordination and synergies on gender and digital inclusion among international organizations such as UN Women, APEC, G20, ASEM, ASEAN, etc.*

**25.** *Take advantage of the ongoing global commitments, APEC economies' government and multi-actors should endeavor in alignment with the related UN' SDGs.*

#### **IV.2. Recommended Actions for PPWE Workplans (2019-2021)**

Base on the endorsed List of Recommendations, we suggest PPWE members to consider these specific actions to the annual workplans (2019-2021). These recommended actions are for PPWE Members to consider adopting on a voluntary basis, in commensurate with each member's respective capacity.

##### ***Improving Digital and Internet Access***

1. Members to report to PPWE on policies and measures to improve digital and internet access for women and girls (the report may include statistics of the rate of smart devices ownership, the rate of internet access for women and girls, and the rate of increasement compared with previous year). The reports are to be updated to the PPWE Dashboard by PSU.

##### ***Promoting Digital Literacy***

2. Member to report to PPWE on policies and measures to encourage women and girls' participation in STEM Education.

3. Each member of PPWE to strive to have at least one scholarship/fund/grant program for women and girls every year and report.

4. PPWE to consider setting up an online database of STEM scholarship/fund/grant program and online courses dedicated for women and girl, which is annually updated by PPWE member contact points.<sup>1</sup>

5. PPWE to consider setting up Annual Award to recognize female role model in high tech sector<sup>2</sup>.

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<sup>1</sup> This website could be similar to or nestled within the APEC Scholarship and Internship Initiative website at <https://education.apec.org/>

<sup>2</sup> PPWE members can refer to the model of The APEC Science Prize for Innovation, Research and Education ("ASPIRE"), an annual award which recognizes young scientists who have demonstrated a commitment to both excellence in scientific research, as evidenced by scholarly publication and cooperation with scientists from other APEC member economies.

6. PPWE members to strive to have at least one APEC projects related to promoting digital and technological inclusion for women and girls.

***Addressing Employment and Improving Social Protection***

7. Members to report to PPWE on their best practices of labor policies, social protection policies, and flexible employment models for women in the context of technological disruption.

***Supporting Women Entrepreneurs***

8. Each PPWE member to strive to provide at least one digital capacity building project a year for women entrepreneurs and report progress at PPWE Meetings.

***Promoting synergies with UN and other International and Regional Organizations***

9. To promote APEC's role in contributing UN's 2030 Development Agenda and the SDGs, PPWE to consider inviting the UN WOMEN's representative at one of the annual PPWE Meetings.
10. PPWE Chair to consider attend other outreach meeting with other International and regional organizations (UNWOMEN, OECD, ASEAN...) to exchange information and promote synergy.

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# ANNEX



**Asia-Pacific  
Economic Cooperation**

**ADVANCING INCLUSION  
THROUGH ENHANCING WOMEN AND GIRLS' DIGITAL LITERACY  
AND SKILLS IN THE CONTEXT OF INDUSTRY 4.0  
(PPWE 02 2018A)**

**BACKGROUND RESEARCH REPORT**  
*(Submitted to APEC SEC on 4 March 2019)*

APEC Project: PPWE 02 2018A

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## EXECUTIVE SUMMARY

This research serves as background reading document to facilitate the preparation and discussion of the APEC Workshop on Advancing Inclusion through Enhancing Women and Girls' Digital Literacy and Skills in the Context of Industry 4.0. The paper aims to provide a more panoramic view of the issue on a global scale and endeavor to analyze the issue in APEC a comparative view within this context

The paper firstly briefly captures the broad context of the Industrial Revolution 4.0, how it is different from previous one and how its rapid pace of growth is impacting all aspect of the economies including women and girls.

The paper then proceeds to analyze the challenges and opportunities facing women and girls within the new context of transforming technology. The key challenges identified are including:

- Low rate of female students' participation in STEM education
- Imbalance gender proportion in tech skills and tech jobs
- Gender gap in digital devices ownership and internet access
- Lack of knowledge and skills to exploit the internet.
- Risk of job loss due to new technologies and changes in labor market demands

The key opportunities identified are including:

- Digital services provide added values and opportunities for women
- New job opportunities thanks to new technologies
- Reducing housework and more opportunities for flexible jobs
- Social Network Services for women empowerment
- Growing trend of supporting women in ICT

The paper then presents a list of measures and best practices by APEC economies. The list is, however, not exhaustive.

Based on the identified challenges and opportunities, the paper proposes the following recommendations

### IMPROVING DIGITAL ACCESS FOR WOMEN AND GIRLS

- Make Internet-capable devices more affordable for women. Foster low-cost Internet service packages for low-income people, especially for women.
- Make broadband cheaper; expand digital infrastructure (i.e. by satellite) to unserved and underserved communities, especially rural and remote areas, and free or low-cost public access points that are safe and women-friendly, involving women's collectives and organizations (i.e. by reviving and expanding the model of APEC Digital Opportunity Centers).

- Implement measures that identify, prevent, and counter the sexual and gender-based abuse, harassment and the threat of violence against women and girls in digital contexts. Increase awareness of cyber violence threats and intimidation and encourage measures to condemn such instances of cyber violence when they occur.
- Combat stereotypes of STEM, biases and discriminatory norms at individual, institutional and societal levels by increasing media awareness and sensitization, promote the integration of a gender awareness perspective into government strategies, policies, and budgets.
- Support original research and the collection, tracking, analysis and sharing of sex-disaggregated data to recommend evidence-based policies, monitor key policy actions, identify priorities, track progress.

#### INCREASE INTEREST, PARTICIPATION, AND PROMOTION OF GIRLS AND WOMEN IN STEM AND TECH JOBS

- Promote boot-camps that foster programming skills for young girls.
- Set up common time-bound target to enhance the number of women and girls in STEM; create fund/grant schemes and prizes to incent women and girls
- Advocate female role models to inspire young women to study, start a business, and lead in high-technology sectors.
- Step up efforts to bring women back to work and to let them grow in their careers. This includes social policies such as improving childcare provision, offering paid leave for fathers and more generally addressing gender discrimination.
- Promote scholarships to support the participation of low-income women in ICT/STEM careers.
- Promote women's networks and associations in high tech sectors to connect women, facilitate mentoring for young girls and graduates, and help them make the transition to the labor market.

#### PREVENTING JOBLESS FOR WOMEN

- Promote research on anticipation of future skills needs to provide policy advice to cope with widening skills mismatch. Coordinated policymaking for more and better jobs for women will require labor market information systems that collect good quality, regular and internationally comparable data that can be used to monitor labor market developments and analyze policy. At the same time, economies will need to strengthen their capacity to compile, analyze and use such data for policy implementation and adjust in a timely manner to labor market developments.

- Implement strategy to promote lifelong learning that enables women and girls to acquire skills and to reskill and upskill, especially in foundational skills, ICT and advanced numeracy (STEM) skills to move up to high skill jobs. Lifelong learning encompasses formal and informal learning from early childhood and basic education through to adult learning. Governments, workers and employers, as well as educational institutions, have complementary responsibilities in building an effective and appropriately financed lifelong learning ecosystem.
- Step up efforts to bring women to work and to let them grow in their careers. Promoting the equal sharing of unpaid care and domestic work between men and women. This includes social policies such as improving childcare provision, offering paid leave, and more generally addressing gender discrimination.
- Facilitate women's participation in education and the labor market by offering new work (for example e-commerce and platforms) and learning opportunities (such as online courses), also ensure that digitally enabled jobs are also quality jobs, with proper pay and social protection.

#### EXPLOITING VALUE FROM DIGITAL SERVICES FOR WOMEN

- Provide adapted content and services. Digital literacy should be developed and enhanced, taking into consideration local needs and constraints by providing appropriate learning opportunities disadvantaged women and girls, which will enhance individual and collective decision-making skills.
- Promote mobile financial services. This can help reduce remittance costs, facilitate digital finance and thus increase the volume of transactions and loans to individuals and businesses, as well as allow governments to save by reducing leakage in spending and tax revenue. This would ensure broader financial inclusion, and ultimately help reaching sustainable development goals.
- Promote capacity training and motivate women MSMEs to learn and use apps, mobile and digital platforms for their business (B2B, B2C). The use of digital platforms may offer women many additional opportunities, including the possibility to overcome challenges related to physical immobility, access to new markets, to knowledge as well as flexibility in working time and supplementing household income.
- Digitize business registration procedures and license fee payments.

#### PROMOTING NEW FLEXIBLE JOBS

- Promote flexible working arrangements and online talent platforms: As physical and organizational boundaries are becoming increasingly blurred; organizations are going to have to become significantly more agile in the way they think about managing women's work and about the workforce. Businesses will increasingly connect and collaborate

remotely with women freelancers and independent professionals through digital talent platforms.

#### EMPOWERING WOMEN BY SOCIAL NETWORKS

- Promote internet safety for women and girl by tackling all forms of violence against women through social media tools: Social media tools have helped female victims to share their experiences of violence with other victims, creating a space to exchange knowledge and information on their rights, legal processes and welfare services.
- Promote Hashtag activism that bring women's issues to the forefront of political agendas: Hashtagactivism has helped to mobilise public attention on women's rights, increasing the visibility of issues that are under-reported in mainstream media. For example, UN Women's successful and high-profile #HeForShe campaign further highlights the potential of social media to attract new and larger audiences: the campaign engaged with more than 1.2 billion people, putting the global spotlight on the need to engage men and boys to achieve gender equality.
- Involve a cross-sector of actors, including grassroots women's networks, traditional media and men: Social media campaigns need to build on and collaborate with local women's movements in order to strengthen advocacy efforts. In particular, linking social media with traditional media can scale up campaigns. Moreover, involving men and other nontraditional partners can reinforce messaging and help campaigns attract greater attention both locally and globally.

#### PARTICIPATING IN THE GLOBAL EFFORT IN PROMOTING WOMEN IN ICT

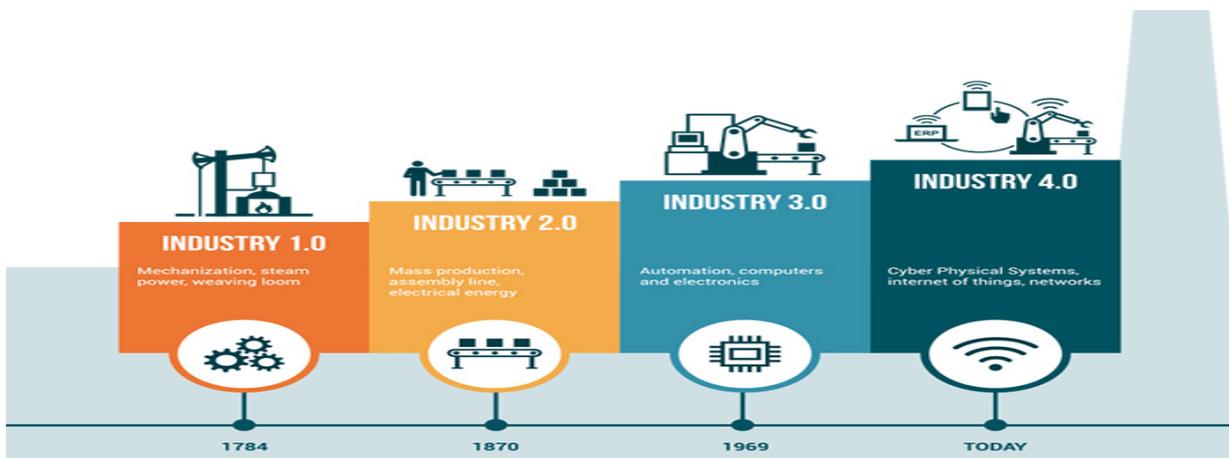
- Taking advantage of the ongoing global commitments, APEC government and multi-actors should endeavor in alignment with the related UN' SDGs, including:
  - SDG5b: Enhance the use of enabling technology, in particular information and communications technology, to promote the empowerment of women.
  - SDG9c: Significantly increase access to information and communications technology and strive to provide universal and affordable access to the Internet in least developed economies by 2020
  - SDG1.4: By 2030, ensure that all men and women have equal access to basic services and appropriate new technology.
  - SDG17.18: By 2020, enhance capacity-building support to developing economies, including for least developed economies and small island developing states, to increase significantly the availability of high-quality, timely and reliable data disaggregated by gender

- Encourage the collection of statistics data and researches that identify the connection between women digital inclusion and economic growth in APEC region with a view to raising awareness among the business leaders.
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## I. THE FOURTH INDUSTRIAL REVOLUTION (4IR) AND WHAT IT MEANS FOR WOMEN?

The Fourth Industrial Revolution began to emerge from the first decade of the 21st century. The fourth industrial revolution (revolution 4.0) began to emerge from the first decade of the 21st century. This is a revolution in smart production based on groundbreaking achievements in various technology fields with the foundation of breakthroughs in digital technology. It is characterized by a fusion of technologies that is blurring the lines between the physical, digital, and biological spheres. The key characteristics of 4IR is marked by emerging technology breakthroughs in a number of fields, including robotics, artificial intelligence, nanotechnology, quantum computing, biotechnology, the Internet of Things, the Industrial Internet of Things (IIoT), fifth-generation wireless technologies (5G), additive manufacturing/3D printing and fully autonomous vehicles.



[http://webfoundation.org/docs/2015/10/womens-rights-online\\_Report.pdf](http://webfoundation.org/docs/2015/10/womens-rights-online_Report.pdf)

The First Industrial Revolution used water and steam power to mechanize production. The Second used electric power to create mass production. The Third used electronics and information technology to automate production. The Fourth Industrial Revolution is building on the Third, the digital revolution that has been occurring since the middle of the last century. The speed of current breakthroughs has no historical precedent. When compared with previous industrial revolutions, the Fourth is evolving at an exponential rather than a linear pace. And the breadth and depth of these changes is transforming the entire systems of production, management, governance.

Historically, industrial revolutions have been accompanied by implications such as increased inequalities that have led to a series of major political and institutional shifts. The 4.0 revolution have affected every aspect of the global economy. With multiple industries being disrupted, those without the relevant skills for the future workplace stand to be at risk. The demand for skilled workers increased while demand for skilled and low skilled workers decreased. The Davos Economic Forum last year predicted that the 4.0 revolution will take place, leaving 7 million previous jobs lost and 2,000,000 new jobs created. Women are likely to be disproportionately negatively impacted, according to a World Economic Forum study. One key reason is because that they are relatively under-represented when it comes to jobs

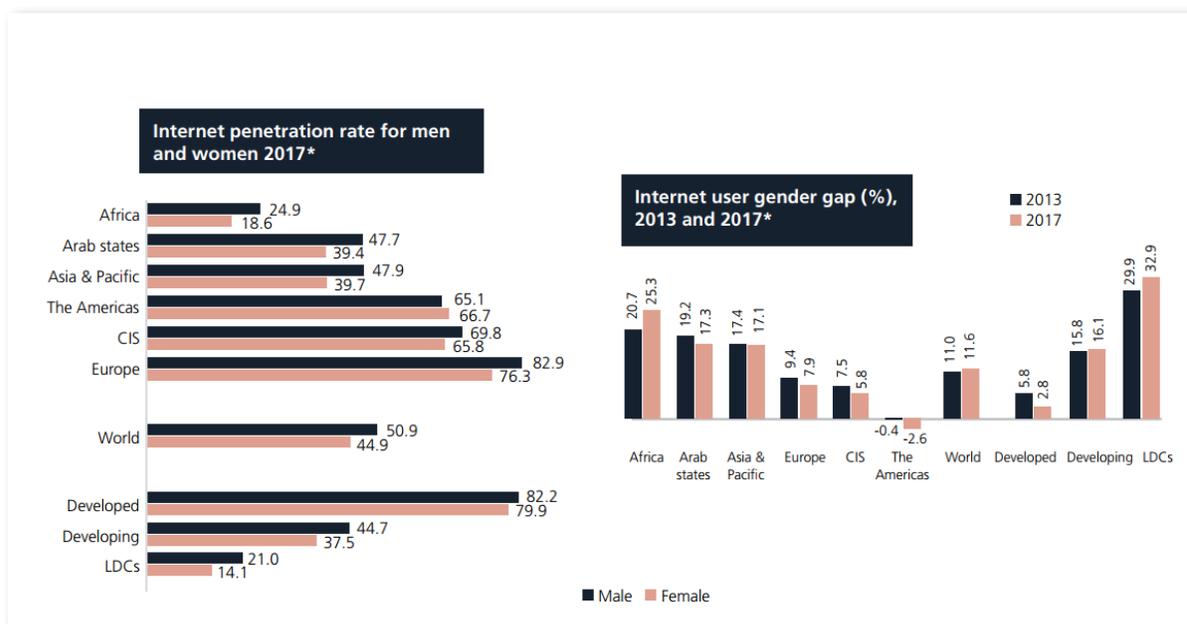
which are expected to have the most growth in the next five years in STEM (science, technology, engineering, mathematical) professions. However, this also means there is tremendous opportunity for women to play a central role in driving innovation and progress. The next part of this paper will provide more detailed analysis on this matter.

## II. CHALLENGES AND OPPORTUNITIES TO WOMEN AND GIRLS IN THE 4IR

In this part, this paper aims to provide an overview of key issues related to gender-digital disparity through collecting the notable statistics from researches of international organization and interpreting the significance of the statistics and uncovering the underlying barriers behind the statistics

### II.1. Key Challenges:

**Gender gap in digital devices ownership and internet access:** Worldwide, roughly 184 million fewer women than men have a smartphone and can access mobile Internet. Women are on average 26% less likely than men to have a smartphone. In South Asia and Africa these proportions stand at 70% and 34%, respectively. The Internet user gender gap in Asia and the Pacific decreased very slightly, but it remains significant at 17%, which is higher than the global average of 12%<sup>2</sup>



Source: ITU, ICT Fact and Figure 2017

Financial affordability is a challenge for all but affects disproportionately more women and girls, as they comprise a majority of the world's poor. Globally, women earn **23 percent** less than men and at the current rate of progress, it will take 170 years to close the gap. 700 million fewer women than men are in paid work<sup>3</sup>. Also, the digital gender divide is found to increase as technological sophistication and functionality grows and with the cost of ownership. A study by Intel and Dalberg (2012) finds that affordability not only represents a barrier for those who are not yet Internet users, but further prevents Internet users from using the World Wide Web to its full extent, if e.g. Internet data allowances increase importantly with the quantity of megabits included in the contract. When it comes to affordability, the

<sup>2</sup> ITU(2016), "ICT Facts and Figures 2017,"

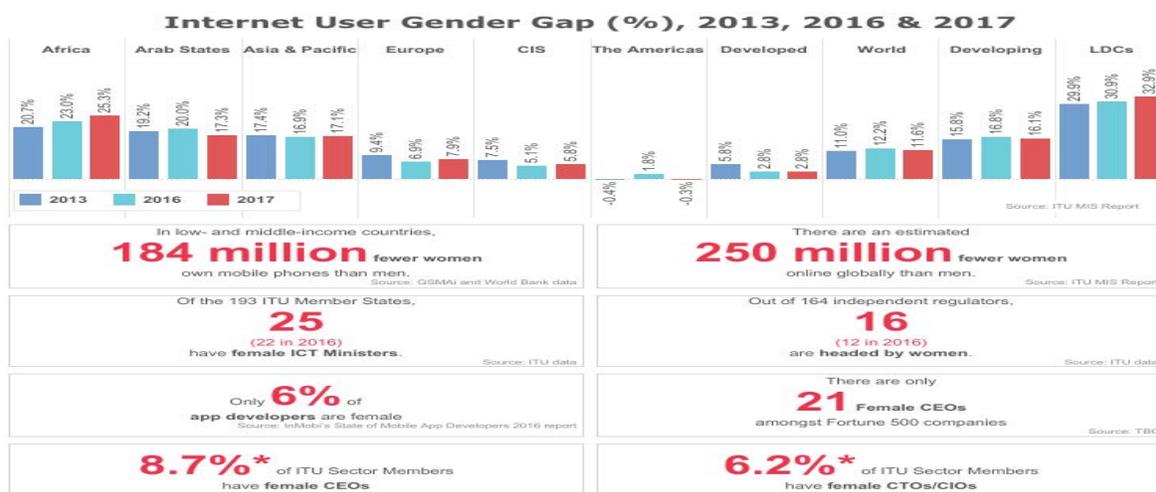
<http://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2017.pdf>.

<sup>3</sup> Oxfam, <https://www.oxfam.org/en/even-it/why-majority-worlds-poor-are-women>

cost of accessing the Internet varies across economies and regions and partly depends on the level of development of the economy<sup>4</sup>.

Safety-related issues are often a key reason for families' opposition to the use of the Internet or the ownership of a mobile phone for both women and girls in developing and emerging economies. For example, for women in China and Mexico, harassment is among the top barriers in owning and using a mobile phone<sup>5</sup>.

Illiteracy also further hinders women's and girls' ability to access online services. About 83% of women worldwide are literate, compared to 90% of men (UNESCO, 2017), women comprise a majority of the 175 million young people globally who are still illiterate and illiterate women only appear to be using online platform services, such as Skype and YouTube, that are more familiar to them or are easier to access and use. While the global digital gender divide in Internet usage remained almost unchanged between 2013 and 2017, at about 11%, the gap between developed and developing economies increased, driven by an increase in the gender Internet usage gap of by 3% in least developed economies and 4% in Africa. Research by the EQUALS also shown that there are also noticeable differences in usage patterns between men and women.



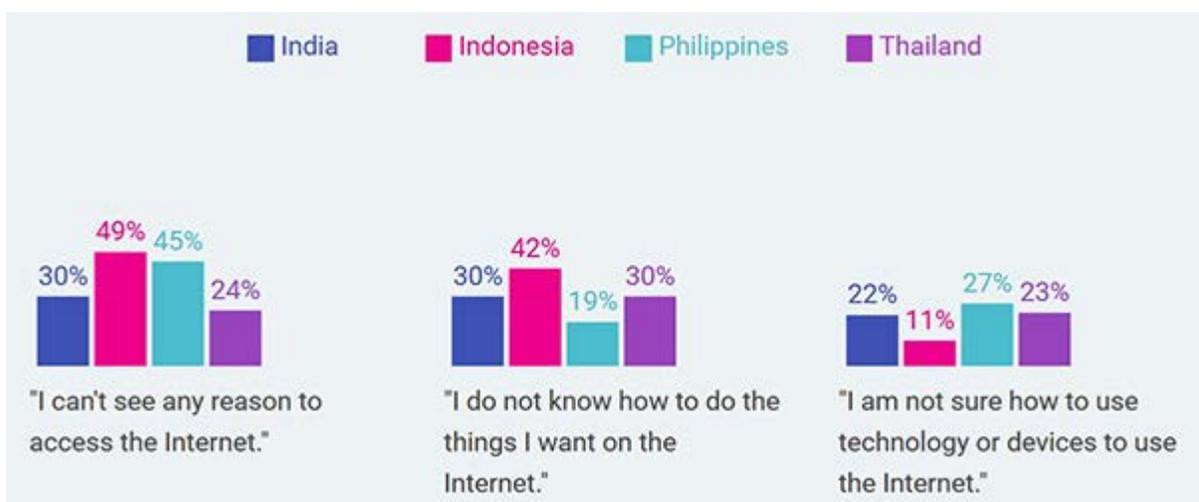
Source: ITU website 2019, <https://www.itu.int/en/ITU-D/Statistics/Pages/default.aspx>

**Women lack knowledge and skills to exploit the internet.** There is growing recognition that basic access to ICTs is not a sufficient condition to eliminate

<sup>4</sup> Intel and Dalberg (2012), *Women and the Web. Bridging the Internet and Creating New Global Opportunities in Low and Middle Income Countries*, Intel Corporation and Dalberg Global Development Advisors, <https://www.intel.com/content/dam/www/public/us/en/documents/pdf/women-and-theweb.pdf>.

<sup>5</sup> GSMA (2015), *Connected Women, Bridging the Gender Gap: Mobile Access and Usage in Low- and Middle-income Countries*, <https://www.gsma.com/mobilefordevelopment/programmes/connected-women/bridging-gender-gap>.

inequalities. Research shows that the dramatic spread of mobile phones is not enough to get women online, or to achieve empowerment of women through technology. Without a major escalation of gender-sensitive policy efforts and investments, most of the benefits of technology change will be captured by men, further deepening the gender divide. Even with gender parity in ownership, access and control over digital technologies, gains are not automatic. In a World Wide Web Foundation study, almost every woman in the survey of nine poor urban communities including in India, Indonesia and the Philippines, owned or had access to a mobile phone. But on average, only 21% of the connected women had searched for critical information on topics like health, legal rights and transport information. For both mobile phone and internet use, even when women do have access to the internet, many of them do not have enough skills or capacities required to use it to improve their lives and those of their families and communities.



Source: [http://webfoundation.org/docs/2015/10/womens-rights-online\\_Report.pdf](http://webfoundation.org/docs/2015/10/womens-rights-online_Report.pdf)

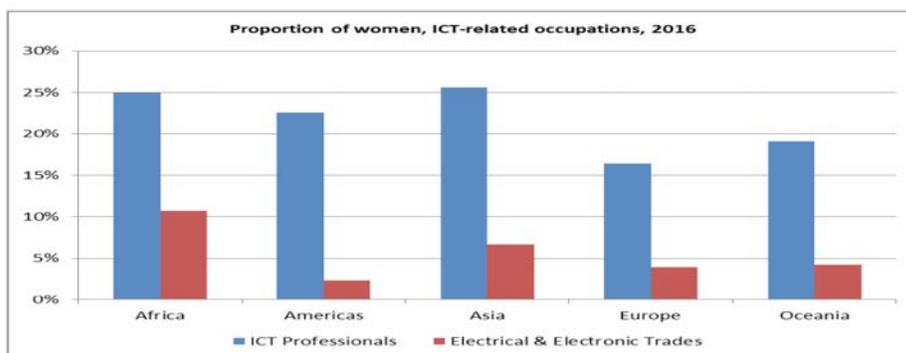
**Low rate of female student in STEM:** According to the UNESCO Report “Cracking the code: Girls’ and women’s education in STEM”, only 35% of STEM students in higher education globally are women, and differences are observed within STEM disciplines. In APEC region, the PPWE Dashboard 2017 reports that female graduates in science programs represented less than 50 percent of the graduates in all 12 economies with available data between 2013 and 2015. Likewise, less than half of all graduates in engineering, technology and mathematics were women in the 14 APEC economies with data available<sup>6</sup>. Indeed, the percentage of female graduates from Engineering, Manufacturing and Construction was as low as 15 percent in some APEC economies. The low proportion of female students in STEM is largely due to specific expectation since early education. According to an OECD research in 2015, at 15 years of age, on average only 0.5% of girls wish to become ICT professionals, compared to 5% of boys. Twice as many boys as girls expect to become engineers, scientists or architects. The OECD research shows that differences in performance in scientific

<sup>6</sup> APEC PSU (2017), *The APEC Women and The Economy Dashboard 2017*, <https://www.apec.org/Publications/2017/09/The-APEC-Women-and-The-Economy-Dashboard-2017>

and ICT-related fields do not stem from innate differences in aptitudes, but rather from students' attitudes and confidence in their own capabilities. Girls are less confident in their maths, science and IT abilities, often due to or fuelled by societal and parental biases<sup>7</sup>.

**Imbalance gender proportion in tech skills and tech jobs:** According to a research by EQUALS Group, men are overall more likely than women to have advanced digital skills. For instance, ITU 2017 data from 49 economies shows that the proportion of men who can write a computer program is twice that of women (7.8% versus 3.5%). In almost all economies with relevant data, women lag behind men in having programming skills<sup>8</sup>. However, there has not been a specific data for Asia Pacific on this area.

The low rate of female student in STEM from early education lead to the fact that lower proportions of women graduate in engineering, manufacturing and construction, or ICTs. While more women than men completed tertiary education in 2015, only 24% of graduates in engineering, manufacturing and construction were women; the share in ICTs was just 25%. Also, when women graduate in these fields and go on to the labour market, they display on average lower numeracy skills than male graduates. Globally, LinkedIn estimated that, globally, women account for 52% of non-tech jobs, but only 20% of tech jobs. In APEC region, based on the available data, women still represent the minority among STEM fields and staff working on research and development. For instance, female graduates in science programs represented less than 50 percent of the graduates in all 12 economies with available data between 2013 and 2015. Likewise, less than half of all graduates in engineering, technology and mathematics were women in the 14 APEC economies with data available. Indeed, the percentage of female graduates from Engineering, Manufacturing and Construction was as low as 15 percent in some APEC economies<sup>9</sup>.



Source: EQUALS (2018), *Taking stock: Data and evidence on gender equality in digital access, skills and leadership*, <https://www.equalso.org/>

<sup>7</sup> OECD (2015), *The OECD ABC of Gender Equality in Education Report*,

<sup>8</sup> EQUALS (2018) *Taking stock: Data and evidence on gender equality in digital access, skills and leadership Preliminary findings of a review by the EQUALS Research Group* <https://www.equalso.org/>

<sup>9</sup> APEC PSU (2017), *The APEC Women and The Economy Dashboard 2017*, <https://www.apec.org/Publications/2017/09/The-APEC-Women-and-The-Economy-Dashboard-2017>

**Risk of job loss due to new technologies and changes in labor market demands:** As the 4<sup>th</sup> Industrial revolution bring disruptive changes to multiple industries, those without the relevant skills for the future workplace stand to be at risk. In absolute terms, men will face nearly 4 million job losses and 1.4 million gains, approximately one job gained for every three jobs lost, whereas women will face 3 million job losses and only 0.55 million gains, more than five jobs lost for every job gained. Due to women's low participation in STEM (science, technology, engineering, mathematical) professions, one of the fastest-growing areas of job creation, women stand to gain only one new STEM job for every 20 lost across other job families, whereas the ratio for men is one new job for every four lost elsewhere. Relating to Asia-Pacific, a 2016 study by the United Nations' International Labour Organization predicted that some Asian nations could lose more than 80% of their garment, textile and apparel manufacturing jobs, as "sewbots" replace humans in factories. In the Association of Southeast Asian Nations (ASEAN) region, it is young women who comprise the majority of the 9 million people dependent on jobs in these sectors, in economies such as Thailand, Viet Nam, Cambodia and Malaysia.

## **II.2. Key Opportunities**

**Digital services provide added values and opportunity for women:** While going digital can be enabling for all, the digital gender divide means there is important scope for women to extract more value from their use of digital tools. Female users currently tend to use fewer services than men and are less confident in using the Internet. For instance, while mobile money accounts offer an effective way to boost financial inclusion, it remains the case that fewer women are likely to own and use such an account. Online or video-based upskilling and tutorials may especially help women make better use of digital tools and extract more value from them.

The new digital landscape will also provide female entrepreneurs with the flexibility to start businesses with a relatively small amount of investment, and to sell their products and services across the globe. For example, in August 2017, for the first time, eBay announced that it will have products from vendors across six African economies on its platform, an opportunity that didn't exist before.

**New job opportunities thanks to new technologies:** On the flip side, the industrial revolution also provides multiple opportunities for new jobs and make some "traditional jobs" become more valuable. Industries like manufacturing and construction, businesses that are mostly male-dominated, are likely to be the most affected by automation. Meanwhile, industries resistant to automation like psychology, medicine and nursing will become more competitive. According to the World Economic Forum (WEF), these drivers of change in the industrial revolution will impact some of the industries with the 'largest traditional gender gap' such as Manufacturing and production. WEF states that, women, due to their under-representation in this sector will only lose 0.37% jobs, but on the other hand, stand to gain approximately over 100,000 jobs in Architecture, Engineering, Computer and Mathematical functions. Skills that women bring to the table, once called "traditional soft skills", are now recognised as profitable and important: the ability to

understand what is going on based on someone's body language; emotional intelligence; the ability to build consensus; to mentor people, etc...

**Reduced house work and more opportunities for flexible work from home:**

As household work (such as laundry, vacuuming, baby monitoring, cooking, gardening, feeding pets...) is further automated, it may relieve part of the dual burden of a woman being both a caregiver and a breadwinner. At the same time, changes in the nature of work – such as an increase in opportunities for remote working – make it easier for both parents to better combine work and family. Companies used to lose talented women in their thirties because that's when women have children and face the “kids versus career” decision, many choose kids. At the same time, changes in the nature of work – such as an increase in opportunities for remote working – make it easier for women to better combine work and family. From these aspects, the 4<sup>th</sup> Industrial Revolution may work in favour of these women.

**Empowering women and girls by social network services.** Many studies have found that women are the majority and more active force on social network services in general. On Facebook, 52% users are women vs 48% men, Pinterest (85% women, 15% men); Twitter (62% women, 38% men); Instagram (58% women; 42%men). While men use social network to gather the information that they need to build influence, Women use social network services truly for social networking. Women are more vocal, expressive and willing to share on social networks. Therefore, social media, with their instant and viral nature, turn into a powerful means for women to rally and speak out for any injustice against them, such as the #metoo online campaign could led to a true social change for women. With social networks, women can learn the knowledge to protect themselves and gain their confidence through following their role models

**A growing global trend in supporting women in ICT.** A report by McKinsey prepared for WEF in 2015 indicated that promoting women role in the economy could add as much as \$12 trillion, or 11 percent, in annual 2025 GDP. In a “full potential” scenario in which women play an identical role in labor markets to that of men, as much as \$28 trillion, or 26 percent, could be added to global annual GDP by 2025. <sup>10</sup> Lowering the barriers faced by women entrepreneurs at home and internationally, and helping more business women to connect to international value chains, would bolster growth and inclusion. It would create more – and better-paying – jobs for women and they have committed to Gender Equity as the 5<sup>th</sup> goals in the 17 Goals of UN's Sustainable Development Goals and gender equity has also been highlighted on the Agenda of G20, OECD, APEC, ASEM, ASEAN...

In the private sector, there is a similar trend going on. In the “Future of Job” Report done by WEF in 2016, 53% of the 371 companies responded that they consider promoting women's participation as a priority item on their organization's senior

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<sup>10</sup> McKinsey (2015), *The Power of Parity: How Advancing Women's Equality Can Add \$12 Trillion to Global Growth*

[https://www.mckinsey.com/~media/McKinsey/Featured%20Insights/Employment%20and%20Growth/How%20advancing%20womens%20equality%20can%20add%2012%20trillion%20to%20global%20growth/MGI%20Power%20of%20parity\\_Executive%20summary\\_September%202015.ashx](https://www.mckinsey.com/~media/McKinsey/Featured%20Insights/Employment%20and%20Growth/How%20advancing%20womens%20equality%20can%20add%2012%20trillion%20to%20global%20growth/MGI%20Power%20of%20parity_Executive%20summary_September%202015.ashx)

leadership's agenda and 58% are confident about the efficacy of their current measures undertaken in this regard.<sup>11</sup>

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<sup>11</sup> WEF (2016), *The Future of Jobs*, <http://reports.weforum.org/future-of-jobs-2016/n>

### III. RECENT POLICIES AND INITIATIVES BY APEC ECONOMIES TO SUPPORT WOMEN’S EMPOWERMENT IN THE DIGITAL AGE

APEC Economies have devised many proactive initiatives and policies to promote more participation of women and girls in STEM education and hi-tech jobs. This table below is a non-exhaustive capture of major policies and initiatives recently carried out by APEC members to support women and girls in the digital economy, based on what we can collect in open sources:

<p><b>AUSTRALIA</b></p>	<ul style="list-style-type: none"> <li>• The Australian Government is investing AUD 13 million over five years from 2016/17 to initiatives focused on women’s participation in STEM. The National Innovation and Science Agenda is contributing to ongoing efforts across the Australian Government to encourage more girls and women to study STEM and pursue STEM-based and entrepreneurial careers.</li> <li>• APEC Women in STEM Initiative: Workshop, GIST Boot Camp and Roundtable</li> </ul>
<p><b>BRUNEI DARUSSALAM</b></p>	<ul style="list-style-type: none"> <li>• Ebunda provides access to e-learning opportunities to raise awareness on issues important to women such as health, the environment, business and finance, careers, education, and affirmative action. eBunda is a CSR initiative of the technology company, <u>BAG Networks</u>. Its name is derived from “ibunda,” the Malay word that means mother. The portal targets women who have taken a break from their careers to have children and need support to continue learning. eBunda has worked with Microsoft and Ikhlas to develop e-learning tools for the website. The Microsoft Digital Literacy Program provides basic, standard, and advanced information on IT and provides a “digital literacy” certification. In partnership with Ikhlas, a small, medium, and micro enterprise (SMMEs) accounting company, eBunda sponsors women’s SMME’s online subscriptions to accounting software so they</li> </ul>

	<p>can accurately record their finances. Further, eBunda's "active aging" initiative provides older woman with ICT skills. The <i>eBunda Café</i> is a radio show broadcast with the University of Brunei Darussalam's radio station. The show cover topics important to women; one such broadcast was called "Women in Business: The Reality of Online Businesses." eBunda plans to launch an ICT classroom in collaboration with the Brunei Darussalam Women's Business Council. It also plans to develop a manual of instructions on text messages, web browsing, and other areas to bridge the digital divide with the older generation.</p>
<b>CANADA</b>	<ul style="list-style-type: none"> <li>• 30 by 30 campaign to increase the percentage of newly licensed engineers who are women to 30 percent by the year 2030.</li> <li>• Social media campaign "Choose Science," encouraging young women to enter STEM.</li> <li>• Actua's National Girls Program to inspire young women to fulfill their role as leaders in STEM and encourages female engagement in STEM fields</li> <li>• hEr VOLUTION targeting young women from underserved communities to come to in order to advance in 21st Century Skills.</li> </ul>
<b>CHILE</b>	<ul style="list-style-type: none"> <li>• Gender Equality Admissions Program by Faculty of Mathematical and Physical Sciences at the University of Chile. Under this program, 40 extra women are selected into the most competitive engineering and science program in the economy.</li> <li>• STEM Academies in Chile project, funded by Pan American Development Foundation (PADF), implemented by nonprofit Fundación Ciencia Joven.</li> </ul>
<b>PEOPLE'S REPUBLIC OF CHINA</b>	<ul style="list-style-type: none"> <li>• Developing the Next Generation of Leaders in China: The WeTech Online Mentoring Program. Sponsored by Qualcomm, WeTech</li> </ul>

	<p>is a customized virtual mentoring program that links young women in China with tech leaders across the world. In its pilot phase, WeTech targeted university women in China as mentees, linking volunteer mentors from Qualcomm offices around the world with the university women, and providing support, career advice and guidance as students' transition from university into the workforce.</p> <ul style="list-style-type: none"> <li>• APEC Women Connect Capacity Building Program - 2018 Global Value Chain-Cross Border e-Trade (GVC-CBET) Workshop</li> </ul>
<b>HONG KONG, CHINA</b>	<ul style="list-style-type: none"> <li>• Women Who Code. A global nonprofit dedicated to inspiring women to excel in technology careers, Women Who Code creates a connected community of women in technology. Hong Kong, China's chapter of Women Who Code links the economy to one of the largest communities of women engineers in the world</li> </ul>
<b>INDONESIA</b>	<ul style="list-style-type: none"> <li>• Development of Cottage Industry Model in 21 districts.</li> <li>• Collaborative work with relevant local stakeholder.</li> <li>• Strengthening women's access to 4 areas: Finance, Trainings, Market, and Information. Incorporating ICT trainings for 10 thousand micro-scale businesswomen.</li> </ul>
<b>JAPAN</b>	<ul style="list-style-type: none"> <li>• New Technologies for Women's Empowerment (telework, home electric appliances, ICT access)</li> <li>• Increase Women in STEM fields (STEM Girls Ambassadors)</li> <li>• Recurrent Education (After Childcare leave; Career shift to IT and digital field; Career up to Leadership position)</li> </ul>
<b>REPUBLIC OF KOREA</b>	<ul style="list-style-type: none"> <li>• IT Women Net (ITWomenNet)</li> </ul>

	<ul style="list-style-type: none"> <li>• Women Enterprise Supporting Center (WESC)</li> <li>• Gyeonggi Women’s Development Center (GWDC)</li> <li>• Information Network Village (INVIL)</li> <li>• Smart App Creative Center</li> <li>• Initiative for APEC Women’s Participation in the Digital Economy</li> </ul>
<b>MALAYSIA</b>	<ul style="list-style-type: none"> <li>• Project “Strengthening STEM Curricular for Girls in Africa and Asia and the Pacific- Phase I,” funded by Malaysia Funds-in-Trust and led by the IBE, the Ministry of Education of Malaysia is supporting the development of STEM education in Cambodia, Indonesia, Kenya and Nigeria, in order to mainstream gender sensitive STEM education in the educational policies, the curriculum, pedagogy and teacher education.</li> <li>• ‘Code for Malaysia’ campaign</li> <li>• Hour of Code’ campaign, “TechFemme”,</li> </ul>
<b>MEXICO</b>	<ul style="list-style-type: none"> <li>• Mil Niñas, Mil Futuros (1,000 girls, 1000 futures) program, by The <b>U.S.-Mexico Foundation (USMF)</b></li> <li>• Codigo X. In April, 2016, Mexico's federal government launched the mentoring program entitled Codigo X, which aims to connect civil society, academy, government and industry to prepare girls and women for careers in ICT</li> </ul>
<b>NEW ZEALAND</b>	<ul style="list-style-type: none"> <li>• In 2018, Association for Women in the Sciences AWIS introduced a financial award to support women studying STEM subjects. Managed by the New Horizons for Women Trust, the \$9,000 award will support up to three women annually enrolled in a tertiary STEM qualification. The award is particularly aimed at women whose social identify is under-represented in their field of study. The initial funds for the award were raised through screenings of the 2017</li> </ul>

	<p>movie <i>Hidden Figures</i>, which centred around female mathematicians involved in the NASA space programme.</p> <ul style="list-style-type: none"> <li>• The next step of the Gender Pay Action Plan was launched in 2018 by Minister for Women Julie Anne Genter, with seven public service agencies committing to flexible work pilots. Seven government agencies have signed up to pilot 'flexible-work-by-default' approaches in the first in a staged roll-out across the whole public service by the end of 2020.</li> <li>• The Ministry for Women has led research with Netsafe in 2017 on digital harm for girls and boys</li> </ul>
<b>PAPUA NEW GUINEA</b>	<ul style="list-style-type: none"> <li>• Girls in ICT Tertiary Scholarship: The Papua New Guinea National Information &amp; Communications Technology Authority (NICTA) first launched the NICTA Girls in ICT Scholarship programme in 2013. Through this programme NICTA will support the education of girls in PNG, in an ICT related field of study. NICTA is pleased to announce that commencing in 2018; four scholarships are awarded to four successful applicants. The scholarship will cover tuition, boarding and lodging, textbook and stationary, fortnightly stipend and travel expenses.</li> </ul>
<b>PERU</b>	<ul style="list-style-type: none"> <li>• In November 2015, the Peruvian Congress approved the Telework Law to support flexibility in the workforce. The law allows full-time or part-time employees to work remotely. Women were able to start their businesses because they could work from home, and by using social media platforms like Facebook as a sales and marketing tool they generated income from home without a significant investment in business infrastructure.</li> <li>• To increase access to the Internet and raise digital literacy in rural areas, development projects, corporate social responsibility</li> </ul>

	<p>programs, and for-profit businesses train or provide incentives for women entrepreneurs in rural communities to use ICT to connect with suppliers and access new market opportunities. The Center for Information and Education for the Prevention of Drug Abuse (CEDRO) has established 37 tele centers and enrolled more than 20,000 small-hold farmers and producers in capacity-building activities.</p> <ul style="list-style-type: none"> <li>• The telecommunication company Telefonica del Peru in 2011 launched a rural connectivity and development program called Connect to Grow (Conectarse para Crecer). The program organizes annual business plan competitions for rural organizations that want to use ICT to improve and create business opportunities for their community. Women have won almost one-third of the \$5,000 to \$10,000 prizes. In addition to a cash prize, winners also receive training on ICT tools.</li> <li>• The Mini Academy of Science and Technology) was awarded the 2017 UNESCO Prize for Girls’ and Women’s Education for its “Mobile MaCTec Bus Labs/Mini Academy of Science and Technology” project. MaCTec is a non-profit organization empowering young Peruvian girls from urban and rural areas through quality science education and helping to reduce the gender gap in science, technology, engineering and mathematics (STEM) fields. It was founded in 2012 by four Peruvians (one scientist and three graduate students) and reaches girls from 8 to 11 years old.</li> </ul>
<p><b>THE PHILIPPINES</b></p>	<ul style="list-style-type: none"> <li>• <i>Women ICT Frontier Initiative (WIFI)</i>, a flagship program of the UN APCICT which aims to promote women’s entrepreneurship through ICT capacity development</li> <li>• <i>APEC MSME Marketplace</i>. The online portal which facilitates business matching for MSMEs and other stakeholders currently showcases 34 government and 158 private</li> </ul>

	marketplaces. With 10, 054 visitors as of last month— 58.2% of which are women
<b>RUSSIA</b>	<ul style="list-style-type: none"> <li>• <i>Project 5-100</i>, a government-run program to maximize the competitive position of a group of leading Russian universities in the global research and education market, stated that: “Russian universities, are dedicated to combating women’s underrepresentation in science and research, and giving female scientists the appreciation they deserve”.</li> <li>• Thanks to the good education policy inherited from the Soviet era, For Russian girls, technology training starts at an early age. Science has been proclaimed to be a domestic priority and technical education are open to everyone, regardless of gender. As a result, young Russian girls view STEM more positively and this has resulted in a more lasting interest. A report from UNESCO recently found that, in Russia, 41 percent of people in scientific research are women. The number of women inventors in Russia number more than three times that of other western economies.</li> </ul> <p>APEC Projects:</p> <ul style="list-style-type: none"> <li>• APEC Business Efficiency and Success Target (BEST) Award</li> <li>• APEC Women Amidst 4th Industrial Revolution</li> </ul>
<b>SINGAPORE</b>	<ul style="list-style-type: none"> <li>• SkillsFuture is a domestic movement to provide citizens with opportunities and resources to develop the skills they need as Singapore continues into the next phase of its development as an advanced economy. In 2016, around 134,000 women took part in SkillsFuture, and efforts are under way to increase participation through multiple media campaigns.</li> <li>• Girls2Pioneers: Along with MasterCard and Standard Chartered, Singapore Committee for UN Women launched the Women in STEM</li> </ul>

	<p>campaign “Girls2Pioneers”. Girls2Pioneers provides day camps for girls between the ages of 10 to 15 comprising of fun challenges that cultivate skills in technology, design and construction, research, strategic planning, improvisation and engineering. These day camps are followed by field trips and mentoring sessions, which allow for first-hand interactions with corporate partners and mentors in each field.</p>
<p><b>CHINESE TAIPEI</b></p>	<ul style="list-style-type: none"> <li>• Talent education programs: e.g. Science Lecture at a Girls’ High School</li> <li>• Female Talent Development Program</li> <li>• Digital Application Promotion Project in Remote Areas</li> <li>• FB#SheMeansBusiness Programme</li> </ul> <p>APEC projects:</p> <ul style="list-style-type: none"> <li>• ADOC : APEC Digital Opportunity Centers</li> <li>• APEC Skills Development Capacity Building Institute</li> <li>• Gender Inclusion in Smart Agriculture 2018</li> <li>• Women and the Economy Sub-Fund (Chinese Taipei, Australia, US, and Japan)</li> <li>• APEC GIFTS A+ Initiative: Seminar on Gender Inclusion in Smart Agriculture</li> <li>• APEC Gendered Innovation for Technology and Science (GIFTS): Promoting Women in STEM for Sustainable Growth</li> <li>• APEC Workshop: Unlocking Potential, Creating Style – APEC GIFTS (Gendered Innovation for Technology and Science) for Women in the Creative Industry</li> <li>• Innovation for Women and Economic Development - Facilitating Women's Livelihood Development and Resilience with ICTs</li> </ul>
<p><b>THAILAND</b></p>	<ul style="list-style-type: none"> <li>• A 2015 <u>study</u> by UNESCO revealed that Thailand was ahead of most economies in</li> </ul>

	<p>terms of women working in STEM (science, technology, engineering and mathematics) fields.</p> <ul style="list-style-type: none"> <li>• Thailand is among the economies with the highest opportunity for women in the workforce, according to the MasterCard Index of Women Entrepreneurs. The survey ranks 20 economies with the highest scores for female entrepreneurship. Thailand is among the top 10 and is the only upper-middle-income economy to make it to the list.</li> <li>• Ministry of Education pilots a policy toolkit under UNESCO's global STEM and Advancement</li> </ul>
<p><b>THE UNITED STATES</b></p>	<ul style="list-style-type: none"> <li>• The Untold History of Women in Science and Technology. Created by the White House Office of Science and Technology Policy, this online repository features stories about women trailblazers in STEM. The resource sets an example of "writing women scientists into history" so that educators and employers can be more mindful of including women as examples of leaders in the sector.</li> <li>• Implementation of the APEC Dashboard: Increasing STEM Education</li> <li>• Empowering Women as Managers of the Renewable Energy Sector</li> <li>• Evaluating Business Environments to Foster Access to Trade and Growth of Women's SMEs in Southeast Asian APEC Developing Economies</li> <li>• APEC Workshops on Best Practices in Micro-Finance and Micro-Credit</li> <li>• Gap Analysis Toward Development of a Women's Entrepreneurship in APEC (WE-APEC) Network</li> <li>• Next Steps for Women's Entrepreneurship in APEC (WE-APEC), Phase 2</li> <li>• Implementing the APEC Women in STEM</li> </ul>

	<p>Framework: Workshop on Building a Pipeline for Girls and Women and Coding the Way to Success</p>
<p><b>VIET NAM</b></p>	<ul style="list-style-type: none"> <li>• The Enabling Boat Project bring digital skill training to women and girls of the fishery communities in 2017</li> <li>• “YouthSpark Digital Inclusion” project, aiming to close the digital gap, inspire passion and develop knowledge and skills in computer science, computational thinking and ICT for students in rural areas.</li> <li>• STEM SPEAK 2018.: The United Nations Educational, Scientific and Cultural Organization (UNESCO) and Microsoft in cooperation with the Centre for Education and Development (CED) gathered thirty-eight Vietnamese youth from across the economy to develop an inclusive Science, Technology, Engineering and Mathematics (STEM) vision</li> <li>• #GIFT (Girls in Future Technology) Project with Microsoft Viet Nam to support girls (13-16 years old) to approach ICT and STEM</li> <li>• APEC Workshop on Advancing Inclusion through Enhancing Women and Girls' Digital Literacy and Skills in the Context of Industry 4.0.</li> </ul>

#### IV. RECOMMENDATIONS: TACKLING THE CHALLENGES, HARNESSING THE OPPORTUNITIES

In this section, the paper aims to provide some recommendations to APEC based on the barriers and opportunities that have been identified. Factors contributing to gender digital divide are infrastructure availability, financial constraints, ability and aptitude, interest and perceived relevance, safety and security, and socio-cultural and institutional constraints. These barriers can only be eliminated through concerted efforts involving multiple stakeholders, including academia, policy makers, the private sector, non-governmental organizations and civil society.

<b>TACKLING THE CHALLENGES</b>		
<b>Challenges</b>	<b>Root Causes</b>	<b>Recommendations</b>
<b>Gender gap in digital devices ownership and internet access</b>	<ul style="list-style-type: none"> <li>• Affordability</li> <li>• Lack of digital infrastructure</li> <li>• Hurdles to access</li> <li>• Lack of awareness and digital literacy</li> <li>• Socio cultural norms</li> <li>• Safety and Security</li> </ul>	<ul style="list-style-type: none"> <li>• Make Internet-capable devices more affordable for women. Foster low-cost Internet service packages for low-income people, especially for women.</li> <li>• Make broadband cheaper; expand digital infrastructure (i.e. by satellite) to unserved and underserved communities, especially rural and remote areas, and free or low-cost public access points that are safe and women-friendly, (i.e. by reviving and expanding the model of APEC Digital Opportunity Centers).</li> <li>• Implement measures that identify, prevent, and counter the sexual and gender-based abuse, harassment and the threat of violence against women and girls in digital contexts. Increase awareness of cyber violence threats and intimidation and encourage measures to condemn such instances of cyber violence when they occur.</li> <li>• Combat stereotypes of STEM, biases and discriminatory norms at individual, institutional and societal</li> </ul>

		<p>levels by increasing media awareness and sensitization, promote the integration of a gender awareness perspective into domestic strategies, policies, and budgets.</p> <ul style="list-style-type: none"> <li>• Support original research and the collection, tracking, analysis and sharing of sex-disaggregated data to recommend evidence-based policies, monitor key policy actions, identify priorities, track progress.</li> </ul>
<p><b>Low participation in STEM education and tech jobs</b></p>	<ul style="list-style-type: none"> <li>• Inherent gender biases and socio-cultural norms</li> <li>• Lack of awareness</li> <li>• Affordability</li> </ul>	<ul style="list-style-type: none"> <li>• Promote boot-camps that foster programming skills for young girls.</li> <li>• Set up common time-bound target to enhance the number of women and girls in STEM; create fund/grant schemes and prizes to incent women and girls</li> <li>• Advocate female role models to inspire young women to study, start a business, and lead in high-technology sectors.</li> <li>• Promote scholarships to support the participation of low-income women in ICT/STEM careers.</li> <li>• Promote women's networks and associations in high tech sectors to connect women, facilitate mentoring for young girls and graduates, and help them make the transition to the labor market</li> </ul>
<p><b>Job loss in the new context</b></p>	<ul style="list-style-type: none"> <li>• Lack of skills</li> <li>• Hurdles to access</li> <li>• Lack of awareness and digital literacy</li> </ul>	<ul style="list-style-type: none"> <li>• Promote research on anticipation of future skills needs to provide policy advice to cope with widening skills mismatch. Coordinated policy-making for more and better jobs for women will require labor market information systems that collect good quality, regular and</li> </ul>

		<p>internationally comparable data that can be used to monitor labor market developments and analyze policy. At the same time, economies will need to strengthen their capacity to compile, analyze and use such data for policy implementation and adjust in a timely manner to labor market developments.</p> <ul style="list-style-type: none"> <li>• Implement strategy to promote lifelong learning that enables women and girls to acquire skills and to reskill and upskill, especially in foundational skills, ICT and advanced numeracy (STEM) skills to move up to high skill jobs. Lifelong learning encompasses formal and informal learning from early childhood and basic education to adult learning. Governments, workers and employers, as well as educational institutions, have complementary responsibilities in building an effective and appropriately financed lifelong learning ecosystem.</li> <li>• Step up efforts to bring women to work and to let them grow in their careers, promote the equal sharing of unpaid care and domestic work between men and women. This includes social policies such as improving childcare provision, offering paid leave, and more generally addressing gender discrimination.</li> <li>• Facilitate women's participation in education and the labor market by offering new work on digital platforms and learning opportunities from online courses, also ensure that digitally enabled jobs are also quality jobs, with proper pay and social protection.</li> </ul>
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## HARNESSING THE OPPORTUNITIES

Opportunities	Recommendations
<p><b>Harnessing more value from digital services - Opportunities for women entrepreneurs</b></p>	<ul style="list-style-type: none"> <li>• Provide adapted content and services. Digital literacy should be developed and enhanced, taking into consideration local needs and constraints by providing appropriate learning opportunities to disadvantaged women and girls, which will enhance individual and collective decision-making skills.</li> <li>• Promote mobile financial services. This can help reduce remittance costs, facilitate digital finance and thus increase the volume of transactions and loans to individuals and businesses, as well as allow governments to save expenditure by reducing leakage in spending and tax revenue. This would ensure broader financial inclusion, and ultimately support the implementation of sustainable development goals.</li> <li>• Promote capacity training and motivate women MSMEs to learn and use apps, mobile and digital platforms for their business (B2B, B2C). The use of digital platforms may offer women many additional opportunities, including the possibility to overcome challenges related to physical immobility, access to new markets, to knowledge as well as flexibility in working time and supplementing household income.</li> <li>• Digitize business registration procedures and license fee payments.</li> </ul>
<p><b>New jobs and flexible job potential</b></p>	<ul style="list-style-type: none"> <li>• Promote flexible working arrangements and online talent platforms: As physical and organizational boundaries are</li> </ul>

	<p>becoming increasingly blurred, organizations will have to become significantly more agile in the way they think about managing women’s work and about the workforce. Businesses will increasingly connect and collaborate remotely with women freelancers and independent professionals through digital talent platforms.</p>
<p><b>Social networks that empower women</b></p>	<ul style="list-style-type: none"> <li>• Promote internet safety for women and girl by tackling all forms of violence against women through social media tools: Social media tools have helped female victims to share their experiences of violence with other victims, creating a space to exchange knowledge and information on their rights, legal processes and welfare services.</li> <li>• Promote Hashtag activism that bring women’s issues to the forefront of political agendas: Hashtagactivism has helped to mobilize public attention on women’s rights, increasing the visibility of issues that are under-reported in mainstream media. For example, UN Women’s successful and high-profile #HeForShe campaign further highlights the potential of social media to attract new and larger audiences: the campaign engaged more than 1.2 billion people, putting the global spotlight on the need to engage men and boys to achieve gender equality.</li> <li>• Involve a cross-sector of actors, including grassroots women’s networks, traditional media and men: Social media campaigns need to build on and collaborate with local women’s movements in order to strengthen advocacy efforts. In particular, linking social media with traditional media can scale up campaigns. Moreover, involving men and other nontraditional partners can reinforce the message and help</li> </ul>

	<p>campaigns attract greater attention both locally and globally.</p>
<p><b>Global trends in supporting women and girls in ICT</b></p>	<ul style="list-style-type: none"> <li>• Make endeavors in alignment with the related UN' SDGs, including: <ul style="list-style-type: none"> <li>➤ SDG5b: Enhance the use of enabling technology, in particular information and communications technology, to promote the empowerment of women.</li> <li>➤ SDG9c: Significantly increase access to information and communications technology and strive to provide universal and affordable access to the Internet in least developed economies by 2020.</li> <li>➤ SDG1.4: By 2030, ensure that all men and women have equal access to basic services and appropriate new technology.</li> <li>➤ SDG17.18: By 2020, enhance capacity-building support to developing economies, including for least developed economies and small island developing states, to increase significantly the availability of high-quality, timely and reliable data disaggregated by gender</li> </ul> </li> <li>• Encourage the collection of statistics data and researches that identify the connection between women digital inclusion and economic growth in APEC region with a view to raising awareness among the business leaders.</li> </ul>

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